DISSERTATION

INTERGENERATIONAL CONTINUITY IN DEPRESSIVE SYMPTOMS AND SUBSTANCE USE BETWEEN FATHER AND CHILD: THE ROLE OF WARMTH

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ABSTRACT

INTERGENERATIONAL CONTINUITY IN DEPRESSIVE SYMPTOMS AND SUBSTANCE USE BETWEEN FATHER AND CHILD: THE ROLE OF WARMTH

Continuity of adolescent substance use and depression across generations has been established and confirmed empirically, yet our understanding of the key drivers of intergenerational continuity remains limited. The present study tested the notion that father-child warmth, a factor closely tied to attachment security and child psychosocial development, may mediate the relationship between a father's own experiences with substance use and/or depression and the development of these problems in his child's adolescence. This path analysis examined two key intergenerational patterns: the intergenerational quality of parent-child warmth, and the intergenerational continuity of depressive symptoms and substance use between fathers and their adolescent children. Results showed that G2 adolescent experience of caregiver warmth was a strong predictor of depressive symptoms and substance use across developmental stages. In the case of G2 adolescence, both the child and parent reports of warmth served as significant predictors, with some variability. Second, while father-child warmth across the G1-G2 and G2-G3 generations were correlated, parental warmth did not demonstrate strong intergenerational continuity. Third, depressive symptoms negatively impacted paternal report of G2 (adult) warmth, while paternal substance use had a marginally significant association with both father and child report of warmth. Fourth, G3 adolescent report of both caregivers' warmth significantly predicted adolescent depressive symptoms, whereas only G3-reported OCG warmth predicted G3 adolescent substance use. Other nuances in the results, relating to covariates and

the differences between maternal and paternal behavior and psychopathology, were also discussed. The study's limitations, implications, and future directions were further outlined and explored.

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Introduction

Health behaviors and conditions often repeat across generations (Schickedanz, Halfon, Sastry & Chung, 2018). This observation, often referred to as intergenerational continuity, continues to be studied in earnest with the multifaceted aim of improving how and when families might disrupt maladaptive patterns, promote optimal health and psychological well-being, and increase resilience to robust risk factors. Aspects of temperament (such as self-regulation; Bridgett, Burt, Edwards & Deater-Deckard, 2015), violence and criminal offending (Widom & Wilson, 2015; Besemer, Axelsson & Sarnecki, 2016), partner-relationship instability (Amato & Patterson, 2017), psychological health (such as mood and anxiety disorders; Starr, Conway, Hammen & Brennan, 2014), and health behaviors (such as substance use and misuse; Knight, Menard & Simmons, 2014) have all demonstrated intergenerational continuity through years of investigation. Continuity of many harmful conditions and behaviors continues to be observed empirically and anecdotally; therefore, extending and refining our knowledge of the key drivers of continuity is tremendously important.

Adolescent depression and substance use are some of the most costly public health concerns, at both the individual and societal level (see Torio et al., 2015), and intergenerational continuity in both of these conditions has been established across various studies (e.g., Hammen, Shih & Brennan, 2004; Chassin, Rogosch & Barrera, 1991; Henry & Augustyn, 2017; Knight, Menard & Simmons, 2014). For example, Merikangas and colleagues (1998) illustrated that family history of substance abuse is one of the most robust predictors of familial substance use problems, with results indicating an 8-fold increased risk of substance use disorders in relatives of individuals with drug disorders. This has been confirmed more recently, with Steinhausen,

Jakobsen, and Munk-Jorgensen (2017) also reporting significantly higher rates of substance use disorder in individuals with familial history of substance use disorder. Similar trends in heritability have also been found for depressive symptoms (Merikangas, Prusoff & Weissman, 1988; Pilowsky et al., 2008), with research teams repeatedly illustrating that parental depressive symptoms are a robust risk factor for depressive symptoms in adolescent offspring (Mason, Chmelka, Trudeau & Spoth, 2017; Garber & Cole, 2010).

Genetics, social competence, disrupted family relationships, and other psychosocial factors have all been implicated as drivers of the intergenerational continuity of these conditions (Garber & Cole, 2010; Hammen et al., 2004; Silberg et al., 2010). These mechanisms have often been assessed in conjunction with the examination of parenting correlates (see Capaldi, Kerr & Tiberio, 2017) to ascertain whether depression and substance may be perpetuated via impaired parenting and/or parent-child relationship characteristics. Key elements of parent-child attachment, in particular, demonstrate predictive ability of adolescent development of health risk problems, like those of depressive symptoms and substance use. For example, insecure attachment and lack of parental warmth predict adolescent psychopathology, including both internalizing and externalizing problems (Muris, Meesters & van den Berg, 2003). Because research findings remain mixed regarding which parenting variables represent the most robust predictors of adolescent psychological and behavioral adjustment (e.g., Pinquart, 2017) and whether certain variables are more salient to mothers versus fathers, more work is needed. Warmth, a measure of positive feelings of acceptance and affection, appears to be one promising aspect of the parent-child relationship dynamic which may play a key role in the transmission of risk for health risk problems (Eiden et al., 2007).

Despite the importance of considering both mothers' and fathers' roles in the transmission of these problems, the extant literature has only just begun to fully examine the father-child relationship after decades of a relatively narrow focus on maternal factors. This limited empirical focus on fathers in the parenting role is likely due, in part, to social and institutional attitudes (e.g., the assumption that the father should function as the sole family bread-winner) that have historically reduced the amount of time fathers spend in the parenting role (Pleck & Masciadrelli, 2004). As the sociopolitical landscape has changed, however, researchers have recognized the important role that fathers play in the health and development of their families, and a thorough examination of paternal effects on family and child health/functioning is warranted.

Thus, my dissertation has two specific aims. First, I will quantify the degree of intergenerational continuity in depressive symptoms and substance use among an ethnically/racially and socio-economically diverse sample of fathers and their first-born child. Second, I will examine parent-child warmth as a potential driving mechanism of intergenerational continuity in depressive symptoms and substance use. This study is rooted in life course theory, as well as parental acceptance-rejection theory (PARTheory), and attachment theory. Undergirding the study is the fundamental belief that damaged or insecure parent-child relationships (theoretically resulting from salient parenting factors related to affection/warmth) repeat across generations, result in intrapsychic dysfunction (i.e., emotion dysregulation, attachment insecurity), and subsequently, lead to engagement in maladaptive coping such as rumination/internalization of distress (i.e., depressive symptomatology) and externalizing behaviors such as using substances.

The following sections will describe relevant extant literature that supports the need for the present study. First, I will provide justification for the focus on preventing adolescent psychological and behavioral health problems, including the lifelong personal and societal consequences that these problems impart. Second, I will review existing literature that establishes intergenerational continuity of parenting, depressive symptoms, and substance use problems, with an emphasis on why father-child continuity is important and in need of additional attention. Third, I will demonstrate how warmth has emerged as a promising potential mechanism of this intergenerational continuity, followed by theoretical perspectives that provide additional support to my hypotheses. Finally, I will discuss cultural diversity as an issue that is sorely lacking from research in this area of study, and address how the present study might augment the literature on understudied populations. Following the review of the pertinent literature, I will state hypotheses and describe the proposed methodology for testing them empirically.

Importance of Adolescent Psychological and Behavioral Health

The period from late childhood into adolescence is characterized as a critical, often confusing and tumultuous, time of rapid changes at both the biological and psychosocial level. Adolescents are faced with the task of achieving competence in multiple contexts, which include interpersonal, academic, and intrapersonal, and behavioral goals. Biologically, the adolescent brain undergoes considerable neurological rewiring and reorganization, particularly in the frontal lobes (Ogden & Hagan, 2018). Cognitive and emotion regulation skills begin to mature, in addition to the foundations of formal operational abilities that include problem-solving, creative and abstract thinking, and planning for the future (Steinberg, 2005). Socially, during this period, youth seek out greater autonomy and are developing their sense of self and their place in the

world (Crocetti, 2017). According to Erikson's psychosocial developmental model (1968), adolescence represents one of eight developmental stages in which individuals assemble and mature their personality within the context of key relationships. Pittman, Keiley, Kerpelman, and Vaughn (2011) highlight that Erikson's theory can further be understood by integrating attachment theory (Bowlby, 1969; Ainsworth, 1979) such that an adolescent's success in fostering intraindividual and interpersonal identities is influenced by the attachment-based representations of the world developed within significant caregiver relationships.

The various life situations that adolescents endure present challenges that can pose a significant threat to adolescent health and well-being, especially if a youth is already disadvantaged or ill-equipped with adequate coping skills. Further, it may be that during the transition from childhood into adolescence, youth require greater external reinforcement of their individual competence, as they enter and must assimilate into new territories (both social and academic, for instance). Developmental transitions, by nature, create uncertainty and subsequently, at times, feelings of inadequacy (but also feelings of anticipation of new possibilities; see Ruble 1994). Characteristics of the family domain, and especially parent-child dynamics, are instrumental during this developmental transition and can promote emotional and psychological health that facilitates smooth entry into the next phase of life.

Psychological health during adolescence can be thought of as an individual's ability to appropriately adapt to biological and emotional changes and to be capable of maintaining emotional and psychological stability (Yahya, Zulkefly & Baharudin, 2018). On the other hand, poor psychological health is exemplified by poor problem-solving and stress-management skills that may manifest as antisocial behavior, psychological disorders (such as anxiety and depression), and substance use. Moreover, disruptions to adolescent mental health can impede

successful negotiation of social relationships (i.e., friendships) and hamper school performance, thereby negatively affecting one's lifelong developmental trajectory (Fergussion & Woodward, 2002; McLeod, Uemura & Rohrman, 2012).

Two specific and alarmingly common markers of poor adolescent mental and behavioral health are depression and substance use. In the U.S., substance use during adolescence remains quite frequent, with 59% of teenagers having consumed alcohol by the time they graduate high school and 36% percent having consumed marijuana by the end of grade 12 (Johnston et al., 2018). These rates are troubling, considering that substance use during youth results in substantial costs at the individual and societal level (Hussong & Chassin, 2004; Sacks et al., 2015). During adolescence, the brain undergoes maturation that may be disrupted by substance use, leading to deficits in working memory, problem-solving, socioemotional processing, and other cognitive functions (Squeglia & Gray, 2016; Spear, 2016). There is some evidence that adolescent exposure to cannabis contributes to functional impairment, including problems with attention, memory, and processing speed, that is not associated with adult-onset cannabis use (Levine, Clemenza, Rynn & Lieberman, 2017). Consequently, academic impairment, psychosocial difficulties, precocious life transitions, and risks for physical injury and/or death increase substantially in the context of adolescent substance use (Hall et al., 2016; Krohn, Lizotte & Perez, 1997; Trim, Meehan, King & Chassin, 2007).

Depression is also widespread and pervasive among U.S. adolescents (Twenge, Joiner, Rogers & Martin, 2018). According to the SAMHSA (Substance Abuse and Mental Health Services Administration, 2018), 3.5 million adolescents reported having a major depressive episode in the past year, with over two thirds of these youth experiencing severe impairment related to the depressive episode. This equates to about one in seven adolescents reporting

distress and/or impairment related to depressed mood, loss of interest in daily activities, hopelessness, and problems related to sleep, appetite, energy, motivation, concentration, and self-esteem. The repercussions, both concurrent and life-long, of adolescent depressive symptomatology are nontrivial; depressive symptoms often co-occur with substance use (Mojtabai, Olfson & Han, 2016), and they predict functional impairment (leading to school dropout and unemployment) and social impairment (resulting in loneliness and lack of social support) (Clayborne, Varin & Colman, 2018; Quiroga, Janosz, Bisset & Morin, 2013). Depressive symptoms, once prevalent during adolescence, demonstrate considerable lifetime continuity; that is, depressed adolescents often go on to experience depressive episodes repeatedly in adulthood (Wilson, Hicks, Foster, McGue & Iacono, 2015). This chronicity is unfortunately associated with further adverse psychosocial outcomes, such as occupational and interpersonal impairments, that contribute to significant societal and personal costs (McLeod, Horwood & Fergusson, 2016; Fletcher, 2013). Clearly, due to the detrimental costs and consequences associated with adolescent depression and substance use, the examination of key risk and protective factors continues to merit attention in current research.

Father-Child Transmission of Mental and Behavioral Problems

Risk for adolescent development of depressive symptoms and substance use is heightened by family history of these very conditions (Mikkonen, Moustgaard, Remes & Martikainen, 2016; Knight, Menard & Simmons, 2014). Although maternal depressive symptoms seem to have a stronger effect on child outcomes relative to fathers', an independent effect of paternal depressive symptoms on child mental and behavioral outcomes exists (Narayanan & Nærde, 2016; Grossman, Grossman, Kindler & Zimmerman, 2008; Mikkonen, Moustgaard, Remes & Martikainen, 2016). For example, the authors of two meta-analyses

demonstrated that paternal symptomatology was significantly associated with offspring psychopathology, particularly for internalizing symptoms (Connell & Goodman, 2002; Kane & Garber, 2004). Results of another study also indicated that fathers' depressive symptoms predicted adolescent outcomes (Reeb et al., 2010), further illustrating the intergenerational risk of depressive symptoms between fathers and their children. In more recent work by Cheung and Theule (2019), the effect size of the relationship between paternal depression and child externalizing behaviors was found to be small but significant (r = .15), supporting the notion that paternal depression may predict or co-occur with child mental and behavioral problems. Thus, identification and confirmation of the influential and pervasive effects of paternal depression which are unique and separate from maternal effects, highlights the need for greater research emphasis on father-child transmission of these internalizing symptoms.

While risk of child maladjustment may depend on a match between parent and child sex (e.g., Christensen & Bilenberg, 2000), increased depressive symptoms have been observed in both male and female children of fathers who have drinking problems (Chen & Weitzman, 2005). In other research, paternal substance use predicted offspring development of substance use symptomatology independently from maternal substance use history (Walden et al., 2007). A robust and consistent association has been found between paternal substance use and adolescent risk of initiation and escalation of substance use (e.g., Grant et al., 2015; Chassin et al., 1993). Not only do parental depressive symptoms and substance use impart risk to offspring when they occur in the parenting role, these issues have also been shown to carry implications for offspring even when they occur prior to parenting. Bailey and colleagues (2013) found that drug use disorder in early adulthood affected later parenting practices, with parent negative emotionality emerging as a facilitator of the association between prior drug use disorder and child

externalizing problems. In a separate study that focused on depression, men who were formerly depressed endorsed worse parent-child outcomes on four of five variables (such as parental acceptance, psychological control, parental criticism, and chronic family stress) (Herr, Hammen & Brennan, 2007). These studies indicate a potential causal pathway from prior mental health problems to later psychosocial and family functioning indicators. Thus, the presence of previously elevated health risk problems may carry important implications for later parent health and behavior, and consequently, for children.

Intergenerational Continuity of Parenting Behaviors

Intergenerational continuity has been established across many health risk problems, and parenting practices and qualities have frequently been explored as key mechanisms of transmission (Patterson, 1998). Parenting behaviors themselves appear to repeat across generations, with some research teams finding somewhat modest, but significant, direct effects of parents' own experiences of being parented on how they come to conduct themselves and engage with their children (e.g., Neppl, Conger, Scaramella & Ontai, 2009; Pears & Capaldi, 2001; Brown, Kogan & Kim, 2018). In fact, in one study, researchers found only a direct effect (ostensibly via social learning within the immediate parent-child relationship) of parenting problems from one generation on to the next (Conger, Neppl, Kim & Scaramella, 2003). However, this study examined only continuity of angry, aggressive behaviors, and other research teams have observed indirect effects of continuity via various mediators, which are mentioned below. Overall, the observed continuity of parenting across generations appears consistent and robust, considering it has been identified across diverse study populations, geographic settings, and measurement approaches (Conger, Belsky & Capaldi, 2009). Clearly, parenting in one generation is associated with how the next generation parents their own children.

A large majority of work in this area of research has focused on the transmission of harsh and/or neglectful parenting, although positive parenting has also been investigated. For example, Neppl, Conger, Scaramella, and Ontai (2009) illustrated intergenerational continuity of both harsh and positive parenting behaviors; they also evaluated the role of externalizing behaviors in facilitating this continuity, finding that if a youth experienced harsh (i.e., angry, hostile, uncaring) parenting they were more likely to demonstrate antisocial behavior during their transition to adulthood, which then predicted their own harsh parenting of their children. In terms of positive parenting continuities, Neppl and her research team identified academic attainment (a consequence of positive parenting during one's childhood) as a mediator of the relationship between positive parenting in two adjacent generations. This finding was confirmed in a review by Conger, Belsky, and Capaldi (2009) which illustrated the mediating role of academic and social competencies in intergenerational continuity of positive parenting (see also Shaffer, Burt, Obradovic & Masten, 2009). Moreover, Chen and Kaplan (2001) found that psychological state (i.e., distress, psychological disturbance), interpersonal relations, and social participation mediated the intergenerational continuity of responsive and consistent parenting, highlighting that poor parental mental health (i.e., negative psychological state) may decrease positive parenting attributes later in time.

It may be that genetic underpinnings account for at least some of the continuity of parenting between generations; however, in the interest of identification of modifiable mechanisms that transmit maladaptive patterns over generations, focusing on behavioral markers of parenting, for example, will likely prove more fruitful in the realm of public health and behavioral health intervention. In fact, according to some, parenting results more so from socialization than purely genetics (Conger, Schofield & Neppl, 2013), and the identification of

multiple mechanisms discussed above offers a variety of promising avenues for intervention. Notably, there have been mixed findings in the literature when it comes to intergenerational continuity of parenting for mothers compared to fathers, leading to uncertainty about the salience of positive versus negative behaviors or the importance of developmental timing of parenting behavior for mothers and fathers (Capaldi et al., 2003; Belsky, Jaffee, Sligo, Woodward & Silva, 2005). Thus, identification of robust, potentially malleable intermediate mechanisms of intergenerational continuity of paternal parenting qualities is a worthy goal for those interested in interrupting unhealthy iterations of parenting behaviors that lead to adverse developmental and behavioral outcomes.

Identifying Potential Mediators of Father-Child Intergenerational Continuity of Behavioral Health Problems

Additional examination of mediators of the transmission of one generation's parenting to the next—which also appears to predict intergenerational continuity of problem behaviors (such as substance use) and internalized distress (in the form of depressive symptoms)—is needed to confirm and extend prior findings. Moreover, specifically focusing on the father-child relationship in this context will contribute to the extant, growing literature on fathers after years of myriad studies on mothers. It stands to reason that manifestations of paternal symptomatology inevitably carry into their interactions and behaviors within the family domain, potentially in the forms of affective reactivity, insensitivity, or internalization (which may read as psychological unavailability to offspring), for example. As evidenced above, children of psychologically-compromised fathers are more likely to have disrupted or unhealthy developmental experiences, such as maladaptive stress-coping, that predispose them to health risk problems in adolescence (Cummings & Cicchetti, 1990).

More specifically, various research teams have begun the crucial work of identifying the mechanisms that facilitate the transmission of behavioral health problems between fathers and adolescent offspring. In general, there is evidence that high quality father-child relationships are associated with reduced substance use behaviors in offspring, above and beyond the contribution of mother-child relationship factors (Bronte-Tinkew et al., 2006). Eiden and colleagues (2016) pointed out the influential role of various parenting behaviors along the pathway from paternal alcohol use and depression to adolescent alcohol use. Across a series of related studies, this research team identified parental warmth and sensitivity as a key mediator of the relationship between parent alcoholism and child self-regulation at age 2 (see Eiden, Edwards & Leonard, 2007). Eiden and colleagues' (2016) study, while unquestionably valuable in the pursuit of clarifying key developmental pathways to adolescent substance use, did not examine warmth/attachment beyond early childhood/infancy and did not examine outcomes other than child externalizing behavior and adolescent alcohol use. In an earlier study by Bailey, Hill, Oesterle, and Hawkins (2009), results supported the link between harsh parenting and child externalizing problem behaviors, though the hypothesis that parental monitoring would account for these behaviors was not supported.

These gaps and inconsistencies represent opportunities for more work aimed at determining whether these, or similar, pathways can explain child internalizing problems and/or other externalizing behavior. Because parental warmth is so highly implicated in healthy child development, and due to the mounting evidence that it may help explain a multitude of adverse adolescent outcomes, the present work will focus on paternal warmth as a key mechanism that may potentially be driving the intergenerational continuity of depressive symptoms and substance use.

Warmth

Parental warmth constitutes behaviors that are supportive, accepting, and affectionate. Maccoby and Martin (1983) described these behaviors as contributing to the formation of an affective relationship quality between parents and their children. Conversely, parental rejection can be thought of as the withdrawal or warmth, acceptance, and affection from children and is a robust, cross-culturally relevant predictor of poor psychological adjustment (Rohner & Khaleque, 2002). Parental warmth, broadly, has been found to protect against risk factors such as poverty, parental depression, and harsh discipline (Pittman and Chase-Lansdale, 2001 as described in Bodovski & Youn, 2010). It has also been shown to help facilitate youth's recovery from physiological and affective stress (Lippold, Davis, McHale, Buxton & Almeida, 2016). This positive parenting characteristic represents an essential factor that contributes to healthy child development and promotes multiple aspects of well-being (i.e., flourishing) across the life-course (Chen, Kubzansky & VanderWeele, 2019).

Some theoretical perspectives have proposed that fathers' parenting role tends to be more instrumental in encouraging child exploration and play, while mothers carry greater importance in their ability to provide emotional security (e.g., Paquette, 2004). However, various studies have demonstrated that paternal nurturance and warmth are key independent predictors of child outcomes (Veneziano, 2003; Khaleque, 2013). For instance, in one study fathers who had above-average scores on adolescent report of parental love, acceptance, involvement, and closeness, were most likely to have children that reported higher self-esteem, less depression, and greater life satisfaction (del Barrio, Holgado-Tello & Carrasco, 2016). Consistent with these findings, Daniel, Madigan and Jenkins (2016) illustrated a significant association between paternal warmth and child prosocial behavior. Furthermore, del Barrio, Holgado-Tello and Carrasco

(2016) also demonstrated that warmth applied consistently across child development mitigated some of the severity of parental depression, and that this effect did not vary across child sex. In terms of lack of warmth as a risk factor, other research teams have also illustrated that father-child relationships high in hostility and low in warmth predicted greater risk of adolescent engagement in illicit drug use (Parker & Benson, 2004).

It is worth noting that some findings have conflicted with the aforementioned conclusions about paternal warmth, pointing to the potentially protective effects of maternal warmth and sensitivity that may mitigate negative effects that arise within the father-child relationship (Eiden et al., 2007). However, in one study, paternal warmth, but not maternal warmth, during childhood was shown to enhance empathetic concern (a correlate of social communication and prosocial behavior) in early-mid adulthood (Tabak et al., 2016). More work is needed to firmly establish whether there are unique effects associated with paternal warmth that remain when controlling for the child's relationships with his or her mother. The present study identifies paternal warmth as a potentially decisive parenting variable during the transition to adolescence which might successfully predict adolescent offspring's risk of perpetuating familial patterns of substance use and depressive symptoms.

Unfortunately, the influence of paternal warmth has been understudied (Lee, Pace, Lee & Knauer, 2018). Moreover, the ways in which fathers' own health and well-being impact their parent-child warmth is important to consider. Fathers' psychopathology and/or substance use likely impact their ability to form close, warm, trusting relationships with their children. For example, in their study on the effects of paternal depression on parenting, Wilson and Durbin (2010) reported that depressive symptoms in fathers predicted lower levels of positive parenting behaviors, with warmth, sensitivity, and responsiveness among the most common measures of

these parenting variables. In addition, in the work by Eiden and colleagues (2016), parental warmth emerged as a key mediator of the effect of father's alcohol use on adolescent behavioral health behavior (i.e., adolescents' own alcohol use), although controlling for maternal warmth reduced the strength of this effect alone. In other words, paternal alcohol abuse has been shown to be associated with lower warmth and sensitivity in father-child interactions (Eiden et al., 2004, 2006). Considering these findings, and the fact that parental warmth appears to be protective against offspring substance use and depression (Chen, Kubzansky & VanderWeele, 2019), warmth in the father-child relationship that is disrupted by paternal psychopathology may lead to the development of mental health problems and health risk behaviors in the next generation.

The issue of reporting is highly relevant to the measurement of parental warmth. In general, parents may present their parenting behavior and characteristics in a more positive light (although this may be less applicable to positive parenting variables, such as warmth; Bornstein et al., 2015), leading to inconsistencies with their child's report of the same parenting factor. Indeed, for some family processes, low correlations between parent and child reports have been observed (Krohn, Stern, Thornberry & Jang., 1992). For example, in the literature on parental monitoring, substantial discrepancies are evident between parental versus adolescent reports (e.g., Reynolds, MacPherson, Matusiewicz, Schrieber & Lejuez, 2011), and adolescent reports have been shown to hold more predictive strength than parents' for this behavior (Kerr & Stattin, 2000). There is some evidence that when adolescents view parenting behavior or attitudes more negatively than parents report, they are more likely to show greater aggression and externalizing behaviors (Dimler, Natsuaki, Hastings, Zahn-Waxler & Klimes-Dougan, 2017). This highlights the importance of adolescent subjective reports when considering whether and how parenting predicts offspring psychological and behavioral outcomes. Historically, studies on

warmth/attachment have been limited to including only the child's report of how the parent and/or parental relationship is perceived. However, the results of a study by Chassin and colleagues (1998) suggest that there are method effects based on who is reporting the parenting behavior (parent versus child), if it is not directly observed (by an "objective" interviewer/observer). Clearly, measuring both parent and child reports would strengthen measurement validity and add nuance to results by identifying discrepancy or correspondence among perceptions.

Theoretical Framework

The theoretical frameworks informing the present study include parental acceptance-rejection theory (PARTheory; Rohner, 2004), life course theory (Elder, 1998), and attachment theory (Bowlby, 1969; Ainsworth, 1979). These theories contribute meaningful perspectives that inform and guide the focus of the current study on key intergenerational transactions and patterns that ultimately result in adverse adolescent mental and behavioral health outcomes.

PARTheory, and specifically its coping subtheory, takes a lifespan approach informed by socialization theory to answer how children's experience of parental acceptance (and its opposite, rejection) influences emotional and behavioral resilience in later stages, such as adolescence and adulthood (Rohner, Khaleque & Cournoyer, 2012). The coping subtheory contends that childhood experiences of parental love and acceptance lead individuals to be more resilient and more effective at emotional coping. More specifically, PARTheory focuses on the warmth dimension of parenting (defined by the affectional bond between parents and their children), and how the opposite quality of parental warmth (cold, unaffectionate, indifferent, and/or hostile expression of parental rejection) leads to intermediate factors (e.g., social-cognitive resources) that promote or deteriorate one's resilience and psychological health. Thus,

parental warmth, and the lack thereof, carries enormous implications for individual and familial health.

Life course theory arises from sociological and psychological theories of individual and family development, and it provides a guiding framework based on the key principles of historical time and place, timing, linked/interdependent lives, and human agency (Elder, Moen & Luscher, 1995). Elder's theory helps researchers to think about how individual outcomes are shaped by life experiences, and particularly those experiences that stem from the "hardship adaptations of people who were important in their lives" (Elder, 1998, p. 4). This theory highlights the importance of considering developmental timing and the interdependence inherent to human relationships, and it is supported by a large body of research which has demonstrated that family characteristics occur in patterns, repeating across generations. The linked lives perspective from Elder's life course theory underscores the intricately intertwined nature of the family system. This principle emphasizes that human development is considered a life-long process (Bengtson, Elder & Putney, 2012). Therefore, events, behaviors, and interpersonal relationships at one stage (e.g., childhood) set into motion outcomes in later developmental periods (e.g., adolescence, adulthood), which may then be understood as the result of cumulative experience. Thus, children's lives are embedded in the context of the lives of their family members across generations, and events at the parent level, across their own lifelong development, subsequently impact child outcomes (e.g., Yuan, 2008).

As such, aspects of parental life, including health markers and making successful (or unsuccessful) life transitions have important effects on child development. Moreover, shared family histories may perpetuate certain conditions or behaviors. For example, if a father learned to cope with parent-child discord by engaging in substance use or internalizing negative affect,

the next generation might inherit these patterns through observation and via the recurrence of discord within their own caregiver relationships. Thus, it reasonably follows that a father who experienced low levels of attachment/parental warmth in his own caregiver relationship will be impacted in ways that affect later experiences of adversity that carry into the lives of his children via characteristics of his parenting. One additional theory outlined below adds further evidence that disruptions to the parent-child relationship will lead to increased risk of adverse child outcomes, such as psychopathology and/or maladaptive coping.

Attachment theory (Bowlby, 1969; Ainsworth, 1979) rounds out the theoretical underpinnings of the present study by further explicating why warmth in the parent-child relationship might mediate the intergenerational transmission of health risk problems of depression and substance use. This theory offers the perspective that caregiving relationships influence psychosocial functioning by shaping the cognitive representations that individuals develop about relationships and self. The role of caregiver warmth in these relationships is paramount within this theoretical approach, with emotional warmth and responsiveness within the parent-child relationship fostering attachment security in the child, which leads to enhanced adjustment within socioemotional, cognitive, and health domains (see also Cummings & Miller-Graff, 2015). It is well-established that children who feel secure in their parent-child attachments are more adept at regulating emotion and coping with stressors (Brumariu, 2015), and, they endorse greater competence in both peer and academic settings (Diener, Isabella, Behunin & Wong, 2008). Supportive father-child relationships provide opportunities for children to cultivate the skills and resources necessary for successful transitions between developmental stages and other challenging/stressful situations.

In the maltreatment literature, insecure attachment has been shown to predict poorer emotion regulation, which then leads to more severe psychopathology (both internalizing and externalizing symptoms; Alink, Cicchetti, Kim & Rogosch, 2009). In another study, Boldt, Kochanska, Grekin, and Brock (2016) found that avoidant attachment behaviors were greater within father-child, compared to mother-child, relationships. Avoidant attachment styles develop at first as an adaptation to perceived threats to the availability of an attachment figure, and results in the inhibition and denial of emotionally salient experiences in a developing child (Mikulincer & Shaver, 2019). Avoidant attachment patterns are associated with low heart-rate variability—a physiological measure of stress response that is higher in individuals with healthy emotion regulation abilities (Maunder et al., 2006). Thus, considering that avoidant behavior is associated with adverse psychological outcomes and engagement in externalizing behaviors, it may be that insecure (avoidant) attachment patterns within the father-child bond increase risk of mental and behavioral health problems by offspring. Attachment security, and associated attachment theory-related constructs, such as in the case of *secure base* and *safe haven,* have been studied for decades in application to very early childhood, but more recently, attention has turned to examining attachment in mid-late childhood, considering that attachment security may not be fully consolidated until late adolescence (particularly if changes in the caregiving environment occur; Groh et al., 2014).

In sum, based on the principles of PARTheory, life course theory, and attachment theory, should parental conditions or life events disrupt critical ingredients of healthy parent-child relationships (such as warmth and acceptance), child and adolescent development may be harmed. If effective emotion regulation results from a combination of individual temperament, key relationships in a child's life (and subsequent attachment security), and a socially-learned

understanding of how to manage and process emotions (Thompson & Meyer, 2007), it would be expected that a child whose father exhibits poor coping (via his depressed mood and/or reliance on substances to cope) would be at a severe disadvantage in acquiring emotion regulation strategies. Furthermore, father's maladaptive coping will be linked to his own embedded experiences within preceding generations (i.e., in his parent-child relationship, which is affected by his parents' trajectories and life events). This impairment would then explain the heightened risk of youth depression and substance use in adolescents whose fathers experience depressive symptoms and substance use.

Cultural Considerations

Little work to-date has specifically examined paternal characteristics along the cascade from generation to generation, likewise, replication of the extant studies in this area is needed in order to examine whether previously established intergenerational continuities (such as those established in the Iowa Youth and Families Project; Elder, 1994; Conger, Schofield & Neppl, 2013) are also found in more racially/ethnically diverse samples. According to PARTheory, (Rohner, Khaleque & Cournoyer, 2012) the importance of parental warmth (and its inverse, rejection) carries across cultures, due to its ubiquitous role in the sociocultural contexts of all cultures and societies. It holds that, although the social institutions and maintenance of family structure may vary cross-culturally, the effects of parental acceptance/rejection are directly observable on children's development of self (i.e., personality) and behavior. Thus, the effects of parental warmth should theoretically be observed in diverse, multicultural samples; unfortunately, very few studies have examined these research questions in such samples.

Many oft-cited studies have relied on overwhelmingly homogenous, White samples to examine intergenerational effects of paternal psychopathology, such as from the Family

Transitions Project (Conger & Conger, 2002) which had an ethnic composition of about 1% ethnic minority families. Also, Eiden and colleagues' (2016) study was 94% White (for mothers; 87% for fathers) and mothers and fathers were largely married to each other (88%). These studies cannot be assumed to be representative of families of more diverse race/ethnicity composition. Notably, Veneziano (2000) found that in a predominantly European American sample, only maternal warmth predicted youth psychological adjustment, whereas both paternal and maternal warmth predicted offspring psychological adjustment in a sample of African-American families. Interactions between race-ethnicity, paternal versus maternal roles, and rates of mental and behavioral health problems may also exist. For example, in a relatively recent study comparing mothers and fathers of African American youth, fathers were shown to exhibit gradually decreasing levels of warmth compared to the stability of this factor in mothers (Jaggers et al., 2017). Moreover, the knowledge regarding how parenting interacts with substance use and child development remains limited in diverse samples (e.g., Luck, Patock-Peckham & King, 2015). Combined with the relative dearth of longitudinal, multicultural investigations of intergenerational health, more research is needed to fill existing gaps in knowledge and examine samples that represent communities of minority race/ethnicity.

Present Study

The primary goal of the present study is to extend current knowledge regarding the intergenerational continuity of depressive symptoms and substance use between fathers and their adolescent offspring. Secondly, this study will seek to test the capacity of paternal warmth to account for intergenerational continuity of depression and substance use. By applying the present research questions to a diverse, multigenerational sample, patterns of continuity (and discontinuity) of paternal warmth and behavioral health problems can be observed. This

approach allows for the examination of how fathers' developmental course affects their parenting behavior, which likely holds implications for the development of their children's own development of psychosocial problems. Furthermore, should paternal warmth prove to serve as a significant predictor of adolescent behavioral health problems, it will add to the current state of evidence that informs targeted intervention and prevention efforts.

Research Questions and Hypotheses

The following research questions will be answered by this research project: 1. Does a father's experience of low parental warmth during adolescence predict his own reduced parent-child warmth during his child's transition to adolescence? 2. Does a father's experience of low warmth predict his elevated use of substances and elevated depressive symptoms during offspring's mid-late childhood? 3. Does a father's elevated substance use and/or depressive symptoms during offspring's mid-late childhood predict lower warmth when offspring is transitioning from childhood to adolescence? 4. Does lower paternal warmth during offspring's early adolescence predict greater engagement in substance use, and greater depressive symptoms, when offspring is in mid-late adolescence? 5. What is the effect within both of these models once maternal depression, substance use, and warmth toward child are introduced to the model? 6. Whose perception of parent-child warmth has greater predictive power of adolescent outcomes, child, father, or mother?

The a priori hypotheses are as follows, and are informed by the aforementioned bodies of work on this area of investigation:

1. Father's experience of low warmth during his adolescence will be associated with his own greater substance use and depressive symptoms during adolescence and once he becomes a parent.

2. Father's experience of low warmth in adolescence will predict his own low parent-child warmth when his first-born child is age 14.
3. Paternal substance use and depressive symptoms when the father's child is age 11 will predict lower warmth (measured by both father, child, and other-caregiver perceptions) at child age 14.
4. Lower father-child warmth will predict elevated child substance use and depressive symptoms during ages 15-17.
5. Child perception of parent-child warmth will have greater predictive power compared to fathers' report.
6. Intergenerational (IG) continuity in warmth from father to child will be observed, and will in part, account for IG continuity in substance use and depressive symptoms between father and child.

Method

Data

The data for this dissertation was drawn from the Rochester Youth Development Study (RYDS), a longitudinal cohort study, and its intergenerational extension (the Rochester Intergenerational Study, RIGS). The RYDS began in 1988 under a grant from the Office of Juvenile Justice and Delinquency Prevention (OJJDP). The study was designed to examine the development of delinquency and substance use in a high-risk sample of boys and girls in the 7th or 8th grade in Rochester, NY (n = 1000). Youth who were at high risk of antisocial behavior were overrepresented by oversampling males and adolescents residing in neighborhoods with higher resident arrest rates, based on police arrest data from 1987. As a result, the sample design overrepresented poor families, with 33% of head of households being unemployed and 40% relying on welfare at the start of the study. However, the sample was representative of the full socioeconomic spectrum for an urban population (Farnworth, Thornberry, Krohn, & Lizotte, 1994). The adolescents (referred to as Generation 2, or G2; primary caregivers of G2 are referred to as G1) were, on average, 13.6 years old at the start of the study, with 73% male, 68% Black, 17% Hispanic, and 15% white. Data collection consisted of face-to-face interviews, and attrition was relatively low, with almost 80% of the original adolescent G2 respondents retained at age 31. During Phase 1 of RYDS (the part of RYDS used in the proposed project), which began in 1988 and covered adolescence, participants and their primary caregiver were interviewed semi-annually nine times (average ages 14-18; referred to as waves 1-9).

The intergenerational component (RIGS) began in 1999 with the focal group being the first-born offspring of the original G2 adolescents from RYDS. This third generation, G3, began with the enrollment of 370 firstborn biological children in Year 1, with an average age of six

years old (with a range of 2 to 13 years old). Each subsequent year, new firstborn biological children of G2 participants were identified and invited to enroll when G3 turned two years old. The sample of G3 participants were evenly split by sex, 62% African American, 17% Hispanic, 12% white, and 9% mixed race. Upon enrollment of each G3 participant, and annually thereafter for a total of 20 years, G2, G3 (beginning at age 8), and G3's other primary caregiver (OCG) were interviewed. For the vast majority of children of G2 fathers (93%), the OCG was the G3 child's biological mother. For children of G2 mothers, the OCG were represented by grandmothers, biological fathers, stepfathers, aunts, and others. For a more detailed review of the RIGS project, see Thornberry, Henry, Krohn, Lizotte, and Nadel (2018). Data collection for the present sample was approved by the University of New York at Albany's Institutional Review Board.

Sub-sample for the current investigation

For the present investigation, the original sample was subset to include only G2 fathers (n = 353) who had at least some contact between G3 ages 11 and 17. Other caregivers of the target G3 sample were included in order to simultaneously consider substance use, depressive symptoms, and warmth toward G3 of the child's other caregiver. Thus, the analytic sample used in the present study included all G2 fathers for whom we have at least some of the measures of the target parenting and health behavior outcome variables (warmth, depressive symptoms, and substance use) during the target developmental periods (see below). The sample also included data from their first-born child (G3) and G3's other caregiver. Thus, the final sample size for the proposed analyses consisted of 302 father-other caregiver-child triads.

Measures

In this study, data was drawn from multiple time-points: G2 fathers' adolescence (ages ~13-15; waves three and five) and three developmental periods based on offspring's age: late childhood (G3 age 11); transition to adolescence (G3 age 14) ; and mid adolescence (G3 ages 15-17). Fathers' experience of low parental warmth in his relationship with his primary caregiver was measured when G2 was age ~13 (wave three). Assessments of paternal depressive symptoms and substance use were taken when G2 was in adolescence and when G3 was age 11. Paternal warmth (both parent and child report) was measured when G3 was age 14. Finally, adolescent depressive symptoms and substance use were measured when G3 age is between ages 15 and 17 (i.e., in mid-late adolescence). See Figure 1 regarding timing of the variables.

The conceptual model for the present study is depicted in Figure 1. The model reflects the expectation that parental warmth, depressive symptoms, and substance use will all demonstrate continuity across three (G1-G2-G3) generations. Specifically, low warmth within the focal parent-child relationship will predict greater G3 depressive symptoms and substance use during their mid-late adolescence, the intergenerational continuity of low parent-child warmth will help explain continuity of the two key health risk problems of depressive symptoms and substance use, and grandparent (G1) levels of warmth may indirectly influence G3 depressive symptoms and substance use via G2's depressive symptoms, substance use, and subsequent parental warmth.

G2 adolescent substance use. At wave five of RYDS (G2 age ~ 16), G2 adolescents responded to a series of items that inquired about their drug and alcohol use. First, they self-reported on whether they had used alcohol or cannabis since the date of last interview. If affirmative, they were then asked about frequency of use. If G2 reported at least monthly use in

the past year, they then responded to six additional items that indicate problematic consequences related to alcohol or cannabis use (e.g., increased tolerance, getting into trouble at school or with the police, not remembering the night before, getting into fights). Based on the responses across all of these items, a continuous measure of substance use was created such that 0=no use, 1= some use, but less than monthly, 2=monthly use without consequences, and 3=problem use (i.e., monthly use with endorsement of consequences).

G2 adolescent depressive symptoms. Around age 16 (wave five of RYDS), G2 adolescents responded to 13 items that asked about depressive and anxious symptoms since the date of last interview. Item responses ranged from 1 (never) to 4 (often), with some examples of items being: how often did you: "Feel depressed or very sad", "Toss and turn when you slept", and "Feel nervous or stressed". One of the original items was dropped for the present scale ("How often did you… feel hopeful about the future?) because this item did not correlate with the other items in the scale sufficiently. The mean response score was used to indicate depressive symptoms on a continuous scale. (Cronbach's alpha =.81).

Paternal (G2) experience of parental warmth. When G2 fathers were ages 14-15 (wave three of RYDS, ~age 15), they and their caregivers reported on 11 items adapted from the Hudson Index of Parenting Attitudes (Hudson, 1996). Each item asked about G2's relationship with their primary caregiver (G1 or OCG) and G1's relationship with their son (G2), with some examples including how often the subject would say, "you feel that you can really trust your [caregiver/son]", "you feel violent toward [him/her]" (reverse coded), "you feel proud of your [caregiver/son]". Each item score option ranged from 1 (never) to 4 (often). Greater scores indicate higher levels of warmth in the parent-child relationship as reported by the adolescent G2

respondents. Cronbach's alpha for this scale demonstrated good reliability (standardized alpha=.88 for G2 report and .83 for G1 report).

Parental depressive symptoms. Annually during RIGS, fathers (G2s) and OCGs completed a modified measure of the Center for Epidemiological Studies-Depression scale (CES-D; Radloff, 1977). The CES-D is a commonly used measure of depressive symptomatology within community samples and assesses depressive symptomatology rather than clinical diagnosis. Parents reported 19 different symptoms of depression (of the 20 original CES-D items, one was dropped due to respondents being confused about the language) that they had experienced within the past two weeks. Parents endorsed experiencing each symptoms on a scale from 1 (never) to 5 (always). The mean score across all 19 items was taken, with higher scores indicating greater depressive symptoms. Standardized alpha=.93 for fathers and .94 for OCGs.

Parental substance use. To measure substance use, fathers (G2s) and OCGs were asked to self-report whether they had used alcohol or cannabis since the date of last interview. If they responded yes, follow-up questions were asked targeting the frequency that they had used substances. Frequency scores were transformed to represent whether fathers and OCGs never used alcohol or cannabis (0), whether they endorsed any use (1), used more than once per month (2), used weekly (3), or used daily (4). The max score of either alcohol use or cannabis use was used to indicate substance use for G2 and OCG.

Parental warmth. Some evidence shows that child reports, as opposed to solely parental reports, of behavioral problems produce differential findings in the modeling of the association between harsh parenting and child outcomes (Mackenbach et al., 2014). Although there is evidence that child reports of paternal warmth are specifically associated with positive outcomes

(del Barrio, Holgado-Tello & Carrasco, 2016), the occurrence of discrepant reports between parent and child suggests that it is important to examine both parent and child perceptions in order to better establish which perspectives may hold more predictive capacity. Thus, due to the availability of father, OCG, and child reports of parent-child warmth in the present sample, all available measures were considered, which allowed for comparisons to be made about the salience of each reporter's (parent versus child) perception of this aspect of the parent-child relationship.

Child warmth toward one's parent was measured using 11 items adapted from the Hudson Index of Parenting Attitudes, which inquire about child's paternal attachment. Questions from this measure ask about whether the child enjoys or respects their father, and how well they get along. The responses can range from 1 (never) to 3 (a lot), with higher scores of the total sum of all item responses indicating greater levels of warmth felt from the perspective of the child. Standardized Cronbach's alpha for child reported warmth toward G2 was .88 and .86 toward OCG.

Parent's warmth toward his child was measured using 11 items adapted from the Hudson Index of Parenting Attitudes (Hudson, 1996). Each item assessed the frequency of expressing or feeling affection toward the child, with response options ranging from 1 (never) to 5 (always). Example items include: "you felt proud of your child", "you really enjoy your child", "You just do not understand your child" (reverse coded), "Your child interferes with your activities" (reverse coded). The total, continuous score summed from all item responses was utilized to represent paternal report of warmth toward his child. Standardized Cronbach's alpha for child reported warmth was .84 for fathers and .89 for OCGs.

G2 contact with G3. The amount of contact that father has with child was also included in the model. Contact was represented by a continuous variable that describes the highest amount of contact during the prior year: 0 = no contact, 1 = visits/phone calls, but no supervision, 2 = supervision 1-2 times per year, 3 = supervision less than monthly, 4 = supervision more than once per month, 5 = weekly supervision, 6 = lives (at least part time) with child. Scores of 0 (no contact) were dropped from subsequent analyses.

G3 adolescent depressive symptoms. At each year that G3 was between the ages of 14 and 17, depressive symptoms were assessed via 13 items from the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977), which addressed common depressive symptoms such as those indicating changes in sleep, mood, appetite, and concentration. Adolescent respondents reported the frequency of each symptom (from 0 = never to 3 = often) since the date of last interview. One item ("you felt hopeful about the future") was dropped due to low correlation with the overall scale, resulting in a final scale of 12 items. The average level of this score was taken across adolescent ages 15-17. Reliability of this scale across G3 ages 15-17 was found to be good (standardized alpha across ages ranged from .89 to .91).

G3 adolescent substance use. When G3 respondents were in their mid-late teens (15-17), they were asked a series of questions about their substance use. First, they self-reported on whether they had used alcohol or cannabis since the date of last interview. If yes, they were then asked about frequency of use. If adolescents reported they had used at least once a month in the past year, they then responded to nine additional items that indicate problematic consequences related to alcohol or cannabis use (see appendix). Based on the responses across all of these items, a continuous measure of substance use was created such that 0=no use, 1= some use, but

less than monthly (i.e., rare), 2=monthly use without consequences, and 3=problem use (i.e., monthly use with harmful consequences).

Control variables. G3 gender, paternal race, paternal birth year, paternal age at child's birth (because fathers with health risk problems may have children at younger ages; Miller-Johnson et al., 1999), paternal educational attainment (highest grade completed at wave 13; see Simons, Whitbeck, Conger & Wu, 1991), and neighborhood arrest rate during G2 adolescence (1987; because this was used as a stratification variable in initial sample collection) were included as covariates.

Analyses

First, the means, standard deviations, and bivariate correlations between all target variables were calculated. Cross-generation associations were inspected to identify intergenerational continuity or discontinuity of parent-child warmth, depressive symptoms, and substance use. Demographic variables were also observed in order to assess whether any had significant associations with both G2 and G3 predictor and outcome variables. A correlation matrix of the relationships among all variables can be found in Table 2.

Next, hypothesized relationships among variables were tested via path analysis using Mplus (Version 8; Muthen & Muthen, 2017). This methodological approach allows for the estimation of both direct and indirect effects simultaneously, and it also permits the inclusion of multiple independent (exogenous) and dependent (endogenous) variables (Stage, Carter & Nora, 2004). The model depicted in Figure 1 was tested. Please note that the conceptual model is a simplified version of the actual path model. Not pictured, for the sake of parsimony, is the inclusion of control variables. All endogenous variables were regressed on the covariates of race/ethnicity, child sex, paternal educational attainment, neighborhood arrest rate, and parent-

child warmth from G3's other caregiver. In addition, all endogenous variables measured after G2 adolescence were regressed on G2 age at the birth of G3. The slope of G3 depressive symptoms across ages 15-17 was not significantly different from 0, thus this value was fixed at 0 for the final analyses in order to eliminate residual variation.

Full Information Maximum Likelihood (FIML) estimation was utilized to account for missing data. FIML allows for the unbiased estimation of parameters (see Collins, Schafer & Kam, 2001) and is recommended for data with incomplete observations of variable indicators (Enders, 2010; Cham, Reshetnyak, Rosenfeld & Breitbart, 2017). Thus, missing data was properly handled under the assumption that all variables are normally distributed, linearly related, and the mechanism of missingness is accessible (i.e., other variables in the model). Also, in the final path models, bootstrapping was used to test direct and indirect effects. This resampling technique addressed the concern that, if the sampling distributions are not normal, inferences based on the parameter estimates may be biased (Wang & Wang, 2019). Using the CINTERVAL output command, non-symmetric bootstrap confidence intervals were generated based on 10,000 bootstrap resamples.

Results

Descriptive statistics

Table 1 includes the demographic makeup of the sample used for this study. Note: G2 (fathers) with no contact with G3 were removed from the sample.

Correlational analyses.

The correlation coefficients among all measures can be found in Table 2. Notably, G1 and G2 reports of parent-child warmth were moderately correlated (r= .25). Similarly, paternal report of warmth was strongly correlated with OCG reported warmth (r=.38). G2 and G3 reports of father-child warmth demonstrated small correlation strength (r=.13). G3 warmth toward OCG was strongly correlated with OCG reported warmth (r= .36). G2 depressive symptoms and substance use during his adolescence were both moderately negatively correlated with his report of caregiver warmth (see Table 2). Later during adulthood, paternal depressive symptoms were strongly and negatively correlated with G2-reported warmth (r=-.30), while paternal substance use had a moderate negative correlation with G2 warmth (r=-.21). G3 adolescent depressive symptoms and substance use were all moderately to strongly correlated across ages 15-17 (see table for exact values). Some of the covariates in the correlation matrix also demonstrated notable association strengths. Of note, G2 fathers' educational attainment and age at first birth were strongly correlated (r=.37). Arrest rate and Black race/ethnicity were moderately correlated, which is to be expected based on the sampling parameters of the RYDS/RIGS study design. For additional nuances and specific correlation coefficients, please refer to Table 2.

Path model.

The complete path model was tested including all variables across the three generations, and with endogenous variables regressed on control variables as described in the methods section. Model fit was evaluated based on chi-square ($\chi^{2)}$ values, Comparative Fit Index (CFI), Tucker-Lewis index (TLI), standardized root-mean-square residual (SRMR), and root-mean-square error of approximation (RMSEA) estimates. Model fit information indicated generally good fit to the data. Notably, the chi-square was significant, which is not unexpected due to having a sample size greater than 200 (Kenny, 2015). However, the RMSEA and SRMR values were both less than 0.08, the CFI was greater than .95 and the TLI was greater than .90, indicating acceptable fit (Hooper, Coughlan & Mullen, 2008; Hu & Bentler, 1999). ($\chi^2(124)=164.10$, p=.01; SRMR=.05; RMSEA=.03; CFI=.96; TLI=.92). Unstandardized regression coefficients are presented throughout the results below.

According to results, the first hypothesis was partially supported, in that G2's self-reported experience of warmth toward his primary caregiver during his own adolescence significantly predicted his level of depressive symptoms in adolescence (b=-.22, p<.01) and during parenthood (b=-.25, p<.05) and his substance use (b=-.25, p=.05) during adolescence, but not adulthood. Also, G1 report of caregiver-child warmth was a significant predictor of G2 adolescent (b=-.26, p<.05) and adult (b=-.74, p<.01) substance use. Of note, father's adult depressive symptoms (b=.37, p<.001) and substance use (b=.25, p=.01) were both significantly predicted by prior reports of these measures during adolescence, indicating substantial continuity of these health risk problems across developmental periods.

The second hypothesis was not directly supported. Namely, paternal (G2 adult) warmth toward his child was not significantly predicted by G2's own experience of warmth in his

caregiver relationship during adolescence, and there was no evidence of significant indirect effects via depressive symptoms or substance use. On the other hand, the third hypothesis was partially supported in that higher levels of paternal (G2 adult) depressive symptoms, but not substance use, significantly predicted lower levels of paternal warmth, as reported by G2 fathers (b=-.16, p=.01). Of note, paternal substance use during parenthood marginally predicted father-reported warmth, though this association did not reach significance (b=-.04, p=.06). Fourth, parent-child warmth, as reported by G3s toward both fathers and OCGs, significantly predicted elevated G3 depressive symptoms (toward father: b=-.29, p=.01; toward OCG: b=-.34, p=.01). Interestingly, neither paternal (G2 adult) report of parent-child warmth nor OCG report of her perceived warmth toward G3 were significant predictors of the level of G3 adolescent depressive symptoms. Further, results showed that for G3 adolescent substance use, only G3 report of warmth toward OCG significantly predicted level of substance use (b=-.28, p<.05). Thus, the overall hypothesis was only somewhat supported, and the specific expectation that paternal (G2 adult) report of warmth would predict adolescent offspring (G3) substance use did not hold to be true in our sample. However, the findings related to this fourth hypothesis speak to, and confirm, the fifth hypothesis. By and large, the child's (G3) perception of parent-child warmth significantly predicted G3 adolescent substance use and depressive symptoms, though for substance use, it was child's perception of the warmth toward OCG and not father that reached statistical significance.

Next, intergenerational transmission of depressive symptoms and substance use was assessed. Both direct effects (i.e., effects that do not pass through the intermediate variables in the path model) and indirect effects were examined. First, directs effects are presented. Intergenerational transmission of depressive symptoms was evident between G2 fathers and their

adolescent children (b=.18, p<.05) such that greater depressive symptoms in G2 fathers predicted higher depressive symptom endorsement by G3 adolescents. However, direct continuity of depressive symptoms during the adolescent stage was not evident. In other words, G2's own experience of depressive symptoms and substance use did not have a direct effect on his child's experience of these problems during the developmental period of adolescence. There was also no direct effect of father's adult substance use on his child's substance use, which was contrary to expectations.

With regard to indirect effects of intergenerational transmission, few of the proposed indirect effects designed to explain intergenerational continuity of substance use and depressive symptoms via warmth were found to be significant. Specifically, the total effect from G2 adult depressive symptoms to the level (intercept) of G3 adolescent depressive symptoms was significant (b=.22, p<.01), while the total indirect effect was not significant. Similarly, the total effect of G2 adult depressive symptoms on the slope of G3 adolescent depressive symptoms was significant (b=-.07, p= .03), whereas the total indirect effect was not significant, and the total effect of G2 adolescent depressive symptoms on the slope of G3 adolescent substance use was also significant (b=-.08, p<.05), whereas the total indirect effect was not significant. Meanwhile, the total indirect effect from paternal (G2 adult) substance use to the level of G3 adolescent depressive symptoms (b=.04, p<.05) was significant, while the total effect was not significant. The specific indirect effect from G2 adolescent depressive symptoms to G3 adolescent depressive symptoms via paternal (G2 adult) depressive symptoms was significant (b=.07, p<.05), while the total and total indirect effects were non-significant. All other effects (including total, indirect, and specific) were not significant for the model.

Recall, the slope of G3 adolescent depressive symptoms across ages was fixed at zero to reduce residual variation. Results showed that the only significant finding related to this outcome was the total effect of G2 adult depressive symptoms on the slope of G3 depressive symptoms (b=-.07, p<.05). Due to the fact that no other significant effects, direct or indirect, were found for G3 depressive symptoms, no additional statistics are presented. However, a few findings for the growth of G3 substance use were significant. First, the direct effect of G2 adolescent substance use significantly predicted the slope of G3 substance use in the negative direction (b=-.09, p<.01). Further, the total effect and direct effect of G2 adolescent substance use on the slope of G3 substance use was significant (b=-.08, p<.05 and b=-.09, p<.05, respectively), though the total indirect effect of this pathway was not significant.

Lastly, residual correlation coefficients from the path model showed that paternal (G2 adult) and OCG reported warmth were significantly correlated (r=.08, p<.001), OCG warmth reported by both OCG and G3 were significantly correlated (r=.06, p<.001), but G3 reported warmth toward both G2 and OCG was not significantly correlated with G2-reported warmth toward G3. There were several additional significant paths among key variables in the model and control variables. First, G3 adolescent report of warmth toward OCG was negatively predicted by G2 adult substance use (b=-.07, p=.05), and G3 child report of warmth toward his or her father was negatively impacted by having an OCG with higher depressive symptoms (b=-.13, p<.05). Secondly, G1 report of warmth was positively associated with Black G2 race/ethnicity (b=.17, p=.01). Also, G3 sex significantly predicted the intercept of G3 adolescent depressive symptoms, such that being male was associated with significantly lower levels of depressive symptoms (b=-.32, p<.001). And, the level of G3 adolescent substance use as predicted by Black race/ethnicity was marginally significant (b=-.27, p=.05). Lastly, G2's age at first birth was

significantly associated with educational attainment, with higher age at first birth predicting more years of education completed (b=.12, p<.001).

Supplemental analyses

Due to the fact that not all G2 fathers were partnered with G3's OCG, it was important to examine whether the effects of parental variables on G3 target outcomes varied substantially depending on parental partner status. To do so, sub-samples were created to compare families in which G2 and OCG were partnered to those families who indicated that G2 was not partnered with the G3's OCG at the time that warmth measures were taken (G3 age 14). Because this dramatically reduced the sample size, thereby diminishing the statistical power to re-analyze the path model, general comparisons among the levels of warmth are presented here in order to ascertain whether this aspect merits further study.

Specifically, path coefficients between the intercept of G3 outcomes (depressive symptoms and substance use) and the preceding parent variables (paternal warmth, OCG warmth, G3 report of paternal and OCG warmth, parent depressive symptoms and substance use) were examined. Due to low power (sample size for intact families = 75, sample size for non-partnered G2-OCGs = 105), significance could not be used as the primary indicator of potential moderation. However, the direction and magnitude of coefficients were visually inspected and notable differences are now presented. G3 depressive symptoms appeared more strongly predicted by G2-reported paternal warmth when G2 and OCG were not partnered (b=-.04 vs. b=.27), whereas G3-reported paternal warmth was more strongly negatively associated with G3 depressive symptoms when G2 and OCG were partnered (b=-.23 vs. b=-.07). Notably, the path coefficients between G3 depressive symptoms and paternal depressive symptoms were quite similar across the two groups (b=.31 for partnered vs. b=.23 for non-partnered).

For the intercept of G3 substance use, some clear differences also emerged. Father-reported warmth toward G3 was positively associated with G3 substance use when G2 and OCG were partnered, whereas it was negatively associated when G2 and OCG were not partnered (*b*=-.35 vs. *b*=-.33). And, the coefficient of the path between G3-reported paternal warmth and G3 substance use was essentially zero when G2 and OCG were partnered, whereas the coefficient was much larger and negative in direction when G2 and OCG were not partnered (*b*=.02 vs. *b*=-.50). In the partnered sample, G3-reported OCG warmth appeared much more strongly protective against G3 substance use (the coefficient was large and negative, *b*=-.35), while the coefficient was close to zero in the non-partnered sample (*b*=-.04). The association between the intercept of G3 substance use and OCG warmth was negative in the partnered sample (*b*=-0.23) but positive and relatively large in the non-partnered sample (*b*=0.49). Paternal (G2 adult) depressive symptoms had a relatively strong, positive association with G3 substance use across both samples (*b*=0.42 and *b*=0.23) whereas paternal (G2 adult) substance use only had a strong, positive association with G3 substance use in the partnered sample (*b*=0.48), with the non-partnered sample showing a negative coefficient between G2 paternal substance use and G3 substance use (*b*=-0.13). Finally, OCG depressive symptoms had a strong positive association with G3 substance use (*b*=0.36) in the non-partnered sample, while this coefficient was near-zero in the partnered sample (*b*=0.07).

Discussion

Continuity of adolescent substance use and depression across generations has been established and confirmed empirically, yet our understanding of the key drivers of intergenerational continuity remains limited. The tremendous impact of these health risk problems compelled the present study to examine potentially modifiable mechanisms of continuity by expanding the current literature to consider the role of fathers in the transmission of substance use and depression. Specifically, this study tested the notion that father-child warmth, a factor closely tied to attachment security and child psychosocial development, may mediate the relationship between a father's own experiences with substance use and/or depression and the development of these problems in his child's adolescence. This path analysis examined two key intergenerational patterns. First, the intergenerational quality of parent-child warmth, and second, the intergenerational continuity of depressive symptoms and substance use between fathers and their adolescent children. By quantifying the degree of intergenerational continuity in depressive symptoms and substance use among an ethnically/racially and socio-economically diverse sample of fathers and their first-born child, this study tested whether parent-child warmth served as one mechanism driving intergenerational continuity in depressive symptoms and substance use.

A summary of the main findings is as follows: G2 adolescent experience of caregiver warmth was a strong predictor of depressive symptoms and substance use across developmental stages (both adolescence and parenthood). In the case of G2 adolescence, both the child and parent reports of warmth served as significant predictors, with some variability (e.g., G1-reported warmth did not predict G2 adolescent depressive symptoms, whereas it did predict adolescent substance use). Second, while father-child warmth across the G1-G2 and G2-G3 generations

were correlated, parental warmth did not demonstrate strong intergenerational continuity; that is, neither G2 nor G1 report of parent-child warmth significantly predicted the level of warmth in the G2-G3 relationship in the next generation when taking into account all of the variables in the model. Third, depressive symptoms negatively impacted paternal report of G2 (adult) warmth, while paternal substance use had a marginally significant association with both father and child report of warmth. Fourth, G3 adolescent report of both caregivers' warmth significantly predicted adolescent depressive symptoms, whereas only G3 reported OCG warmth predicted G3 adolescent substance use. Other nuances in the results, relating to covariates and the differences between maternal and paternal behavior and psychopathology, will also be discussed.

In line with the first hypothesis, fathers' experience of low warmth during his adolescence significantly predicted greater substance use and more depressive symptoms during adolescence and parenthood. Further, G2 fathers' adolescent depressive symptoms and substance use did indeed predict greater depressive symptoms and substance use as they were fulfilling the paternal role for their 11 year-old children. This is consistent with much of the research that has linked caregiver warmth to healthy emotional coping and resilience, which is theoretically and empirically linked to reduced psychological distress and externalizing problem behavior (as described in PARTheory; Rohner, Khaleque & Cournoyer, 2012). The results from the G1-G2 portion of the conceptual model demonstrate that those G2 adolescents who experienced less warmth were indeed less resilient against depressive symptoms and substance use, both during their adolescence and later when they themselves went on to parent their G3 children. However, while one of the priorities of this study was to respond to the dearth of research focused on fathers' warmth and health behaviors' impact on adolescent outcomes, the G1-G2 relationship most likely reflected a dynamic between mother and child. Thus, while the results add to and

confirm much of the literature regarding the trajectories of fathers who experienced low warmth in adolescence, fathers' specific role in this trajectory remains unclear within the G1-G2 relationship.

The second hypothesis was not directly supported, considering that none of the G2-G3 warmth variables were significantly predicted by the level of warmth reported by either G1 or G2 during G2's adolescence. In other words, when taking into account all of the variables in the model, warmth in the prior generation did not directly significantly predict warmth in the subsequent generation. However, a small to moderate correlation strength between adolescent reports of warmth within the G1-G2 relationship and within the G2-G3 relationship was observed, indicating that there is some general continuity of warmth across generations when not controlling for all of the paths tested in the conceptual model. And, it is clear from the results that G2's warmth in the G1-G2 relationship begets a pattern of worse mental and behavioral health that holds across multiple developmental periods (i.e., from G2's adolescence to adulthood when G2 is a father to a child entering into adolescence). Thus, while we did not observe evidence that parent-child warmth repeats across generations due to direct effects, perhaps via modeling and social learning for example, the general finding of a small to moderate correlation among intergenerational levels of warmth may be accounted for by myriad related factors.

Intergenerational continuity of depressive symptoms was evident in this study, in line with a large body of research findings (Narayanan & Nærde, 2016; Grossman, Grossman, Kindler & Zimmerman, 2008; Mikkonen, Moustgaard, Remes & Martikainen, 2016). The present findings showed that G2 adolescent depressive symptoms indirectly predicted G3 adolescent depressive symptoms via G2 fathers' depressive symptoms during parenthood. This

makes sense considering that depressive symptoms often demonstrate substantial continuity across development, that is, men who were depressed during adolescence are more likely to demonstrate elevated depressive symptoms during adulthood (Lewinsohn, Rohde, Klein & Seeley, 1999; Rothenberg, Hussong & Chassin, 2018). Then, offspring of depressed fathers, especially during the sensitive developmental period of adolescence, inherit risk of internalizing problems perhaps through social modeling of poor coping, low self-esteem related to fathers' low engagement or encouragement of offspring, or sense of isolation and rejection, for example.

A few significant findings emerged in regard to the growth of the G3 adolescent outcomes in our model. First, we observed that G2 adolescent substance use had a negative direct and total effect on the slope of G3 substance use. This suggests that G3 adolescents whose fathers indicated elevated substance use during their own adolescence were more likely to have stable levels, rather than increasing, of substance use. One possible interpretation of this may be that these G3 adolescents begin using substances at a higher level earlier, leaving less room for growth in use over the ages 15-17. And, the growth of G3 depressive symptoms during adolescence was significantly negatively associated with G2 adult depressive symptoms. This is perhaps indicative of a similar process mentioned above, by which G3 adolescents with depressed fathers are at risk of elevated depressive symptoms earlier in adolescence, which explains the flatter growth in symptoms across G3 development. More work is needed to ascertain whether these speculations hold true.

Impact Of Paternal Depression And Substance Use On Parent-Child Warmth

It is clear from the present results that paternal depressive symptoms (when child is age 11) have a negative impact on father's report of warmth toward his child at age 14. In other words, paternal (G2) depressive symptoms during G3 childhood significantly predicted paternal

report of parent-child warmth, whereas G2 substance use during parenthood had a marginally significant association with both paternal and G3 reported warmth. However, it was also evident that it was largely the child's perception of caregiver warmth that significantly predicted his or her own elevated depressive symptoms and substance use in later adolescence, regardless of fathers' depressive symptoms. In other words, greater paternal depressive symptoms predicted lower paternal warmth as reported by fathers, but not as reported by G3 adolescents. This was counter to predictions in this study, and contrasts with other research findings that showed child report of parental warmth was significantly related to child externalizing problems but not internalizing problems (McKee et al., 2008). However, in McKee and colleagues' study, 86% of the parents were female (i.e., mothers) and the parent themselves reported on the child outcome measures (internalizing and externalizing problems) which were similar, but not identical, to our target outcome variables. Our results are generally consistent with our understanding of depressive symptoms, which can cause parents to negatively distort their report of warmth toward their child, perhaps due to a combination of negative affect, fatigue, and other cognitive distortions related to depressed mood (Caouette & Guyer, 2016). Further, it is well established that depressed individuals are more susceptible to negative perceptual bias, in that they are more likely to attend to negative stimuli (e.g., their mistakes or shortcomings in the parent-child relationship) and to disregard or easily forget positive aspects of their environment (see Levens & Gotlib, 2010). Paternal substance use, on the other hand, had a marginally significant impact on G3's report of paternal warmth, which then significantly predicted G3 depressive symptoms. Again, we see in this finding that it is less the impact of father's substance use that predicts his child's development of elevated depressive symptoms, but more importantly, the child's view of paternal warmth that has a significant impact on whether he or she goes on to endorse more

frequent and/or severe internalizing symptomatology. Our results, in conjunction with findings from other research studies, highlight the importance of considering multiple informants in ascertaining the interplay between parent-child relationship qualities and health risk problems.

Interestingly, adolescent report of warmth toward fathers was significantly negatively impacted by having an OCG with increased depressive symptoms. It is unclear why this was the case in our sample, however, one possible explanation may have to do with the interplay between caregiver well-being and child emotional security. That is, if a child experiences their primary caregiver as being depressed (e.g., self-isolating, negative affect, hostile and/or withdrawn behavior), he or she may feel emotional insecurity that negatively distorts the perception of warmth from fathers. For instance, results from some research have shown that, when controlling for maternal depression, father's depressive symptoms do not predict a child's level of emotional security (Kouros, Merrilees & Cummings, 2008). Taken together with the present study's findings, it appears that the female caregiver's depressed affect and/or psychological distress has more to do with a child's emotional insecurity, which then influences child emotion regulation and developmental adjustment.

Next, G2's experience of depressive symptoms and substance use during his adolescence did not directly predict his adolescent child's experience of these problems during the developmental period of adolescence. However, father's depressive symptoms at his child's age 14 did significantly predict his child's depressive symptoms when he or she was in late adolescence. We observed that the total effect from paternal depressive symptoms to G3 adolescent depressive symptoms was significant, while the total indirect effect was nonsignificant, suggesting that there may be more immediate effects of having a depressed father (such as direct modeling of poor coping skills) when his child is in emerging adolescence, rather

than there being any underlying, perhaps biological, explanation of these problems appearing around the same ages across generations. This is consistent with other research that has demonstrated that it is not solely a biological or genetic pathway that contributes to the transmission of psychopathology and/or behavioral problems, but more likely characteristics and qualities of the parent-child relationship that lead to adverse child psychological and/or behavioral problems (e.g., Harold et al., 2012).

Comparisons With OCG Depression, Substance Use, Warmth

The finding that only G3-reported warmth in the OCG relationship, and not in the paternal relationship, predicted adolescent substance use was contrary to predictions and dissimilar to the findings regarding adolescent depressive symptoms. In other words, G3 substance use appears to be related to the adolescent's perception of warmth with their female caregiver while warmth toward fathers does not significantly predict adolescent substance use. One potential explanation for this result may be related to the role of parental monitoring, which has been shown to predict adolescent problem behaviors independently of the parent-child relationship quality (Fosco, Stormshak, Dishion & Winter, 2012). It is also interesting to notice that paternal (G2 adult) substance use had a significant negative impact on G3's report of OCG warmth, which then significantly predicted G3 depressive symptoms and substance use. While the intricacies of this pathway are likely complicated, the path from paternal substance use to adolescent offspring's adverse outcomes is clearly impacted substantially by having a child perceive less warmth in the maternal caregiver relationship. The importance of fathers is abundantly clear, despite the results not illustrating this in the exact manner that was hypothesized. Extant research from Chassin and colleagues (1993) offers some general indications that parental substance use increases negative affect in offspring, which may then

damage the child's perception of maternal warmth. Further, parental substance use (namely, alcoholism) has been shown to increase child depression via worse parental monitoring of child whereabouts (Chassin et al., 1993). In addition, incongruence of parental warmth between mothers and fathers could be an indication of marital problems, warranting assessment of potentially impaired co-parenting (Chung, Phillips, Jensen & Lanier, 2019). Clearly, the interplay between parent substance use, child affective functioning and health, and adolescent outcomes continues to merit attention in research and practice.

Child Versus Parent Report Of Parent-Child Warmth

Notably, paternal report of warmth toward his adolescent child did not significantly predict the level of depressive symptoms endorsed by G3 teens. This provides confirmation for the hypothesis that child perception of parent-child warmth holds greater predictive power in regard to the target G3 adolescent outcomes. It is also notable that paternal and OCG reported warmth were significantly correlated, OCG warmth reported by both OCG and G3 were significantly correlated, but G3 reported warmth toward both G2 and OCG was not significantly correlated with G2 reported warmth. This pattern of results suggests that, among our sample, OCG reported warmth was congruent with her G3 child and the child's father, but that fathers' reports generally diverged from other reporters. The present results add to the extant literature in confirming that parent and youth reports seem to demonstrate variability through the discrepant predictive power of parent versus child report. Our findings do not indicate the same level of consistency among parent and child reports as other studies have found (e.g., Gonzalez et al., 2017), which further reinforces the importance of considering multiple informants for research and clinical purposes.

These findings provide evidence to support taking child-reported relationship quality seriously in the prevention and treatment of adolescent depression; results clearly suggest that efforts to recognize children at-risk for adolescent depressive symptoms cannot rely solely on parental reports of their attachment to their children. This is consistent with attachment theory's position that one's attachment security, which may be reflected by a child's report of warmth in the caregiver relationship, is associated with healthy emotion regulation and coping later in life (Moran, Turiano & Gentzler, 2018). Further, and importantly, our findings also demonstrate that it is essential to consider a child's attachment (parent-child relationship warmth) to their fathers as well as female caregivers. This confirms the growing recognition of the importance of fathers though the present results do not indicate that paternal warmth is a stronger predictor of adolescent outcomes than maternal warmth, as some research has found (e.g., Veneziano, 2003). This may reflect the differences in adolescent outcome variables across studies. For instance, Veneziano (2003) examined adolescent aggression, whereas del Barrio, Holgado-Tello, and Carrasco (2016) examined adolescent symptoms of depression and showed that both mothers' and fathers' warmth was important in decreasing adolescent depression severity. Building on existing findings in the literature continues to be an important public health endeavor, with prevention of unhealthy adolescent behaviors at the core of numerous empirical efforts.

In contrast to the findings for adolescent depressive symptoms, only G3's report of warmth toward OCG significantly predicted G3 adolescent substance use. This highlights the importance of consideration child's perceived relationship quality with mothers in the development of adolescent substance use. The present results contrast with other findings in the literature pertaining to the role of paternal relationship in reducing adolescent substance use. For instance, one research team recently found that positive relationship quality between adolescents

and their fathers mitigated the association between childhood adverse experience of maltreatment and adolescent marijuana use (Dubowitz et al., 2019). Taken together, our findings suggest that, while paternal relationship quality may play a protective role against heightened risk from various factors, it does not appear to be sufficient to have an independent effect on adolescent substance use in the way that mothers' warmth does in our sample.

The small to moderate correlation among the warmth variables for G1, G2, and G3 respondents is in line with findings that demonstrate intergenerational continuity of parent-child relationship qualities and parenting factors; however, it is important to note that, because the path model did not indicate that G1-G2 parent-child warmth significantly predicted the level of warmth in the next generation, there may be more *discontinuity* than continuity for this parenting variable, underscoring the modifiable nature of the quality of parent-child relationships. This suggests that, while warmth may indeed go from high to low levels, it also is likely that warmth can be enhanced in those families that have low or moderate parent-child attachment. This is in line with work that shows that attachment can be improved between parent and child (Allen, Timmer & Urquiza, 2014), though much less is known about effective paternal interventions than has been established for mothers. In fact, the body of research on attachment-based parent training interventions (such as parent-child interaction therapy [PCIT], Funderburk & Eyberg, 2011) has historically focused predominantly on mothers (see Fabiano, 2007). Indeed, societal norms and research deficits likely perpetuate fathers' internalization of messages about whether they can and/or should alter their parenting behavior to promote optimal child health and behavior (see Niec et al., 2015). This study sought to respond to previous calls to consider fathers in research in parallel and equal ways to how research has focused on mothers until relatively recently. Specifically, we agree that "it is particularly important to include the same

quality and quantity parenting constructs for fathers and mothers in research today because both fathers and mothers increasingly assume the same parenting responsibilities and engage in the same parenting activities with their children" (Fagan, Day, Lamb & Cabrera, 2014, p. 398).

The present study contributes empirical evidence to add to a body of literature than has historically relied on predominantly White samples (e.g., Kerns, Aspelmeier, Gentzler & Grabill, 2001; Neppl, Conger, Scaramella & Ontai, 2009). Some exceptions of this trend should be noted, including work by Hussain, Alvi, Zeeshan, and Nadeem (2013), Veneziano (2000; 2003), and Love (2008), for example. Specifically, research dating back to 1999 began demonstrating the unique contribution that nurturing behaviors by African American fathers' have on child development, above and beyond maternal factors and socioeconomic indicators (Black, Dubowitz & Starr). These research teams have added to the literature in impactful ways, with many findings pointing to the buffering effects of paternal warmth against adverse adolescent outcomes in relatively diverse samples (e.g., Love, 2008). The present study generally confirms that it is crucial to consider both mothers and fathers in research pertaining to adolescent outcomes. For instance, even within a recent study that showed stronger effects of adverse childhood events (ACEs) for mothers on offspring behavioral problems, fathers' ACE history still carried implications for offspring behavioral health, and these effects were also mediated by parental emotional distress (Schickedanz, Halfon, Sastry & Chung, 2018). Yet, Schickedanz and colleagues' study relied on a predominantly White, educated sample, reinforcing the pattern of empirical focus on non-racial minority populations to make claims about risk factors for child health outcomes. Our study shows that in a predominantly Black and Hispanic urban sample, adolescent children's experience in both the maternal and paternal relationship is important to consider.

The present results suggest that interventions that seek to increase the child's perception of warmth within interactions with their fathers should be prioritized in the pursuit of preventing and/or reducing adolescent depression. Improving fathers' contingent responsiveness (i.e., warmth) to their children's emotional and physical needs may decrease the likelihood that children of depressed fathers will go on to experience their own depressive symptoms. Indeed, some research indicates that children who perceived greater paternal rejection are more likely to go on to suffer from clinical psychological disorders (Hussain, Alvi, Zeeshan & Nadeem, 2013). In light of our findings, future research is needed to explore the nuances of how paternal factors foster optimal child outcomes by influencing a child's world-view, self-esteem, and social competence, for example (see Eiden et al., 2016).

The use of a sample of predominantly African American and Hispanic adolescents (and their fathers and OCGs) adds to the extant literature regarding continuity of depressive symptoms and substance use within the father-child relationship. In our sample, we observed that paternal depressive symptoms when offspring were transitioning to adolescence predicted the child's depressive symptoms in later adolescence, via child's report of paternal warmth. Conversely, the relationship between father's substance use during his child's late childhood and offspring's substance use in later adolescence was not mediated by paternal warmth. These are key findings, not only because they demonstrate that paternal depression and warmth carry implications for adolescent development of depressive symptoms beyond exposure during infancy and/or early childhood, but also because these findings occurred in an urban sample of mostly nonwhite race/ethnicity families, where even less is known about risk and resilience factors for adolescent behavioral health. Findings also support the need to simultaneously consider fathers' psychological factors in family-based interventions of adolescents' depressive

symptoms, in particular. Promoting adolescents' perception of both paternal and maternal warmth clearly should be fully integrated into the planning and implementation of adolescent behavioral problem prevention and intervention efforts.

Significant Covariate Associations

The inclusion of certain covariates, and the observation of some results that were not directly related to primary hypotheses, led to some results that are also noteworthy. For example, G1 report of warmth was positively associated with Black G2 race/ethnicity, suggesting that the primary caregivers of Black teens endorsed more affectionate feelings toward their adolescent children. This may be a reflection of underlying average levels of warmth that differ between cultural groups; for instance, distinct patterns of warmth and control have been found between African American, Latinx, and European American families (Deater-Deckard et al., 2011). However, caution is warranted in interpreting this finding more specifically, and future work should empirically clarify the potential differences (and equivalences) of parenting behaviors across cultural and racial/ethnic identity.

Furthermore, G3 sex significantly predicted the intercept of G3 adolescent depressive symptoms, such that being male was associated with significantly lower levels of depressive symptoms. This comes as no surprise, considering generally accepted trends that show boys and men often have lower rates of depression compared to their female counterparts (McGuinness, Dyer & Wade, 2012; Nolen-Hoeksema, 2001). And, the level of G3 adolescent substance use as predicted by Black race/ethnicity was marginally significant. Lower levels of substance use in Black communities have been observed across the literature (Zapolski, Pedersen, McCarthy & Smith, 2014; Meich et al., 2015). Our results provide additional data to support the patterns of less substance use in Black adolescents, though more recently the gap between White and racial

minority adolescent substance use in the U.S. appears to be closing rapidly. In fact, data from the most recent report from Monitoring the Future (Johnston et al., 2019) showed that rates of Black and Hispanic adolescent substance use are becoming more in line with rates of use seen in White teens. Consumers of this research should consider the historical and generational context of the findings and, as always, replication will be necessary in order to confirm or update the findings of the present study. Lastly, G2 father's age at first birth was significantly associated with educational attainment, with higher age at first birth predicting more years of education completed. This result is unsurprising, considering that a vast body of research shows that delaying parenthood is associated with increased years of academic attainment (Sipsma, Biello, Cole-Lewis & Kershaw, 2010; Fulco, Henry, Rickard & Yuma, 2019). Although this study did not tease apart the additional factor of whether these older, more educated fathers were also more likely to be partnered with their child's mother, this is something that future research should continue to focus on and clarify (see Trimarchi & Van Bavel, 2017).

Supplemental Results

The findings from the supplemental, descriptive analyses (descriptive, because low power does not allow for the discussion of significant versus non-significant findings) highlight some patterns that are now discussed and can help guide future study design and implementation to address the variable of parental partnership. First, paternal-reported (G2 adult) warmth was actually positively associated with G3 depressive symptoms when G2 and OCG were not partnered. This may reflect that, when fathers are not partnered with an adolescent's primary female caregiver (i.e., mother), their perceived warmth toward G3 can potentially exacerbate an adolescent's negative affect, though no concrete conclusions can be made from this observation. In contrast, there appeared to be congruence in the association between G3 depressive symptoms

and paternal (G2 adult) depressive symptoms across the samples, such that father's depressive symptoms had relatively large, positive association with his child's level of depressive symptoms irrespective of G2-OCG partner status. This may be indicative of the stability of the strength of the risk of depression for adolescents whose father demonstrated elevated depressive symptoms, which is not buffered by having intact parental partnership.

Regarding the outcome of G3 substance use, paternal (G2 adult) report of father-child warmth had notably different associations with adolescent offspring's substance use depending on the partner status of G2 and OCG. When G2 and OCG were partnered, father-reported warmth was positively associated with G3 substance use, whereas it was negatively associated in the non-partnered sample. When considering the G3 adolescent report of paternal warmth, associations with G3 substance use appeared to be relatively strong and negative in direction only in the non-partnered sample. It is unclear why this pattern emerged from the data, as this would suggest that fathers' perception of parent-child warmth may be a risk factor for adolescent offspring's substance use, while if G3 adolescents report greater paternal warmth, their likelihood of substance use appears to decrease. It is possible that the discrepancy between parent and child reports of paternal warmth has a differential impact on adolescent outcomes depending on the partner status of the adolescent's parents, though this speculation warrants deeper examination and empirical testing. Furthermore, G2-OCG partnership appeared to enhance the positive effect of G3-reported OCG warmth on adolescent offspring substance use, which merits additional examination as well. And, OCG-reported warmth appeared to have a negative, moderate association with G3 substance use in the intact partner sub-sample, while the opposite was true (the relationship was strong and positive) in the non-partnered sample. Again, there appears to be a subtle pattern of enhanced risk of adverse adolescent outcomes when the

parent reports higher levels of warmth toward their child when they come from non-partnered families. More work is needed to clarify whether this is indeed a true pattern (and not random effects that appeared in exploratory analyses with small samples) and how or why this may be the case.

In regard to parental mental and behavioral health variables' (i.e., G2 and OCG depressive symptoms and substance use) relationships with G3 outcomes, some additional findings were notable. First, paternal (G2 adult) depressive symptoms when G3 was age 11 seemed to have a moderate, positive association with G3 substance use in both sub-samples, indicating that paternal depression may be a robust risk factor for G3 substance use regardless of parental partner status; however, while the coefficients were similar in direction, their magnitudes may reflect meaningful differences if they had been tested in larger samples. Conversely, paternal (G2 adult) substance use had a relatively large, positive association with G3 substance use in the partnered sample, and this association was negative and relatively large in the non-partnered sample. Perhaps adolescents whose G2 fathers do not remain partnered with their OCG are more likely to view paternal substance use in a negative light and therefore refrain from their own use, though this speculation needs further testing in future studies. Finally, it appeared from the results that OCG depressive symptoms had a larger, positive association with G3 substance use when G2 and OCG were not partnered, suggesting some amplification of the negative effects of caregiver depression on adolescent risk of substance use in families where an adolescent's parents did not remain partnered. Future work is necessary to shed more light on the nuanced interactions between intergenerational transmission of mental health in the context of single-parent, separated/divorced, and intact parent relationship families.

Limitations

Despite also possessing a number of strengths, this study is not without its limitations. First, the diversity of the sample requires caution in making any generalizations, considering its makeup is not nationally representative but rather drawn from a specific urban locale in New York state. Careful consideration of how results may or may not generalize must be given in light of the socioeconomic and demographic makeup of our sample. Second, we were unable make comparisons across parent and child sex, due to sample size limitations. Biological sex may moderate the relationships observed in this study, perhaps as a function of time spent between parent and child depending on sex match (Shanahan et al., 2007). However, some studies find no sex differences in similar research contexts (e.g., Eiden et al., 2016), further illustrating the need for additional clarity on this issue. Third, the nature of self-report measures is inherently susceptible to bias. Interpretation of the present results should consider the fact that participants reported on sensitive topics including substance use habits, family relationships, and psychological distress. Fourth, fathers without any contact with their child and/or fathers for whom the mother refused participation in RIGS are not included in this study, which may limit generalizability. Finally, in the study of intergenerational health, including the health of familial relationships, many variables add to and reciprocally interact with the target variables in the model tested here. Controlling for the all of the family dynamics and nuances of psychological and behavioral outcomes, especially longitudinally, is nearly impossible. Yet, the present study controlled for many theoretically pertinent covariates and comparatively examined various pathways within the father-OCG-child triads from the given sample.

Conclusions And Future Directions

Based on the present results, adolescents' perception of warmth toward their fathers is apparently about as important as perceived maternal warmth in predicting adolescent depressive symptoms. On the other hand, adolescent substance use was only predicted by adolescents' report of maternal warmth in our study, with paternal warmth not reaching significance as a predictor of G3 substance use. Further, fathers who experienced low warmth from their caregiver during mid-adolescence were more likely to experience elevated depressive symptoms and endorse greater levels of substance use when they themselves were parenting adolescent offspring. Taken together in the context of other findings from the model tested in the present study, we see that parental warmth, as perceived by adolescents, has pervasive effects on our target mental and behavioral health outcomes. While the bulk of the literature regarding parental warmth has focused on infancy and early childhood as critical periods, our results demonstrate that the developing adolescent's experience of warmth from their fathers and mothers carry meaningful implications for their wellbeing. Future work should further clarify the potentially moderating role of parental partner status (e.g., non-partnered, married, cohabitating) on the stability of these effects, as also discussed by del Vecchio (2018). While one of the main strengths of this study was that it allowed for the examination of an intergenerational model in a predominantly racial/ethnic minority sample, it will also be crucial that future research teams replicate and extend these findings in other diverse samples. In sum, while research teams have historically relied on testing maternal versus paternal effects, with only relatively recent efforts aimed at increasing our understanding of paternal factors, our study adds yet more rationale to consider the simultaneous examination of maternal and paternal factors as the gold standard in public health and social science research.

Figures

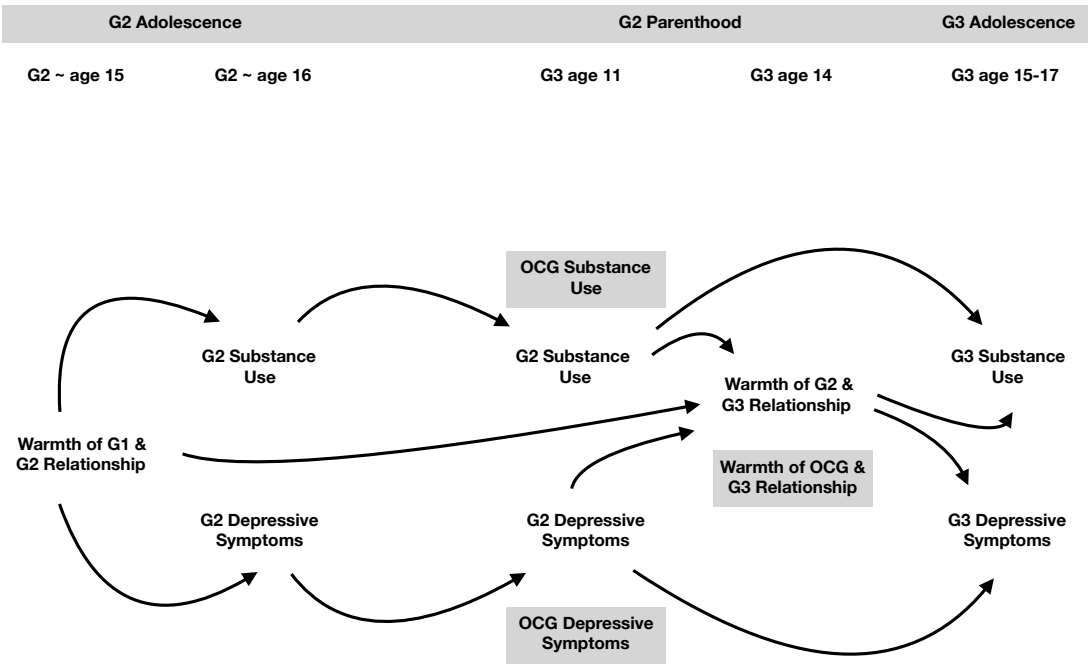

Figure 1. Conceptual model

Tables

Table 1. *Descriptive statistics*

Variable	N	Mean	SD	Min	Max
G2 birth year	302	1973.95	0.76	1973	1975
G2 race	302	2.14	0.93	1	4
Arrest rate	302	4	1.92	0.12	7.87
G2 education	288	12.07	1.72	10	21
G2 age at first birth	302	23.49	5.39	15.6	41.1
G3 birth year	302	1997.43	5.59	1989	2014
G2 adolescent substance use	298	0.58	0.9	0	3
G2 adolescent depressive symptoms	299	2.01	0.47	1	3.15
G3 substance use age 15	233	0.21	0.6	0	3
G3 substance use age 16	225	0.41	0.81	0	3
G3 substance use age 17	213	0.51	0.89	0	3
G1 warmth	287	3.47	0.43	1.81	4
G2 warmth	185	4.55	.40	3	5
G2 adolescent warmth	289	3.41	0.44	1.46	4
G2 depressive symptoms	237	1.69	0.57	1	3.68
OCG depressive symptoms	250	1.8	0.65	1	4
G2 substance use	236	0.86	1.23	0	4
OCG substance use	250	0.34	0.77	0	4
G3 warmth to G2	209	2.34	0.5	0.27	3
G3 warmth to OCG	230	2.43	0.4	0.91	3
G3 depressive symptoms age 15	233	1.06	0.66	0	2.67
G3 depressive symptoms age 16	225	1.12	0.6	0	2.67
G3 depressive symptoms age 17	214	1.11	0.67	0	2.83

Table 2. *Correlations among all variables*

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. G2 adolescent warmth	1																							
2. G1 warmth	.25	1																						
3. G2 adolescent depressive symptoms	-.22	-.09	1																					
4. G2 adolescent substance use	-.15	-.16	.09	1																				
5. G2 adult depressive symptoms	-.28	-.12	.37	.19	1																			
6. OCG depressive symptoms	.10	0	-.07	.05	-.03	1																		
7. G2 adult substance use	-.28	-.15	.06	.24	.18	.04	1																	
8. OCG substance use	.02	-.06	.08	-.03	-.07	.31	.14	1																
9. Black race/ethnicity	.04	.14	-.14	-.03	-.12	-.14	-.05	-.05	1															
10. Hispanic race/ethnicity	.06	-.03	.13	.02	.12	.14	0	-.02	-.60	1														
11. G2 age at first birth	-.02	.05	-.01	-.12	-.11	-.05	-.10	.01	-.22	-.06	1													
12. G2 education	.07	.17	-.04	-.15	-.15	-.14	-.10	.01	.01	-.15	.37	1												
13. Arrest rate	-.02	.04	.05	-.02	.07	.06	-.10	.01	.20	.17	-.15	-.12	1											
14. Male sex	.00	.12	.00	-.13	-.08	-.02	-.10	.06	-.02	.08	-.03	-.04	.10	1										
15. G2 warmth	.19	.22	-.14	-.07	-.30	-.05	-0.21	-.06	.15	-.06	-.09	.09	.04	.02	1									
16. OCG warmth	-.05	.13	.03	.03	-.09	-.33	0.01	-.21	.04	.06	.15	.14	-.04	-.03	.38	1								
17. G3 warmth toward G2	.01	.13	-.01	-.18	-.12	-.18	-.22	-.07	-.13	.12	.39	.23	0	.12	.13	.26	1							
18. G3 warmth toward OCG	.03	.03	-.01	-.02	-.12	-.14	-.17	-.07	02	.04	.38	.06	.04	.10	.05	.36	.30	1						
19. G3 substance use age 15	-.08	-.06	.02	.05	.07	.18	.09	.06	.09	-.04	-.18	-.01	-.02	-.13	-.01	-.09	-.27	-.27	1					
20. G3 substance use age 16	-.05	-.13	.06	-.06	.13	.11	.23	.06	.03	-.02	-.14	.01	-.04	.03	-.12	-.21	-.23	-.32	.52	1				
21. G3 substance use age 17	-.02	-.09	-.01	-.13	.03	.16	.15	.07	.03	-.11	-.06	.03	-.05	.03	-.11	-.17	-.23	-.25	.41	.62	1			
22. G3 depressive symptoms age 15	-.03	.00	.12	.07	.24	.17	.10	.08	-.06	-.01	-.15	-.07	-.05	-.26	-.09	-.13	-.31	-.30	.26	.28	.19	1		
23. G3 depressive symptoms age 16	-.08	-.04	.08	-.01	.16	.21	.11	.12	-.03	-.07	-.08	-.08	-.01	-.30	-.10	-.15	-.31	-.33	.21	.25	.20	.72	1	
24. G3 depressive symptoms age 17	-.08	-.07	.08	.02	.13	.21	.10	.02	.00	-.01	-.16	-.05	.04	-.27	-.04	-.14	-.31	-.34	.22	.26	.27	.71	.74	1

Table 3. *Path coefficients*

Path	Estimate	SE	p value
Intercept of G3 Depression on G2 Warmth	-0.04	0.13	0.76
Intercept of G3 Depression on G3 warmth toward father	**-0.29**	**0.1**	**0.01**
Intercept of G3 Depression on G3 warmth toward OCG	**-0.34**	**0.12**	**0.01**
Intercept of G3 Depression on OCG warmth	0.1	0.11	0.39
Intercept of G3 Depression on G3 on G2 Depression	**0.18**	**0.08**	**0.03**
Intercept of G3 Depression on G2 Substance use	-0.03	0.03	0.36
Intercept of G3 Depression on OCG Depression	0.1	0.06	0.1
Intercept of G3 Depression on OCG Substance use	0.08	0.06	0.16
Intercept of G3 Depression on G2 Adolescent depression	0.06	0.09	0.51
Intercept of G3 Depression on G2 Adolescent substance use	-0.04	0.04	0.36
Intercept of G3 Depression on Arrest Rate	0	0.02	0.995
Intercept of G3 Depression on G2 race Black	-0.01	0.12	0.96
Intercept of G3 Depression on G2 race Hispanic	0.08	0.13	0.52
Intercept of G3 Depression on G2 Age at first birth	0.01	0.01	0.73
Intercept of G3 Depression on G2 Educational attainment	-0.004	0.03	0.88
Intercept of G3 Depression on G3 sex	**-0.32**	**0.07**	**0.00**

Note. Significant results are presented in bold

Table 4. *Path coefficients*

Path	estimate	SE	p value
Intercept of G3 Substance Use on G2 warmth	-0.01	0.19	0.96
Intercept of G3 Substance Use on G3 warmth toward father	-0.2	0.13	0.11
Intercept of G3 Substance Use on G3 warmth toward OCG	**-0.28**	**0.13**	**0.03**
Intercept of G3 Substance Use on OCG warmth	0.11	0.12	0.37
Intercept of G3 Substance Use on G2 Depression	0.03	0.1	0.77
Intercept of G3 Substance Use on G2 Substance use	0.02	0.05	0.75
Intercept of G3 Substance Use on OCG Depression	0.14	0.08	0.08
Intercept of G3 Substance Use on OCG Substance use	-0.002	0.06	0.98
Intercept of G3 Substance Use on G2 Adolescent depression	0.03	0.09	0.75
Intercept of G3 Substance Use on G2 Adolescent substance use	-0.02	0.05	0.77
Intercept of G3 Substance Use on Arrest Rate	0.02	0.02	0.35
Intercept of G3 Substance Use on G2 race Black	*-0.27*	*0.14*	*0.05*
Intercept of G3 Substance Use on G2 race Hispanic	-0.3	0.18	0.09
Intercept of G3 Substance Use on G2 Age at first birth	-0.01	0.01	0.3
Intercept of G3 Substance Use on G2 Educational attainment	0.03	0.03	0.31
Intercept of G3 Substance Use on G3 sex	-0.06	0.07	0.41

Note. Significant results are presented in bold

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Appendix

Individual Items in Scales

G1-G2 warmth at wave 3 (α=.83-.87)
Responses: 4=often, 3=sometimes, 2=seldom, 1=never
How often would you say that…

1. You get along well with your ___.
2. You feel that you can really trust your____.
3. Your ____ does not understand you. (reverse coded)
4. Your ____ is too demanding. (reverse coded)
5. You really enjoy your ____.
6. You have a lot of respect for your ____.
7. Your ____ interferes with your activities. (reverse coded)
8. You think your ____ is terrific.
9. You feel very angry toward your ____. (reverse coded)
10. You feel violent toward your ____. (reverse coded)
11. You feel proud of your ____.

G2 paternal depressive symptoms during adolescence at wave 5 (α=.81)
Responses: 4=often, 3=sometimes, 2=seldom, 1=never
Since we interviewed you last time, how often did you…

1. Feel you had trouble keeping your mind on what you were doing?
2. Feel depressed or very sad?
3. Feel bothered by things that don't usually bother you?
4. Not feel like eating because you felt upset about something?
5. Feel that everything you did was an effort?
6. Think seriously about suicide?
7. Feel scared or afraid?
8. Toss and turn when you slept?
9. Feel that you talked less than usual?
10. Feel nervous or stressed?
11. Feel lonely?
12. Feel people disliked you?
13. Feel you enjoyed life? (reverse coded)

G2 Warmth (α=.84) (α=.89 for OCG warmth)
Responses: 5=always, 4=often, 3=sometimes, 2=seldom, 1=never
Thinking about (child/g3), how often would you say that…

1. (G3) is too demanding. (reverse coded)
2. (G3) interferes with your activities. (reverse coded)
3. You think (G3) is terrific.
4. You feel violent toward (G3). (reverse coded)
5. You feel very angry toward (G3). (reverse coded)
6. You feel proud of (G3).
7. You wish (G3) was more like other children that you know. (reverse coded)
8. (G3) is well behaved.
9. You get along well with (G3).
10. You just do not understand (G3). (reverse coded)
11. You really enjoy (G3).

G3 Warmth toward G2 (α=.88) (α=.86 toward OCG)
Responses: 3=Often, 2=Sometimes, 1=Almost never, 0=Never
How often would you say that…

1. You get along well with____.
2. You feel that you can really trust____.
3. ____does not understand you. (reverse coded)
4. ____is too demanding. (reverse coded)
5. You really enjoy ____.
6. You have a lot of respect for ____.
7. ____ interferes with your activities. (reverse coded)
8. You think ____ is terrific.
9. You feel very angry toward ____. (reverse coded)
10. You feel violent toward ____. (reverse coded)
11. You feel proud of ____.

G3 Depressive Symptoms (item 3 dropped) (α=.89-.91)
Responses: 3=often, 2=sometimes, 1=almost never, 0=never
Since your last interview, how often did you…?

1. Feel you had trouble keeping your mind on what you were doing?
2. Feel depressed or very sad?
3. Feel bothered by things that don't usually bother you?
4. Not feel like eating because you felt upset about something?
5. Feel that everything you did was an effort, or that everything was difficult for you to do?
6. Feel scared or afraid?
7. Toss and turn because you couldn't sleep?
8. Feel that you talked less than usual?
9. Feel nervous or stressed?
10. Feel lonely?
11. Feel people disliked you?
12. Feel you enjoyed life? (reverse coded)

G3 adolescent substance use consequences:
Responses: (1=yes, 0=no).
Since your last interview, have you…

1. Gotten into trouble at work or school because of your drinking?
2. Gotten into trouble with the police because of your drinking?
3. Found you needed to drink more than you used to, to get drunk or to feel good?
4. Woke up the day after drinking and not been able to remember what you had done the night before?
5. Tried to cut down on your drinking and found that you could not?
6. Gotten into physical fights because of your drinking?
7. Had problems with your health because of your drinking?
8. Had problems with your family because of your drinking?
9. Had problems with your friends because of your drinking?