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# The Development of Childhood Risk-Taking: Parenting and Self-Regulation in Sociocultural Context

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ABSTRACT OF THE DISSERTATION

The Development of Childhood Risk-Taking: Parenting and Self-Regulation in Sociocultural Context

by

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Maladaptive risk-taking (e.g., substance use, unsafe sex, reckless driving) is a public health epidemic that is nonrandomly distributed across groups by gender, race/ethnicity, and poverty level. Although studies have examined risk-taking in adolescence, few have identified pathways to childhood risk-taking. Drawing on a sample of 250 child-parent dyads (50% female; $M_{age}$ = 49.1 months; *SD* = 2.9; 46% Hispanic, 18.4% Black, 11.2% White, .4% Asian, and 24% multicultural) in an ongoing longitudinal investigation, this study evaluated 1) associations between observations of positive parenting during the preschool period (i.e., high support, low hostility, and low intrusion) and risk-taking at age 10 using the laboratory-administered Balloon Analogue Risk Task for Youth (BART-Y), 2) associations between children's behavior regulation and emotion regulation at age 6 and risk-taking at age 10, 3) indirect relations from positive parenting to risk-taking through behavior and/or emotion regulation, and 4) the invariance of the proposed mediation model by child gender, race/ethnicity, and poverty status. Positive parenting and behavior regulation were associated with higher levels of

risk-taking, whereas emotion regulation was related to lower levels of risk-taking. Both behavior regulation and emotion regulation mediated the relation between positive parenting and risk-taking. However, invariance analyses revealed that the indirect path through emotion regulation was significant only among children of Hispanic descent and those who were not in poverty. Although most research has conceptualized risk-taking as maladaptive, these findings suggest that risk-taking may be adaptive in select contexts. The findings highlight the adaptive heterogeneity of childhood risk-taking, encourage further investigation of these processes during childhood, and suggest that prevention and intervention efforts should incorporate parenting and regulatory processes to promote adaptive risk-taking and reduce maladaptive risk-taking.

*Keywords:* BART-Y, mediation, moderation, parenting, risk-taking, self-regulation

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Risk-taking refers to voluntary engagement in behaviors that have some probability of undesirable results as well as rewards (Boyer, 2006; Furby & Beyth-Marom, 1992). Risk-taking encompasses a multitude of behaviors, ranging from jumping off high places, to driving under the influence of drugs or alcohol, unsafe sex, and gambling (Byrnes, Miller, & Schafer, 1999). As a group, risk-taking behaviors are associated with elevated rates of morbidity (Furby & Beyth-Marom, 1992) and constitute the leading cause of death and disability among 10 to 24 year olds (World Health Organization, 2011). Yet, risk-taking also entails potential rewards. For example, venturing a new solution to a formidable challenge introduces risks of failure or social ridicule, but also offers the potential for benefit by solving the problem, or contributing to its resolution. Given the substantial economic and human costs associated with risk-taking, as well as the potential gains it affords, the current effort to identify factors that influence developmental trajectories toward maladaptive (and adaptive) risk-taking has significant potential for positive public health impact.

## De-limiting Risk-Taking from Related Constructs

Risk-taking is closely related to behavioral and personality constructs, such as antisocial behavior and impulsivity. For example, risk-taking is often referenced in models of antisocial and delinquent behaviors, even though these constructs differ from risk-taking (and from each other) in important ways. Antisocial behaviors include both overt and covert behaviors that violate social norms, such as bullying or substance use, as

well all as destructive and non-destructive behaviors, such as property damage or lying (Frick et al., 1993). Within the broader domain of antisocial behavior, delinquency encompasses a discrete subset of illicit activities that could result in criminal charges, arrest, or adjudication (Kazdin, Kraemer, Kessler, Kupfer, & Offord, 1997). In contrast, antisocial behaviors may or may not be explicitly prohibited by law. For example, lying may be an antisocial behavior, but lying under oath would also be considered a delinquent behavior. Risk-taking behaviors may entail antisocial behavior and/or delinquency, as when, for example, reckless driving or drug use may violate the law, but many forms of risk-taking do not entail the violation of societal norms or laws (e.g., bungee jumping).

All risk-taking involves risky behavior, but the defining feature of risk-taking, versus risky, behavior is that the individual is aware of the potential for positive and adaptive as well as negative and maladaptive consequences. The individual's awareness of relative reward and loss contingencies differentiates risk-taking from risky behaviors. For example, a 2-year-old who is walking across the street following a toy ball would be engaging in a risky behavior, whereas a 5-year-old child who knows that running across the street without being careful is dangerous, yet continues to do so, would be engaging in risk-taking.

Personality constructs, such as impulsivity and sensation seeking, may influence the probability of risk-taking, but they are not, in and of themselves, risk-taking behaviors. Impulsivity refers to the speed of response initiation or the inability to wait for a desired goal or object (Lengua, Sandler, West, Wolchik, & Curran, 1999). Because

impulsivity may prompt an individual to act a certain way without taking the time to think through the consequences of her/his behavior, it may increase the likelihood that an individual would engage in risk-taking behavior, but it is not actually risk-taking in its own right (Romer, 2010). Likewise, sensation seeking is characterized by a strong need for varied, novel, and complex sensations and experiences (Zuckerman, Eysenck, & Eysenck, 1978). This trait may increase an individual's willingness to take physical or social risks to gain such experiences, but it is not synonymous with risk-taking (Boyer, 2006; Zuckerman & Kuhlman, 2000). Impulsivity or sensation seeking may contribute to risk-taking, but risk-taking does not require impulsivity (as when preparing to climb Mt. Everest) and/or sensation seeking (as when trying a new problem solving strategy during an important exam).

**The Adaptive Implications of Risk-Taking**

Risk-taking encompasses complex phenomena that span a continuum from adaptive to maladaptive, and vary in meaning across multiple determinants and contexts. Adaptive risk-taking occurs when positive outcomes are more likely to occur than negative outcomes, or the relative gains to be had outweigh comparatively minimal costs (Byrnes et al., 1999). For example, it would be adaptive for an individual to take a risk and relocate for a promotion that advances her/his career, but moving without adequate financial, occupational, or social support could be maladaptive. An array of factors influences the adaptive implications of a particular risk-taking behavior, as well as the likelihood that an individual will enact said behavior.

Risk-taking may be influenced by subjective and objective risks as perceived by

the individual and the larger community, respectively (Byrnes et al., 1999). These assessments are influenced by the perceived probability, magnitude, or severity of the negative outcome associated with a given risk (MacPherson et al., 2010). For example, jumping from a ledge that is four feet tall is not likely to yield a negative outcome and any such outcome would be relatively minor. In contrast, drunk driving is associated with negative outcomes of higher probability and severity. Importantly, assessments of subjective and objective risk may vary across development and as a function of experience. For example, a jump over a three-foot fence may be associated with a low probability of a minor negative outcome for an experienced horse rider of 16 years, but the probability of injury would be higher and more severe for an inexperienced rider of 6 years. Likewise, subjective and objective risk assessments may not match. For example, a teenager who wants to have a child may not perceive a pregnancy as risky, but objectively, and in line with western social norms, the teenager and the child would be at risk for negative outcomes.

As discussed earlier, a range of factors may influence risk-taking, including endogenous characteristics, such as individual differences in impulsivity or sensation seeking (Zuckerman & Kuhlman, 2000). Assessments of risk (and its adaptiveness) are also influenced by the broader social context (Arnett, 1992). For example, engaging in unprotected sex with a spouse is not as risky and may even be desirable when seeking offspring, whereas engaging in unprotected sex with a stranger can be very risky with regard to disease and unplanned pregnancy. As noted earlier, developmental status can influence the nature of risk such that swinging on parallel bars in the playground poses a

greater risk for a young child than an adolescent, yet broader contextual factors could further qualify both the desirability and expected gains of a given risk, as would be the case if either child were training for a gymnastics competition.

Risk-taking may be curtailed (or encouraged) by environmental factors, such as cultural norms, laws, or relationships with parents or peers (Arnett, 1992). Moreover, the influence of these factors, alone and in combination, on rates of risk-taking behavior can vary across different types of risk-taking (e.g., substance use is most strongly influenced by peers; Marshall & Chassin, 2000), and across time (e.g., parents may be more influential at younger ages, while peers take on increasing salience in adolescence; Brown, 2004). Given that risk-taking behaviors emerge from a dynamic system of transacting influences within and beyond the individual, this investigation employed a developmental perspective to clarify how risk-taking emerges, for better and for worse.

**Risk-Taking and Developmental Theory**

The form and frequency of risk-taking changes over the life course, as does the salience of its determinants. Across childhood, risky behaviors may evolve to become risk-taking as children develop an increased awareness of the consequences of their behavior, which occurs as early as 3 years of age (Bjorklund, 2012). The timing of this learning process is a developmental question in its own right. For example, climbing on cupboards to retrieve a sweet is risky for a 2-year old because s/he could fall, however, this becomes risk-taking when the child climbs on cupboards despite knowing it can result in a fall or a punishment if it violates a parent's prohibition. Risk-taking is a developmental acquisition, much in the same way that antisocial behavior is given that

one requires an awareness of social norms to intentionally violate them (e.g., an 18-month-old child throwing a block at a friend is not the same as a 10-year old doing so).

Generally, children first become aware of the physical consequences of their behavior. Thus, the earliest expressions of risk-taking are largely characterized by physical risks (Morrongiello, Kane, McArthur, & Bell, 2012). Very young children begin to interact with their environment through grasping and (later) walking, which prompts parental concern regarding safety and risky physical behaviors. Over time, children learn the boundaries of safe and acceptable behavior via parental instruction and modeling (Morrongiello, Corbett, & Bellissimo, 2008), as well as the untoward consequences of violating those boundaries. Thus, with development risky physical behavior evolves into physical risk-taking. In middle childhood, physical risk-taking typically declines as children internalize parental and environmental constraints (Steinberg, 2007), and benefit from advancing cognitive capacities (DeLoache, Miller, & Pierroutsakos, 1998). However, with the transition to formal schooling, risk-taking begins to include more social and school related risks.

Although risk-taking behaviors typically decline in middle childhood, there is a resurgence of risk-taking during adolescence, in terms of both the frequency and breadth of behavior as health and sexual risk-taking become more prominent amidst broad elevations in risk-taking (Steinberg, 2010). Risk-taking levels off gradually across the transition to adulthood, during which time risk-taking also changes qualitatively (e.g., financial and occupational risks become more prominent venues for adult risk-taking; Lam & Ozorio, 2013). Because risk-taking increases in frequency and expands in form

across the transition to and through adolescence (Arnett, 1992), the majority of theory and research on risk-taking behavior has focused on this developmental period (Boyer, 2006). Although several theoretical frameworks have been applied to the study of risk-taking, particularly in adolescence, they remain poorly integrated, both with one another, and across the continuum of development (Boyer, 2006).

First, psychobiological research emphasizes neurological and biochemical processes that underlie cognition and emotion as related to the emergence, escalation, and peak in risk-taking behaviors during adolescence (Nelson et al., 2002). In this view, individuals' biological predispositions influence their proclivity to engage in risk-taking (Diclemente, Hansen, & Ponton, 1996). During adolescence, psychobiological changes that influence risk-taking may include a) synaptic pruning in the prefrontal regions of the brain (Spear, 2000a), b) an increase in myelination in the prefrontal cortex which aids processing speed (Paus, 2005), c) a shift from posterior to frontal activation (Steinberg, 2008), d) increases in excitatory dopamine (Steinberg, 2008) and androgenic growth hormones (Arnett, 1992), and e) a physical maturation (Caspi, Lynam, Moffitt, & Silva, 1993). Prior research indicates that these psychobiological changes are related to elevated sensation seeking and risk-taking tendencies, including cigarette smoking and sexual risk-taking (Spear, 2000b).

Second, theories of social development highlight the importance of parent-child relationship quality, parenting strategies, and peer influences on the emergence of adolescent risk-taking. Parents are an important part of the developmental context (Allen, Chango, Szwedo, Schad, & Marston, 2012; Ary, Duncan, Duncan, & Hops, 1999;

Dishion, Patterson, Stoolmiller, & Skinner, 1991). However, as development proceeds, children increasingly trade off spending time with parents to spend more time with peers (Erwin, 1993; Steinberg & Monahan, 2007). Thus, risk-taking behavior in adolescence is influenced by both parental and peer contexts. Parenting practices, such as maternal support (Allen et al., 2012), monitoring (Stattin & Kerr, 2000), and psychological control, influence rates of risk-taking (Barber, 1996; Shaw, Gilliom, Ingoldsby, & Nagin, 2003). Likewise, adolescents' experiences in peer relationships, including peer rejection, may influence the form and frequency of risk-taking (Miller-Johnson, Coie, Maumary-Gremaud, Lochman, & Terry, 1999). Importantly, as discussed later, both parental and peer influences on risk-taking may be moderated by other facets of the developmental context, such as gender (Byrnes et al., 1999), race/ethnicity (Blum et al., 2000), and/or poverty level (Engle & Black).

Third, cognitive developmental approaches to understanding risk-taking emphasize youth's decision-making process, as well as other cognitive constructs, such as executive control (Romer, 2010). Several studies have shown that processing speed, memory retention and capacity, and reasoning skills improve with age (DeLoache et al., 1998). As a result of these advances, cognitive theorists predict risk-taking behaviors will decrease with age (e.g., Deloache et al., 1998). Although research has supported the relation between cognitive development and reduced risk-taking during childhood (Boyer, 2006), these relations become less clear during adolescence (Lopes, 1993). In an effort to explain these mixed findings, researchers have suggested that adolescents' increased use of heuristic strategies may contribute to more automatic decision-making,

such that they may bypass critical evaluations of the situation at hand and, ultimately, engage in more risk-taking behavior (Lopes, 1993). Further evidence in support of this hypothesis stems from work showing that adolescents are capable of understanding and perceiving risky activities accurately when provided with ample opportunity to carefully think through a situation (Steinberg, 2004).

Finally, the regulatory research framework focuses on the role of self-regulatory processes in risk-taking (Cauffmann & Steinberg, 2000). Self-regulation consists of the ability to modulate, redirect, modify, and control one's behavior, emotion, and physiology, according to the demands of a particular situation (Calkins & Fox, 2002; Posner & Rothbart, 2000). Behavior regulation refers to an individual's ability to overtly control (i.e., activate or inhibit) their behavioral responses to environmental demands (Batum & Yagmurlu, 2007; Posner & Rothbart, 2000), and this likely influences risk-taking because the inhibition or activation of a behavioral response may be needed to maximize the benefits in a risky situation. Emotion regulation, which refers to the implicit or explicit modulation of the intensity and duration of felt and expressed emotion, particularly negative affect (Gross, 2013; Gross & Jazaieri, 2014), is also likely to influence risk-taking. Since risky situations feature the potential for reward and loss, they are likely to elicit heightened emotion. Therefore, the capacity to regulate emotions likely influences risk-taking. Physiological regulation refers to the ability to modulate bodily arousal (e.g., return to resting heart rate after a startle), which is likely to influence risk-taking because, similar to emotion regulation, being able to better modulate

physiological responses during a situation that elicits arousal, would allow the individual to better assess the risky situation.

Risky situations tend to elicit emotional responses and increased arousal due to the potential for a desired reward or a negative outcome. In addition, risky situations require the activation or inhibition of a response to achieve either outcome. Thus, it is likely that self-regulatory capacities influence risk-taking behavior. In this regulatory framework, maladaptive risk-taking behaviors are expected to decline as individuals' capacities to regulate their behaviors, emotions, and bodies improve (Boyer, 2006). In support of this assertion, prior studies have demonstrated relations between improved self-regulation capacities and reduced risk-taking (Byrnes, 2006; Magar, Phillips, & Hosie, 2008; Paus, 2005; Steinberg, 2005), but some work suggests that self-regulation skills, particularly behavior regulation, may contribute to higher risk-taking (Morris, Hudson, & Dodd, 2014). These mixed findings may reflect the aforementioned variability in the adaptive significance of risk-taking with self-regulation being negatively related to maladaptive risk-taking, but positively related to adaptive risk-taking.

In recent work, Steinberg (2010) has integrated these varied theoretical perspectives across biological, social, cognitive, and regulatory influences on risk-taking behavior. In this integrative framework of adolescent risk-taking, risky behaviors reflect the temporal gap between the relatively rapid maturation of the limbic system, which mediates socioemotional responses, and the relatively slow maturation of the cognitive control system, which mediates planning and decision making. Steinberg (2004, 2010) and others (e.g., Bechara, Damasio, & Damasio, 2000) suggest that the rapidly

developing limbic system prompts adolescents to seek stimulating experiences, while the slower development of frontal lobe cognitive processes hinders youth's ability to inhibit their behaviors and regulate their emotions, especially during highly charged social situations (Steinberg, 2004). The current study drew upon these varied theoretical models, as well as Steinberg's integrative framework, to evaluate a developmental process model of childhood risk-taking wherein early parenting and, by extension, children's behavior regulation and emotion regulation skills were expected to influence trajectories toward adaptive and maladaptive risk-taking.

**Risk-Taking Processes in Adolescence**

Theoretical models of adolescent risk-taking converge on the identification of parenting practices, peer relationships, and self-regulation as important influences on risk-taking. Parenting influences on adolescent risk-taking include monitoring practices, autonomy support, and psychological control. Parental monitoring refers to supervisory practices regarding adolescents' activities (Laird, Pettit, Bates, & Dodge). In prior research, poor parental monitoring predicted increased youth risk-taking behaviors, including sexual risk-taking and substance use (Ary et al., 1999). Autonomy support refers to parental encouragement of youths' expressions of individual points of view and proactive efforts to include youth in family decision-making (Barber & Olsen, 1997). In a study of parent and peer influences on risk-taking, Allen and colleagues (2012) found that early adolescent substance use among 13 to 15-year-olds was predicted more strongly by the use behaviors of close friends when adolescents reported a lack of autonomy support from parents. Parental control encompasses both behavioral facets of control (e.g.,

restricting youths' activities) and psychological control (e.g., parental use of guilt induction or love withdrawal to coerce the adolescent into acting a certain way; Barber, 1996). Pettit, Laird, Dodge, Bates, and Criss (2001) found that 15-year-olds whose parents used psychological control strategies were more likely to exhibit risk-taking behaviors than youth whose parents used monitoring strategies.

Peer relationships become more adult-like during the transition to adolescence (Caspi et al., 1993). Thus, these relationships start to influence a wider range of risk-taking behaviors, such as substance use and sexual behavior. Peers affiliate with one another based on shared characteristics (Bauman & Ennett, 1996), and, once they come together as a dyad, these characteristics may become increasingly pronounced and intractable (Dishion, 2007). For example, in a study of 500 adolescents drawn from a single high school, Prinstein, Boergers, and Spirito (2001) found that youth who engaged in risk-taking behaviors were more likely to have friends who engaged in similar behaviors. The influence of peer relationships was also shown in a study by Allen and colleagues (2012), who demonstrated that, among early adolescent's ages 13 to 15, close friends' substance use was a significant predictor of change in youths' substance use. Moreover, these effects were particularly pronounced when youth's friends were well-liked by the larger peer group (Allen et al., 2012). Indeed, the mere presence of peers can influence adolescent's risk-taking. For example, studies have shown that adolescents (ages 13-16) who played a computerized risk-taking game with their same-aged peers were more likely to take risks than those who played on their own (Gardner & Steinberg, 2005, 2012).

In recent years, researchers have become increasingly interested in the influence of self- regulation processes on risk-taking, particularly during adolescence. As reviewed earlier, behavior regulation refers to an individual's ability to control their behavioral responses (Batum & Yagmurlu, 2007), and emotion regulation refers an individual's ability to modulate the intensity and duration of felt and expressed emotions (Gross, 2013). In general, poor behavior regulation is related to higher levels of risk-taking behavior in adolescence (Magar et al., 2008; Steinberg, 2004). Specifically, key facets of behavior regulation, such as inhibitory control (i.e., the suppression of a dominant response in favor of a subdominant response; Geier, Terwilliger, Teslovich, Velanova, & Luna, 2010), are associated with risk-taking behavior, such that lower levels of behavior regulation are associated with greater engagement in risk-taking (Paus, 2005). Scholars suggest that the rise in novel experiences and expectations during adolescence renders behavior regulation processes, such as youth's capacities to delay gratification and inhibit prepotent responses, particularly influential for understanding risk-taking (Romer, Duckworth, Sznitman, & Park, 2010).

Consistent with the literature on behavior regulation and adolescent risk-taking, the bulk of regulation research indicates that emotional processes of self-regulation also influence adolescent risk-taking. Research has shown that individuals' emotional reactivity and regulation can influence their decisions in risk-taking situations (i.e., affective decision-making; Damasio, 1994). Individuals who are emotionally dysregulated may be more likely to engage in risk-taking behaviors (Cauffman & Steinberg, 2000) because they are less able to manage their emotions effectively in

charged situations such that decision making bypasses the more "thoughtful" processing areas in the brain (Damasio, 1994). Researchers suggest that the transition to adolescence may precipitate intense emotions and attendant difficulties regulating them, which, in turn contribute to elevated risk-taking behavior during this period (Steinberg, 2004). Although self-regulation abilities are consistently associated with adolescents' engagement in risk-taking (Byrnes, 2006; Steinberg, 2005), few studies have distinguished among distinct facets of the regulatory response, and still fewer have examined these relations in childhood.

In sum, theoretical and empirical considerations of adolescent risk-taking implicate several factors as important considerations in efforts to understand risk-taking. Specifically, evidence supports roles of parenting, peer, and self-regulatory influences in adolescent risk-taking. These findings have advanced our understanding of adolescent risk-taking, and also informed the proposed effort to uncover processes underlying pathways to *early* risk-taking in childhood.

**Risk-taking Processes in Childhood**

Relative to the literature on adolescent risk-taking behavior, little is known about childhood risk-taking. However, coupled with theories and studies of risk-taking during the adolescent period, research on childhood externalizing behavior problems may inform a conceptual model of childhood risk-taking. Externalizing problems include aggressive, destructive, and oppositional behaviors (Campbell, Shaw, & Gilliom, 2000), some of which could be characterized as risk-taking behaviors. As with the previously discussed distinctions among antisocial, delinquent, and risk-taking behaviors, externalizing

problems are not synonymous with risk-taking. However, the literatures on both adolescent risk-taking and childhood externalizing problems converge to offer strong theoretical support for the likely contributions of parenting and self-regulatory capacities to risk-taking behaviors in childhood and beyond. Peer influences, though present during childhood, take on greater salience during middle childhood and adolescence and thus were not examined in this investigation (Parker, Rubin, Erath, Wojslawowicz, & Buskirk, 2006; Steinberg & Monahan, 2007).

Parenting factors, such as monitoring and psychological control, are important influences on adolescent risk-taking; however, different parenting factors may be salient during childhood as compared to adolescence. Whereas global indices of parenting quality, such as supportive presence, are influential across development, their specific expressions may vary in salience across childhood and into adolescence. For example, supportive and responsive parenting would be characterized by more hands-on parenting during early childhood (as when parents physically intervene when a child is doing something wrong), while in adolescence, supportive parenting may entail more distal monitoring strategies (as when parents ensure responsible adults will be at an event their teen is attending; Bornstein, Tamis-Lemonda, Hahn, & Haynes, 2008).

In later childhood (ages 7-12), Morrongiello and colleagues (2008) showed that children's self-reported physical risk-taking behavior (e.g., wearing a seatbelt, wearing a helmet when rollerblading) was best predicted by parents' instructional support (e.g., teaching children to cross the street carefully) and parents' own behaviors (e.g., parental safety practices, or lack thereof, when crossing the street). In a related study,

Morrongiello and Dawber (2000) found that mother's speed to intervene, as measured by stopping a tape depicting a child engaging in a risky situation (e.g., dancing on top of a climbing apparatus), was related to children's risk-taking such that mothers who stopped the tape to intervene more quickly also reported that their children engaged in lower levels of risk-taking behavior.

Drawing again on studies of children's externalizing behavior problems, research has shown that caregivers' hostility, negativity, and harsh or inconsistent discipline, predict increased externalizing problems (Campbell et al., 2000). Similar features of negative parenting as indicated by low support, high hostility, and intrusion/overcontrol may contribute to childhood risk-taking. In contexts of positive parental support, which is characterized by appropriate and responsive parenting, children developed valued developmental capacities, including emotional security (Cummings & Davies, 1996), executive functioning (Bernier, Carlson, & Whipple, 2010), psychophysiological regulation (Gunnar & Donzella, 2002), and social skills (Landry, Smith, Swank, Assel, & Vellet, 2001), which may result in lower levels of maladaptive (or higher levels of adaptive) risk-taking.

Thus far, very few studies have evaluated the role of self-regulation as a possible mechanism underlying childhood, as opposed to adolescent, risk-taking. Morris and colleagues (2014) were among the first to show that behavior regulation, as measured by inhibitory control in a Stroop task, was related to *lower* risk-taking during the preschool period. Likewise, and Morrongiello colleagues (2012) found that children with poor emotion regulation skills, as assessed by child self-reports on the emotion dysregulation

scale for children (Neumann, van Lier, Gratz, & Koot, 2010), exhibited higher risk-taking propensities (Morrongiello et al., 2012). Although prior studies of early parenting practices and externalizing behavior suggest that supportive parenting can predict improved effortful control and fewer externalizing behavior problems over time (H. Chang, Olson, Sameroff, & Sexton, 2011), the current study was the first to systematically evaluate prospective associations among positive parenting, behavior regulation and emotion regulation, and childhood risk-taking to test a process-oriented model of risk-taking.

**A Developmental Model of Childhood Risk-Taking**

Theoretical and empirical considerations of development and risk-taking in adolescence and, to a lesser degree, in childhood, suggest a putative developmental model from parenting to risk-taking through self-regulatory capacities. As reviewed earlier, children begin understanding the consequences of their behavior in early childhood (Bjorklund, 2012), and, with this understanding, the execution of risky behaviors becomes risk-taking. Evidence demonstrates that parenting influences children's emergent understanding of behavioral boundaries and consequences (Landry, Miller-Loncar, Smith, & Swank, 2002), as well as of children's emergent self-regulation skills (Cole, 1994). Moreover, these influences may be especially salient during the preschool years when children gain increased autonomy yet remain dependent on the parent as an external organizer of their own behavior and self-regulation (Hofer, 1994; Spangler, Schieche, Ilg, Maier, & Ackermann, 1994). In a meta-analysis conducted by Karreman, van Tuijl, van Aken, and Deković (2006) researchers found that positive

parental control (e.g., directive behavior to teach, encourage, and guide) was positively associated with children's regulation of their behaviors (i.e., compliance, inhibition) and emotions (i.e., refrain from outward aggression when frustrated in a task), whereas negative parental control (e.g., power-assertive control characterized by anger, harshness and criticism), was associated with poorer self-regulation skills. Building on these findings, the present study evaluated a multiple mediation model wherein behavior regulation and emotion regulation skills were expected to explain predicted relations between positive parenting and childhood risk-taking (i.e., higher adaptive and lower maladaptive risk-taking).

Behavior regulation studies suggest that inhibitory control mediates the relation between parenting and externalizing problems (Eisenberg et al., 2001), but researchers have not yet tested these indirect effects with regard to risk-taking. Eiden, Edwards, and Leonard (2007) found that kindergarten children whose mothers were warm and sensitive evidenced higher behavior regulation skills, as measured by effortful control, in the preschool years. In turn, children's effortful control was associated with fewer externalizing problems in kindergarten (Eiden et al., 2007). This and other studies (Brody & Ge, 2001) support the proposed developmental model of childhood risk-taking wherein positive parenting was hypothesized to support children's behavior regulation capacities, and, in turn, contribute to lower levels of maladaptive risk-taking but to higher levels of adaptive risk-taking.

Research investigating emotion regulation capacities supports similar mediating effects from parenting quality to child adaptation via emotion regulation. Contreras,

Kerns, Weimer, Gentzler, and Tomich (2000) found that 5th grade children who had a positive attachment with caregivers 2 years earlier evidenced more peer competence, and emotion regulation skills mediated this effect. In this case, negative attachment with the caregiver(s) in grade 3 predicted negative emotionality in grade 5 and, in turn, negative emotionality predicted lower peer competence (Contreras et al., 2000). Although not yet evaluated with regard to childhood risk-taking, these findings support the current hypothesis that children's emotion regulation is a probable mechanism by which positive parenting processes influence childhood risk-taking, by decreasing maladaptive risk-taking tendencies and/or by increasing adaptive risk-taking.

**Risk-Taking in a Sociocultural Context**

Risk-taking behaviors are nonrandomly distributed across groups by gender, race/ethnicity, and poverty status (Blum et al., 2000; Byrnes et al., 1999). Likewise, the mechanisms that contribute to risk-taking in diverse groups may vary in systematic ways. For example, with regard to externalizing problems, evidence suggests that positive parenting factors and self-regulatory capacities take on disproportionate salience in high-risk contexts (Rudolph, Lambert, Clark, & Kurlakowsky, 2001). Thus, it is important to evaluate if and how relations among parenting, behavior regulation and emotion regulation, and childhood risk-taking vary across groups as a function of child gender, child race/ethnicity, and poverty status.

**Gender and Risk-Taking**

Gender socialization practices can influence the expression and/or meaning of parenting and self-regulation behaviors thereby leading to different risk-taking outcomes.

In addition, there may be mean level differences in risk-taking between boys and girls. For example, Byrnes and colleagues (1999) has shown that males took more risks even when it was clear that it was a bad idea to take a risk, whereas girls seemed to be disinclined to take risks even in fairly innocuous situations and sometimes even when it was a good idea to take a risk (e.g., intellectual risk-taking on practice SATs).

Some evidence suggests that parenting effects may vary between boys and girls. For example, psychological control has been shown to increase the odds of sexual risk-taking in adolescence, but only for girls (Rodgers, 1999). One possible explanation of this pattern is that daughters may engage in higher levels of communication with parents, and thus psychological control may affect females more strongly than males (Rodgers, 1999). Rothbaum and Weisz (1994) found that maternal sensitivity influenced externalizing behavior problems for both genders, but these effects were stronger for boys than girls. In addition to differential effects, the expression of parenting practices can vary by child gender. For example, evidence suggests that physical punishments are more strongly related to externalizing behaviors among girls than among boys, but parents are more likely to physically punish their sons than their daughters (Kerr, Lopez, Olson, & Sameroff, 2004).

Some evidence suggests that parenting practices may differentially impact self-regulatory skills across genders. For example, Chang, Schwartz, Dodge, and McBride-Chang (2003) found that fathers' harsh parenting as indicated by low parental acceptance and high rejection, was related to greater emotion dysregulation and aggression for boys, but not for girls, whereas mothers' harsh parenting did not evidence a differential effect

by gender. Likewise, some studies point to gender differences in the explanatory role of self-regulation in relations between parenting and child behavior. Chang and colleagues (2011) found that parental warmth and responsiveness was related to lower externalizing problems, but this relation was mediated by effortful control for boys only. Taken together, these findings suggest that relations among positive parenting, self-regulation, and risk-taking may differ between girls and boys, but there is insufficient data to support specific hypotheses about these relations.

**Race/Ethnicity and Risk-Taking**

Cultural practices and values create a socializing context for young children (Quintana et al., 2006). Specifically, while all individuals may experience similar events and situations across development (e.g., learning manners), belonging to a different racial/ethnic group can provide a context in which the meaning and form of these behaviors could vary (e.g., some cultures hold childhood alcohol consumption as normative). Much of the research on race/ethnicity and risk-taking has focused on descriptive patterns across groups (Quintana et al., 2006). For example, lifetime smoking rates are higher for Whites and Hispanics than for African Americans (Griesler & Kandel, 1998). However, there is a need to clarify if and how the mechanisms underlying childhood risk-taking may be influenced by cultural factors. For example, parents of Mexican descent have been found to emphasize *respeto*, which is a cultural value that highlights the importance of respect for others and encourages authoritarian parenting, both of which can serve an adaptive/protective function in high risk settings (Knight, Virdin, & Roosa, 1994). In support of this assertion, Huebner and Howell (2003) found

that adolescents who were Hispanic and had low communication with parents exhibited the highest rates of sexual risk-taking (34%) when compared to Hispanic adolescents who reported higher communication (18%), but risk-taking among non-Hispanic Whites was not related to communication with parents. Unfortunately, as reviewed above, very few studies have evaluated relations of self-regulation to risk-taking across racial/ethnic groups despite evidence that parenting and self-regulatory capacities may be more salient for understanding risk-taking in Hispanic groups.

**Poverty and Risk-Taking**

Poverty can have important implications for risk-taking behavior, via influences on parenting practices, the development of regulatory capacities, and/or on the relations of each to risk-taking. Children in poverty are more likely to experience multiple ecological stressors, such as residential instability, parenting stress, and neighborhood violence. These stressors create a harsh and negative environmental context in which children struggle to negotiate developmentally salient tasks more than their higher income peers (Engle & Black, 2008). These struggles may magnify the impact of parenting (Raver, 2004) or self-regulation (Evans & Kim, 2007) on risk-taking behaviors. For example, research has found that high levels of parental control in a low-risk neighborhood are associated with poorer adolescent adjustment, whereas, in high-risk neighborhoods, high levels of parental control are associated with more positive adjustment (Mason, Cauce, Gonzales, & Hiraga, 1996). Likewise, McElhaney and Allen (2012) found that parents who undermined their adolescent's autonomy by overpersonalizing and pressuring them, evidenced lower levels of trust and acceptance in

relation to their child, but only in low-risk contexts. In high risk-contexts, undermining autonomy was related to higher levels of trust and acceptance of the child. Thus, it is likely that associations among parenting quality, self-regulation, and risk-taking may be magnified in the context of poverty status.

**The Current Study**

Theory and research suggest that risk-taking is influenced by environmental factors, such as parenting, as well as by individual differences, such as self-regulatory capacities. Due to the peak in risk-taking during adolescence, most research has focused on this period. However, there is a dearth of research on childhood risk-taking. Moreover, to my knowledge, no study has evaluated a full developmental model of childhood risk-taking, let alone in consideration of putative moderating influences within the broader sociocultural context.

Studies of childhood externalizing and risk-taking behaviors suggest that processes known to influence adolescent risk-taking may also undergird pathways to childhood risk-taking. Therefore, this study evaluated a developmental model of childhood risk-taking wherein I hypothesized that parenting quality would influence childhood risk-taking. Further, relations between parenting and childhood risk-taking were expected to reflect, at least in part, intervening measures of children's behavior regulation and emotion regulation (see Figure 1). Importantly, I also evaluated the magnitude of these hypothesized relations by child gender, race/ethnicity, and poverty status. I predicted that positive parenting as observed at age 4 would be associated with lower levels of maladaptive risk-taking and with higher levels of adaptive risk-taking, at

age 10. I further predicted that behavior regulation and emotion regulation, as reported by parents at age 6, would evidence similarly positive and negative relations with adaptive and maladaptive risk-taking at age 10, respectively. Finally, I hypothesized that behavior and/or emotion regulation would mediate the expected relation between early parenting and childhood risk-taking. Importantly, given the cognitive awareness that differentiates risky behaviors from risk-taking, all analyses included child intelligence as a covariate.

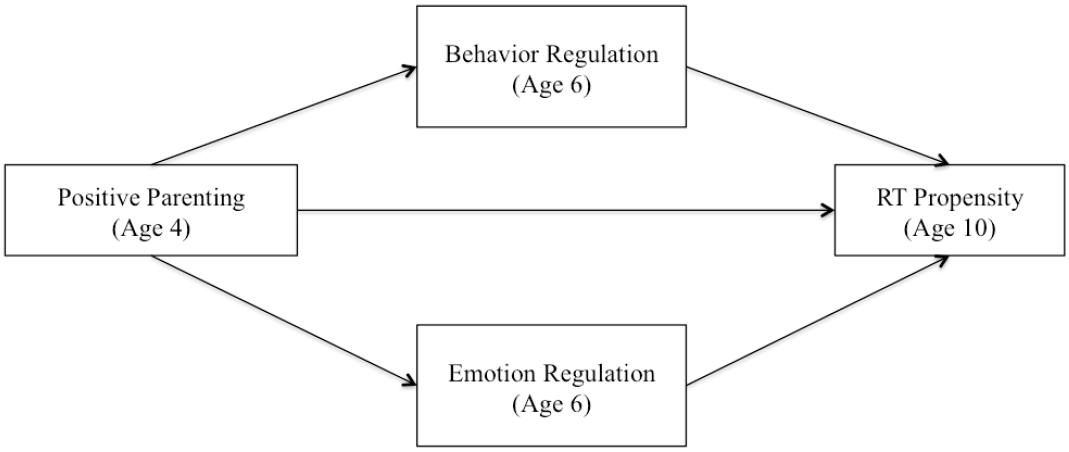


*Figure 1.* Multiple mediation conceptual model.

Given some evidence that the patterns and implications of parenting (Darling & Steinberg, 1993), self-regulation (Karreman et al., 2006), and risk-taking (Byrnes et al., 1999) vary across gender, race/ethnicity, and poverty status, the second set of analyses evaluated the invariance of the hypothesized model across boys versus girls, racial/ethnic groups (i.e., Hispanic versus Non-Hispanic), and poverty status (i.e., below the poverty

line versus above poverty). First, based on prior findings demonstrating mixed patterns with regard to gender differences across studies of parenting, self-regulation, and adaptation, moderation analyses by child gender were exploratory. Second, I predicted that the proposed developmental model from positive parenting to later risk-taking via self-regulation would be stronger among Hispanic children relative to their non-Hispanic peers. Although a range of cultural factors may influence risk-taking in children across diverse racial/ethnic groups due to the differences in cultural norms of behavior, I focused on differences between children of Hispanic and non-Hispanic descent because they are apt to be especially salient for understanding risk-taking within a cultural frame of reference. Whereas racial/ethnic differences between African American and other racial/ethnic groups may reflect the influence of correlated contextual stressors, such as poverty and violence exposure, and/or cultural effects, differences between Hispanic and other racial/ethnic groups may be more strongly related to cultural processes, such as *familismo*, that increase the salience of parenting and regulatory influences on children's risk-taking behavior. Third, given evidence that stressful environments may magnify the impact of parenting and regulatory processes in development due to the added demands on the individual and the family, I predicted that the proposed model from positive parenting to later risk-taking via self-regulation would be stronger among children residing in poverty than those who lived above 130% of the poverty line.

## Method

### Participants

Participants were drawn from an ongoing longitudinal research study of child development. Families were recruited to participate in "a study of early learning and development" via flyers placed in community-based child development centers and preschool programs. Parents completed a brief intake screening by phone before scheduling a laboratory assessment. Exclusionary criteria included children with diagnosed developmental disabilities or delays ($n$ = 3), children who were not able to understand English ($n$ = 4), and children outside the target age range of 45–54 months (not tracked). Child-parent dyads ($N$ = 250) completed an initial assessment at age 4 (50% female; $M_{age}$ = 49.1 months; $SD$ = 2.9), as well as follow up assessments at age 6 ($N$ = 215; $M_{age}$ = 73.30 months; $SD$ = 2.51), and at age 10 ($N$ = 210; $M_{age}$ = 118.30 months; $SD$ = 2.50). Of the full sample, 226 (90.4%) dyads completed at least two of the three assessments in these analyses. The racial/ethnic composition of the sample was representative of the surrounding community (i.e., 46% Hispanic, 18.4% Black, 11.2% White, .4% Asian, and 24% multicultural; U.S. Census Bureau, 2011).

At the Age 4 assessment, the majority of parent figures were biological mothers (91.4%), followed by grandmothers or other kin (5%), and foster/adoptive mothers (3.6%). Education levels were variable such that 19.8% of parents had not completed high school, 17.3% had a high school diploma or GED, and 62.9% had some kind of technical training or college coursework. Just over half the parents were employed (55.6%), and the majority were married (61.6%) or in a committed relationship (18.8%).

Poverty status was determined based on the parent's reported income divided by the appropriate poverty threshold for each household size and number of children under 18 in the home (U.S. Census Bureau Housing and Household Economics Statistics Division, 2007). Approximately half the sample (40.4%) resided at or below 130% of the poverty line, which is the federal cut-off to qualify for subsidies, such as food stamps and low-income housing.

**Procedures**

At each time point, dyads completed a 3-4-hour laboratory assessment, which included measures with the child and the parent in adjacent rooms with separate examiners, as well as an observation of the parent and child interacting during a series of challenging teaching tasks. Parents were compensated with 25 dollars per hour of assessment time and children received a small gift of their choosing at each time point. The University's Human Research Review Board approved all of the study procedures. Informed consent from the child's legal guardian and child assent (beginning at age 6) were obtained before each laboratory visit.

**Measures**

**Positive parenting (age 4).** Parenting quality was assessed across a series of semi-structured teaching tasks (i.e., a color-shape matching task, tower building, naming objects with wheels, and collaborative maze game; Block & Block, 1980). The parent was told to give the child as much help as she thought the child needed, but that the child should also have the opportunity to do as much as s/he could on her/his own. Independent coders blind to other information about the family evaluated parenting quality with task

order counterbalanced across coders (Carlson & Sroufe, 1995; Egeland, Pianta, & O'Brien, 1993). Coders met to achieve consensus on the scores for each task, and consensus scores were averaged across tasks to yield a mean rating of each scale across tasks. Scores assessing the parent's supportive presence, intrusiveness (reversed), and hostility (reversed) were standardized and composited across three 7-point scales to yield a composite index of positive parenting.

***Supportive presence.*** Supportive presence captured the extent to which the parent provided a secure base for the child, and remained attentive to the child's needs for the duration of the task. A parent scoring high on support (7) expresses positive regard and emotional encouragement or comfort for the child (e.g., "You got another one right;" "That's okay, just try again") as a means of letting the child know that s/he has the parent's support and confidence to do well in the task. A parent scoring low on this scale (1) fails to provide supportive cues and may either be passive, uninvolved, or aloof, or gives the impression that s/he is more concerned about her/his own adequacy in the setting than the child's needs (i.e., an achievement orientation versus a child-centered, teaching orientation; ICC = .806).

***Intrusiveness.*** Intrusiveness assessed the extent to which the parent lacked respect for the child as an individual and evidenced a failure to understand and recognize the child's efforts to gain autonomy and self-awareness. A parent high on this scale (7) interferes with her child's needs, desires, and actual behaviors by behaving in accord with her own agenda rather than in response to the child's needs. Intrusiveness may be expressed in multiple forms, including harsh physicality (e.g., parent grabbing the child's

arm and pulling her/him back to the table), inappropriate affection (e.g., contact which interferes with the child's efforts, such as excessive or unsolicited kissing, hugging, or grooming), or excessive control (e.g., a parent who does not give the child opportunities for self-directed efforts). In contrast, a parent scoring low on this scale (1) may or may not be involved with the child, but only imposes directives on the child if it is clear that the child needs them. Intrusiveness was reverse-scored, such that a 7 indicated low intrusion and a 1 indicated high intrusion (ICC = .750).

***Hostility.*** Hostility was indicated by the parent's expression of anger, discounting, or rejection of the child. A high rating (7) indicates clear or overt rejection of the child (e.g., blaming the child for mistakes) or lack of emotional support for the child. A parent scoring low (1) on this scale may or may not be supportive of the child, but she does not directly blame or actively reject the child. Hostility was reverse-scored, such that a 7 indicated low hostility and a 1 indicated high hostility (ICC = .797).

**Childhood self-regulation (Age 6).** Parents completed the Children's Behavior Regulation Questionnaire-Short Form (Putnam & Rothbart, 2006), which measures children's regulatory patterns across items rated on a 7-point scale from 1 (extremely untrue) to 7 (extremely true). Behavior regulation was assessed using the inhibitory control subscale ($\alpha$ = .725), which consists of 6 items that ask parents about their child's ability to modulate their behavior in various scenarios (e.g., "Can easily stop an activity when told no"). Emotion regulation was assessed using the anger/frustration scale ($\alpha$ = .734), which consists of 6 items that ask caregivers about their child's experiences of anger or frustration in various scenarios (e.g., "Gets frustrated when prevented from

doing something wants to do"). Previous research has reported good reliability and validity of the CBQ-SF as a measure of child self-regulation overall, as well as across diverse samples (de la Osa, Granero, Penelo, Domenech, & Ezpeleta, 2014; Putnam & Rothbart, 2006).

**Childhood risk-taking (age 10).** Risk-taking was assessed using the Balloon Analogue Risk-Task for Youth (BART-Y; Lejuez et al., 2002). Using a visual demonstration (see Figure 2), trained examiners told the child that s/he would be playing a computer game in which s/he would fill balloons to win a prize. Examiners explained that the child would see 30 balloons on the computer screen, one after the other; for each balloon, the child was told s/he could pump as much as s/he wanted to fill the balloon and collect as high of a prize as possible. Children were informed that the balloons can pop at any time, as soon as after one pump, or as long as until the balloon filled the whole screen. More pumps elevate the reward payoff, but also heighten the risk of a balloon explosion. To ensure the child understood and trusted that s/he would receive the specified prize, children were shown each of the four prize levels (i.e., 1, 3, 5, and 10 dollars) in four envelopes, and these were laid on the table beside the child.

Children progressed through the 30 trials, banking rewards in a visual meter or losing the opportunity to do so if a balloon exploded. The number of pumps required for each balloon to burst in the BART-Y is based on a normal distribution with a mean of 64 pumps across the 30 balloons. At the end of the task, children received the prize level indicated on the meter. If the child was unable to reach the cut-off for the small prize, s/he still received the small prize as a consolation.

The BART-Y software provides several data points per participant, and per balloon. Consistent with the research literature on the BART-Y's reliability and validity with regard to real-world risk-taking (Lejuez et al., 2007; Lejuez, Aklin, Jones, et al., 2003; Lejuez, Aklin, Zvolensky, & Pedulla, 2003), childhood risk-taking was indicated by the adjusted average number of pumps per balloon per participant. In light of previous research suggesting the BART-Y's learning curve levels off after the first set of balloons (Wallsten, Pleskac, & Lejuez, 2005), the first block of 10 balloons were excluded from all analyses to mitigate the confounding influence of learning effects. The BART-Y has been widely validated in studies of real world risk-taking (e.g., substance use) among older youth (Lejuez et al., 2002), but this study was among the first to employ this measure with children at this age.

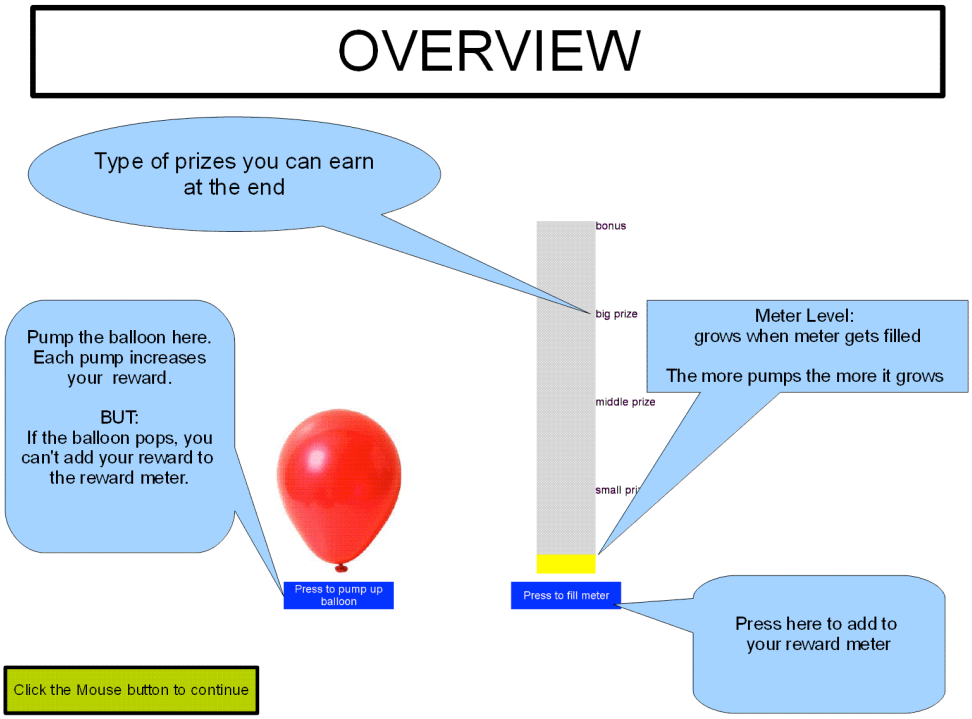


*Figure 2.* BART-Y instructions screenshot.

**Child intelligence.** Child intelligence was assessed with the Vocabulary (i.e., verbal IQ) and Block Design (i.e., performance IQ) subtests of the Wechsler Preschool and Primary Scale of Intelligence-III (WPPSI-III; Wechsler, 2002). For verbal IQ, children younger than 48 months were asked to point to pictures that represented an orally-presented word, while children older than 48 months were asked to verbally explain the meaning of the orally-presented word ($M$ = 96.87, $SD$ = 15.55). For performance IQ, all children were asked to assemble red and white blocks to match models ($M$ = 92.33, $SD$ = 17.67). Estimated verbal and performance IQs were average to yield a prorated measure of Full Scale IQ ($M$ = 95.17, $SD$= 13.47). In light of the cognitive factors that differentiate risky behavior from risk-taking, child intelligence (i.e., Full Scale IQ) was included as a covariate in all analyses.

## Data Analytic Plan

**Data preparation and missingness.** Data were analyzed using MPlus 7.4 (Muthén & Muthén, 1998-2015). Missing data were handled using full-information maximum likelihood (FIML) estimation as supported by Little (1988)'s test, $\chi^2$ (9) = 12.070, $p$ = .209, which indicate the data met the criteria for missing completely at random (MCAR). There were no missing observations of positive parenting, but there were missing parent reports of child regulation due to attrition at wave 2 (14%, $n$ = 35). Age 10 risk-taking scores were missing for 26% of the participants as a result of attrition ($n$ = 39), completion of the age 10 assessment via telephone ($n$ = 7), administration errors ($n$ =4), or in cases where the child did not comprehend the task ($n$ = 13). The distributions

of all study variables were sufficiently normal to render parametric statistics valid, thus no transformations were necessary (Afifi, Kotlerman, Ettner, & Cowan, 2007).

Chi-square analyses evaluated distributional patterns of child gender and child race/ethnicity. A multivariate analysis of variance (MANOVA) evaluated mean differences in child intelligence, positive parenting, behavior regulation and emotion regulation, and risk-taking as a function of child gender, child race/ethnicity, poverty status, and their interactions.

**Model evaluation.** All predictors were centered to reduce multicollinearity. Bias-corrected bootstrapped confidence intervals (CI) across 10,000 resamples evaluated direct and indirect effects between positive parenting and risk-taking via behavior regulation and emotion regulation (MacKinnon, Lockwood, & Williams, 2004). Bootstrapped CIs are preferred over traditional methods because they do not have restrictive assumptions regarding the sampling distribution of the indirect effect (MacKinnon et al., 2004). Model fit was assessed sequentially using the criteria set forth by Hu and Bentler (1999) as informed by model fit chi-squares, the comparative fit index (CFI>.90), the Tucker-Lewis Index (TLI >.90), the standardized root mean square residual (SRMR <.08), and the root mean square error of approzimation (RMSEA <.08). Failure to meet criteria on one or more fit indices was indicative of poor fit.

**Moderated Mediation.** Moderated mediation models tested the invariance of observed pathways from positive parenting to risk-taking through behavior regulation and emotion regulation as a function of child gender (i.e., girls as compared to boys), child race/ethnicity (i.e., Hispanic as compared to non-Hispanic), and family poverty status

(i.e., above versus below 130% of the federal poverty line). Consistent with recommendations to estimate interactions between the moderator and the pathways that define an indirect effect to evaluate moderated mediation (Edwards & Lambert, 2007; Preacher, Rucker, & Hayes, 2007), the MODEL CONSTRAINT command in MPlus defined each conditional indirect effect as the product of its component paths (i.e., X→M and M→Y) at each level of the moderator. Conditional indirect effect comparsisons were then made via bias-corrected bootstrapping (Edwards & Lambert, 2007; Preacher, Rucker, & Hayes, 2007; Satorra, 2000).

## Results

### Descriptive Analyses

Chi-square analyses revealed no significant differences in the distribution of children across gender, race/ethnicity, and poverty groups. Table 1 shows the means and standard deviations of all study variables by child gender, race/ethnicity, and poverty status. A multivariate analysis of variance (MANOVA) evaluated mean differences across continuous study variables by child gender, race/ethnicity, poverty status, and their interactions. Although there were no significant main effects of child gender (Wilks' $\lambda$ = .973, $p$ = .508) or poverty status (Wilks' $\lambda$ = .953, $p$ = .186), there was a main effect of child race/ethnicity (Wilks' $\lambda$ = .843, $p$ = .030), and the interaction of child gender and child race/ethnicity was significant (Wilks' $\lambda$ = .831, $p$ = .016). Between-subjects effects revealed significant differences in positive parenting across racial/ethnic groups, $F$ (3,174) = 4.557, $p$ = .004. Bonferroni-adjusted post-hoc tests revealed that White children received significantly higher levels of positive parenting ($M$ = .614, $SD$ = .193) than children who were Black ($M$ = -.226, $SD$ = .153, $p$ = .011), multiracial ($M$ = -.259, $SD$ = .128, $p$ = .004), or Hispanic ($M$ = -.046, $SD$ = .095, $p$ = .028). Between-subjects effects probing the interaction between child gender and race/ethnicity revealed a significant effect on child intelligence, $F$ (3,174) = 4.111, $p$ = .008. Overall, girls obtained higher IQ scores ($M$ = 97.854, $SD$ = 13.663) than boys ($M$ = 95.359, $SD$ = 13.338) among Black, Hispanic, and multiracial groups, but White boys obtained higher IQ scores ($M$ = 111.786, $SD$ = 19.420) than White girls ($M$ = 95.750, $SD$ = 12.938).

Table 1

*Descriptive Statistics for Study Variables by Child Gender, Race/Ethnicity, and Poverty Status*

| | | Child Gender | | Child Race/Ethnicity | | | | Poverty Status | |
|---|---|---|---|---|---|---|---|---|---|
| | | Boys | Girls | White | Hispanic | Black | Multi | > 130% Poverty Line | < 130% Poverty Line |
| | *M* (SD) | *M* (SD) | *M* (SD) | *M* (SD) | *M* (SD) | *M* (SD) | *M* (SD) | *M* (SD) | *M* (SD) |
| Risk Taking | 17.45 (10.00) | 16.70 (9.40) | 18.15 (10.53) | 19.25 (10.79) | 17.69 (11.11) | 17.38 (8.74) | 16.31 (8.35) | 17.28 (10.56) | 17.68 (9.25) |
| Positive Parenting | 0.00 (.82) | -0.05 (0.87) | 0.05 (0.77) | 0.41 (0.81) | -0.002[a] (0.66) | -0.12[a] (0.75) | -0.10[a] (1.08) | 0.06 (.85) | -0.07 (.78) |
| Behavior Regulation | 28.55 (6.33) | 27.62 (6.55) | 29.50 (5.96) | 26.99 (6.68) | 29.32 (6.23) | 28.43 (6.24) | 27.92 (6.39) | 29.19 (6.19) | 27.79 (6.43) |
| Emotion Regulation | 19.28 (7.01) | 18.77 (7.07) | 19.80 (6.94) | 19.21 (5.13) | 20.24 (7.33) | 17.81 (6.74) | 18.65 (7.25) | 19.70 (7.12) | 18.76 (6.87) |
| Child Intelligence | 95.17 (13.47) | 93.69 (12.94) | 96.66 (12.86) | 101.05 (17.01) | 92.41 (11.79) | 94.88 (12.93) | 97.56 (13.85) | 97.27 (13.55) | 92.79 (13.03) |
| **Wilk's *F*** | | **1.285** | | | **2.038*** | | | **1.237** | |

*Note: N*=250; *$p < .05$, **$p < .01$, ***$p < .001$. Superscripts denote mean differences across groups for significant Omnibus *F* MANOVA effects (i.e., main effect of Race/Ethnicity, where Whites evidenced higher positive parenting than all other groups).

**Bivariate Analyses**

Correlations among study variables are presented in Table 2. For the total sample, positive parenting was associated with higher levels of risk-taking at age 10, as well as with better regulation of both behavior and emotion at age 6. However, the relation between behavior regulation and higher risk-taking was only marginally significant, and there was no significant relation between emotion regulation and risk-taking. Finally, child intelligence was positively related to risk-taking, parenting, and behavior regulation.

Table 2
*Correlations Among Study Variables*

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1. Risk-Taking | | | | | |
| 2. Positive Parenting | .144* | | | | |
| 3. Behavior Regulation | .131+ | .223*** | | | |
| 4. Emotion Regulation | -.014 | .201** | .560*** | | |
| 5. Child Intelligence | .173* | .180** | .145* | .070 | |

*Note*: +$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$.

With regard to gender (see Table 3), positive parenting was related to higher levels of risk-taking among boys but not girls. In addition, positive parenting was related to better behavior regulation for boys and girls, but to better emotion regulation for girls only. Child intelligence was positively related to positive parenting for boys and marginally related for girls. Child intelligence was related to higher risk-taking for girls, but not for boys.

Table 3
*Correlations Among Study Variables by Child Gender*

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1. Risk-Taking | - | .048 | .092 | -.062 | .236* |
| 2. Positive Parenting | .242* | - | .209* | .267** | .155+ |
| 3. Behavior Regulation | .147 | .223* | - | .597** | .119 |
| 4. Emotion Regulation | .033 | .138 | .523** | - | .036 |
| 5. Child Intelligence | .080 | .206* | .153 | .094 | - |

*Note*: +$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$; Lower Triangle = Boys, Upper Triangle = Girls.

With regard to race/ethnicity (see Table 4), positive parenting was related to higher risk-taking among non-Hispanics, but not among children of Hispanic descent. In addition, although positive parenting was related to higher behavior regulation for Hispanics and non-Hispanics, it was related to significantly higher emotion regulation in Hispanics, but only marginally increases in emotion regulation among non-Hispanics. For non-Hispanics, both behavior regulation and emotion regulation were marginally related to higher risk-taking, whereas, for Hispanics, behavior regulation was not significantly related to risk-taking and emotion regulation was marginally related to risk-taking in the opposite direction such that better emotion regulation was related to lower risk-taking. Finally, child intelligence was positively related to positive parenting, behavior regulation, and risk-taking, but only among non-Hispanics.

Table 4
*Correlations Among Study Variables by Child Race/Ethnicity*

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1. Risk-Taking | - | .063 | .068 | -.195+ | .134 |
| 2. Positive Parenting | .221* | - | .269** | .293** | .098 |
| 3. Behavior Regulation | .200+ | .204* | - | .544** | .110 |
| 4. Emotion Regulation | .182+ | .153+ | .565** | - | .052 |
| 5. Child Intelligence | .228* | .234** | .213* | .133 | - |

*Note*: +$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$; Lower Triangle = Non-Hispanic, Upper Triangle = Hispanic.

With regard to poverty status (see Table 5), positive parenting was marginally related to higher risk-taking among children under 130% of the poverty line. In addition, positive parenting was related to better behavior regulation and emotion regulation, but only among children above the poverty line. Finally, child intelligence was marginally related to greater risk-taking for both groups, however, it was significantly related to positive parenting only among children above the poverty line.

Table 5
*Correlations Among Study Variables by Poverty Status*

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1. Risk-Taking | - | .121 | .109 | -.105 | .162+ |
| 2. Positive Parenting | .188+ | - | .258** | .343** | .205* |
| 3. Behavior Regulation | .173 | .151 | - | .594** | .126 |
| 4. Emotion Regulation | .135 | -.006 | .514** | - | .000 |
| 5. Child Intelligence | .200+ | .137 | .142 | .141 | - |

*Note*: +$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$; Lower Triangle = Below Poverty, Upper Triangle = Above Poverty.

**Mediation Analyses**

A multiple mediation model evaluated the effect of positive parenting during the preschool period on risk-taking at age 10 through the child's behavior regulation (i.e., inhibitory control) and emotion regulation (i.e., anger/frustration) at age 6 (see Figure 3). The model evidenced good fit ($\chi^2$ [10] = 11.289, $p$ = .336; RMSEA = .023, 90% CI [.000 - .074], $p$ = .754; CFI = .988; TLI = .978; SRMR = .035). Positive parenting was related to better behavior regulation ($b$ = .649, β = .190, $p$ = .008) and better emotion regulation ($b$ = .715, β = .188, $p$ = .005). However, whereas behavior regulation was related to significantly higher levels of risk-taking ($b$ = .351, β = .218, $p$ = .005), emotion regulation was marginally related to lower levels of risk-taking ($b$ = -.255, β = -.176, $p$ =

.062). The specific indirect effects through each mediator revealed that both behavior regulation ($b$ = .228, $p$ = .080, 95% CI [.035 – .581]; β = .042, 95% CI [.007 – .103]), and emotion regulation ($b$ = -.182, $p$ = .100, 95% CI [-.549 – -.008]; β = -.033, 95% CI [-.100 – -.002]) accounted for a significant portion of the observed relation between positive parenting and risk-taking as indicated by the bootstrapped bias-corrected 95% CIs.

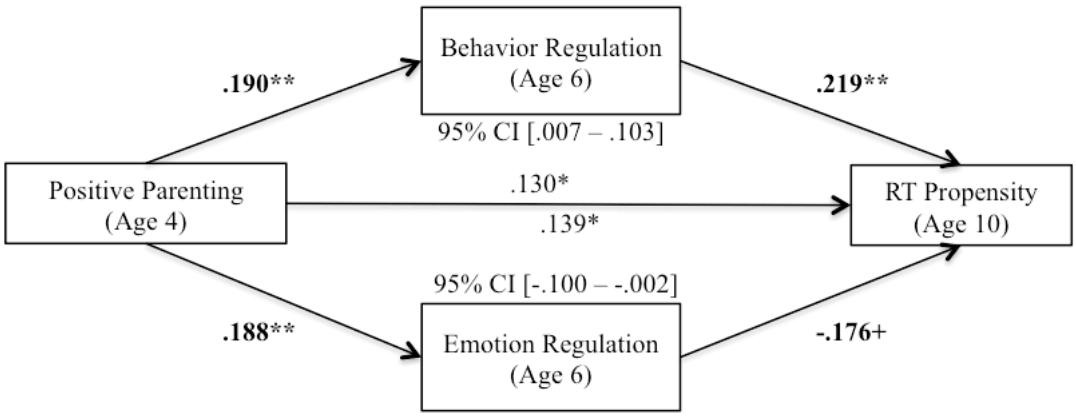


*Figure 3.* Multiple mediation model of positive parenting to RTP, through self-regulation. Standardized coefficients (Betas) shown. Covariates (not shown) include: child intelligence, poverty status, child gender, and child race/ethnicity (Hispanic/Not). *$p$ < .05; **$p$ < .01; ***$p$ < .001.

**Moderated Mediation Analyses**

Model invariance was evaluated by first comparing the final model without constraints against separate models with constraints by child gender (i.e., girls as compared to boys), by child race/ethnicity (i.e., Hispanic as compared to non-Hispanic), and poverty status (i.e., above versus below 130% of the federal poverty line). First, a multiple group comparison revealed no significant differences in indirect effects by child

gender and evidenced good fit ($\chi^2$ [10] = 11.560, $p$ = .316; RMSEA = .035, 90% CI [.000 - .107], $p$ = .557; CFI = .984; TLI = .951; SRMR = .038).

Second, a multiple group comparison between Hispanic and non-Hispanic children evidenced good fit ($\chi^2$ [10] = 11.490, $p$ = .320; RMSEA = .035, 90% CI [.000 - .106], $p$ = .562; CFI = .984; TLI .952; SRMR = .039), and revealed a significant difference between Hispanics and non-Hispanics for the indirect effect of emotion regulation on risk-taking ($b_{difference}$ = .632, 95% CI [.013 – 1.830]; see Table 6). Among Hispanics, positive parenting was related to better emotion regulation ($b$ = 1.331, β = .271, $p$ = .007), which, in turn, was related to lower risk-taking ($b$ = -.479, β = -.313, $p$ = .022), and the indirect path was significant ($b$ = -.638, $p$ = .100, 95% CI [-1.829 – -.057]; β = -.121, 95% CI [-.227 – -.016]). However, these relations were not significant among children of non-Hispanic descent (all $p$s > .120 and CIs crossing zero).

Third, a multiple group comparison by poverty status evidenced good fit ($\chi^2$ [12] = 12.908, $p$ = .375; RMSEA = .025, 90% CI [.000 - .096], $p$ = .638; CFI = .991; TLI .979; SRMR = .043), and revealed a significant difference between poverty groups with regard to the indirect effect of emotion regulation on risk-taking ($b_{difference}$ = .661, 95% CI [.106 – 1.582]; see Table 6). Among children who resided above 130% of the federal poverty level, positive parenting was related to better emotion regulation ($b$ = 1.337, β = .355, $p$ < .001), which, in turn, was related to lower levels of risk-taking ($b$ = -.503, β = -.341, $p$ = .009), and the indirect path was significant ($b$ = -.673, $p$ = .035, 95% CI [-1.542 – -.155]; β = -.122, 95% CI [-.216 – -.058]). However, these relations were not significant among children of non-Hispanic descent (all $p$s > .245 and CIs crossing zero).

Table 6

*Indirect effects of Emotion Regulation and Model Fit Indices by Moderators*

| Moderator | Indirect b | 95% CI | β | 95% CI | b diff | 95% CI |
|---|---|---|---|---|---|---|
| Hispanics | -.638+ | [-1.829 -.057] | -.121 | [-.227 -.016] | .632 | [.013 1.830] |
| Non-Hispanics | -.006 | [-.221 .197] | -.001 | [-.052 .044] | | |
| $\chi^2$ [10] = 11.490, $p$ = .320; RMSEA = .035, 90% CI [.000 - .106], $p$ = .562; CFI = .984; TLI = .952; SRMR = .039 | | | | | | |
| Below Poverty | -.012 | [-.315 .146] | -.002 | [-.057 .028] | .661 | [.106 1.582] |
| Above Poverty | -.673* | [-1.542 -.155] | -.122 | [-.216 -.058] | | |
| $\chi^2$ [12] = 12.908, $p$ = .375; RMSEA = .025, 90% CI [.000 - .096], $p$ = .638; CFI = .991; TLI = .979; SRMR = .043 | | | | | | |

*Note*: +$p$ < .10; *$p$ < .05; **$p$ < .01; ***$p$ < .001.

## Discussion

This investigation evaluated a developmental process model from positive parenting in early childhood (age 4) to risk-taking in later childhood (age 10), through children's behavior regulation and emotion regulation during middle childhood (age 6). Moreover, moderated mediation analyses evaluated the influence of children's gender, race/ethnicity, and poverty status on these relations. Findings indicated that positive parenting was associated with higher levels of behavior regulation and emotion regulation, as well as with greater risk-taking. Interestingly, children's behavior regulation, which was indicated by inhibitory control, was associated with higher levels of risk-taking. However, as expected, children's emotion regulation, which was indicated by lower levels of anger and frustration expressed in difficult situations, was associated with lower risk-taking. Although these indirect effects did not differ significantly by gender, child race/ethnicity and poverty status moderated the model such that the relation between positive parenting and later risk-taking through emotion regulation was significant for Hispanic children and those not in poverty, but not for children who were not Hispanic or who were in poverty.

The obtained finding that positive parenting during the preschool period contributed to higher levels of risk-taking six years later countered the majority of prior studies, which point to negative relations between positive parenting during adolescence and concurrent risk-taking behavior. Adolescent studies generally find that positive parenting (e.g., monitoring strategies, autonomy support) is related to lower levels of adolescent risk-taking (Allen et al., 2012; Ary et al., 1999; Pettit et al., 2001), whereas

negative parenting (e.g., psychological control, and rejecting or harsh parenting) is related to higher levels of adolescent risk-taking (Allen et al., 2012; Barber & Olsen, 1997; Shaw et al., 2003). Consistent with these patterns, prospective studies of early childhood parenting quality and later risk-taking in adolescence indicate that positive parenting practices, such as authoritative parenting, are negatively related to adolescent risk-taking, such as lower levels of substance use (Baumrind, 1991; Grolnick & Ryan, 1989; Woodward & Fergusson, 1999). Relatedly, maternal harshness during the preschool years has been shown to predict adolescent elevations in some risk behaviors, including substance use and delinquent behavior, but not in other risk behaviors, such as sexual risk-taking (Belsky, Steinberg, Houts, & Halpern-Felsher, 2010).

In contrast to the sizable literature focused on parenting and risk-taking during the adolescent period, only two studies have examined relations between parenting and childhood risk-taking, and both employed cross-sectional designs. Morrongiello and Dawber (2000) found that mother's speed to intervene in a risky situation (i.e., how quickly they stopped a tape to report when they'd stop their own child if they were engaging such activity) was positively related to their reports of their child's risk-taking, and these same researchers found that children's self-reported physical risk-taking behavior (e.g., not wearing a seatbelt) was predicted by lower rates of positive parenting practices, such as instructional support, and parents' own risk-taking behaviors (Morrongiello et al., 2008). Thus, though some evidence suggests that positive parenting practices may be related to lower levels of risk-taking in childhood, the current study offered a novel examination of these relations, particularly as they may be explained by

children's behavior regulation and emotion regulation skills, in the context of a laboratory-based risk-taking paradigm, and across diverse groups of children drawn from a large community sample that has been followed over time.

The obtained relations among positive parenting in early childhood and increased risk-taking at age 10 would be consistent with a conceptualization of risk-taking on this task and/or at this time in development as adaptive, rather than maladaptive. Middle childhood (ages 5 – 12) and the transition to formal schooling introduce novel social structures (e.g., hall passes for walking in and out of classrooms), expectations (e.g., raising your hand to speak), and opportunities (e.g., expanded friendship networks; Collins, Madsen, & Susman-Stillman, 2002). Risk-taking may support positive adaptation to these novel challenges such that children with higher levels of adjustment and confidence will engage these new situations in a proactive and risk-tolerant manner. Studies have shown that positive parenting (e.g., parental involvement) is associated with greater school engagement, including classroom engagement (Collins et al., 2002; Hill & Tyson, 2009; Simons-Morton & Crump, 2003), and higher social competence in middle childhood (Diener & Kim, 2004; Lengua, Honorado, & Bush, 2007). Positive parenting may contribute to children's adaptive risk-taking because it encourages their confidence to try new things and provides support in the context of failure, thereby increasing children's comfort and self-efficacy to face novel challenges and navigate risky situations.

In addition to direct effects of positive parenting on risk-taking, positive parenting may promote adaptive risk-taking indirectly by equipping children with better self-

regulation skills that both support their mobilization in response to challenge and their recovery in the face of failure. For example, children with strong self-regulation skills may be more comfortable venturing an educated guess to a teacher's question or approaching new social partners, despite the risk of social rejection. Indeed, positive parenting in this study was related to better behavior regulation and emotion regulation skills two years later, and these findings are consistent with prior studies showing positive relations between parenting quality and self-regulation (Grolnick & Frakas, 2002). Self-regulation may contribute to risk-taking in select contexts where risk-taking may be adaptive, such as when negative outcomes are less likely to occur than positive outcomes (Byrnes et al., 1999).

Paralleling the observed relation between positive parenting and greater risk-taking, children's behavior regulation in this sample was related to higher risk-taking. Moreover, these data revealed a significant mediating pathway from positive parenting to higher risk-taking via improved behavior regulation. Theoretically, higher behavior regulation (e.g., inhibitory control) should be related to lower risk-taking in children due to its association with children's abilities to think through the consequences of their actions and refrain from pursuing a goal without forethought (Boyer, 2006; Rothbart & Bates, 1998). Consistent with this assertion, adolescent studies have shown negative relations between inhibitory control and risk-taking (Romer, 2010; Steinberg, 2007, 2008; Williams et al., 2010). However, as with the current findings between positive parenting and risk-taking, the fact that better behavior regulation was related to increased

risk-taking in this sample may reflect the unique contingencies presented in the BART-Y and/or the relatively young age of the current sample.

Indeed, a recent study of very young children indicated that relations between inhibitory control and risk-taking may change with development. In a study of 146 preschoolers, Morris and colleagues (2014) found that higher inhibitory control was positively associated with risk-taking in the BART-Y. Due to the low probability of negative consequences in the BART-Y, children with higher behavior regulation may have been better able to control their banking behavior (i.e., stop themselves from banking too soon) in their pursuit of higher rewards. These findings suggest that children who experience more supportive parenting developed higher behavior regulation capacities and, in turn, were better equipped to engage in adaptive, rather than maladaptive, risk-taking.

In addition, the unique features of the risk-taking paradigm in this study may account for some of the unexpected relations observed among parenting, self-regulation, and later risk-taking. The BART-Y presents a cost-benefit ratio that features a negative outcome (i.e., losing money) that becomes relatively mild once participants pass the small prize threshold. Thus, elevated risk-taking in this context could be adaptive given the minimal cost of a balloon pop, relative to the positive incentive of increased money. In an adult study of risk-taking using the BART, which differs from the BART-Y in that text appears on the screen to indicate accruing money with each pump as opposed to the visual meter that fills up as each balloon is banked in the BART-Y, Bornovalova and colleagues (2009) manipulated the participants' reward/loss ratio by providing 1, 5, or 25

cent reward increments *per pump*. As expected, adults' risk-taking decreased as the magnitude of the pump reward/loss ratio increased such that they performed fewer pumps with higher per pump rewards. Interestingly, however, participants who were less impulsive and endorsed lower sensation seeking were more responsive to these shifting contingencies than were adults who were higher in impulsivity and sensation seeking. As such, adults with personality profiles that typically predict lower risk-taking propensity, namely good impulse control and low sensation seeking, actually engaged in relatively higher levels of risk-taking when the relative reward/loss ratio was smaller (i.e., smaller posted rewards per pump). These findings suggest that the relatively low cost/benefit ratio in the BART-Y paradigm may have yielded elevated levels of risk-taking generally, and particularly among children who showed characteristics that are typically associated with lower risk-taking (e.g., better behavior regulation).

Of note, the findings of Bornovalova and colleagues (2009) do not clarify the different relations between behavior regulation and emotion regulation observed in the current study. In contrast to behavior regulation, the mediating effect of emotion regulation evidenced the expected pattern of associations between positive parenting and risk-taking with positive parenting associated with better emotion regulation skills, which, in turn, were associated with lower levels of risk-taking. These results are consistent with the aforementioned study by Morrongiello and colleagues (2012) wherein children with relatively poor emotion regulation skills evidenced higher risk-taking on the BART-Y as compared to their better regulated peers. It may be that children with less well-developed emotion regulation skills have difficulty managing their emotional

reactions during the risky decision-making process, which could undermine the child's focus and compromise the child's ability to assess potential positive or negative outcomes accurately (Cauffman & Steinberg, 2000; Damasio, 1994). Thus, evidence shows that risk-taking is elevated in contexts where there is a positive ratio of benefits to risks, and children with relatively better developed behavior regulation and emotion regulation skills may be most responsive to these reward and cost contingencies, but in opposite ways, such that high behavior regulation would support increased risk-taking whereas high emotion regulation would support decreased risk-taking.

Importantly, the indirect effect of positive parenting on risk-taking through emotion regulation, but not through behavior regulation, was moderated by sociocultural factors, including race/ethnicity and poverty. Evidence suggests that both the expression of parenting (Knight et al., 1994), and its implications for children's age-salient adaptation (Leidy, Guerra, & Toro, 2010) vary across Hispanic versus non-Hispanic cultures. It may be that the traditional emphasis on *familismo* (i.e., placing the family's needs before one's own personal needs) in Hispanic cultures magnified the influence of positive parenting on children's emotion regulation skills. Furthermore, consistent with data showing that rates of anxiety and emotional distress are elevated among children of Hispanic descent relative to their non-Hispanic peers (Varela et al., 2004), it may be that emotion regulation skills exerted a stronger influence on risk-taking among Hispanic children as compared to their non-Hispanic peers. In this view, the BART-Y may have elicited stronger emotions among Hispanic children because they were more anxious or excitable about the task relative to their non-Hispanic peers. Thus, although the overall

relation between positive parenting and later risk-taking was positive, these data illuminate a potentially important indirect path from positive parenting to lower risk-taking via increased emotion regulation resources among Hispanic, but not among non-Hispanic, children.

Children's poverty status also moderated the indirect path from positive parenting to risk-taking via emotion regulation, but in an unexpected direction. Emotion regulation accounted for significant variance in the observed relation between positive parenting and risk-taking for children who did not reside in poverty, but this pathway was not significant among children who resided below 130% of the federal poverty line. A possible explanation for these unexpected findings could be that children in poverty were more familiar with risky situations and thus experienced relatively less arousal and, in turn, less demand for emotion regulation strategies as compared to their wealthier peers.

**Strengths and Limitations**

This study advanced our understanding of risk-taking during later childhood in a diverse community sample as related to early positive parenting, and as explained by children's self-regulatory capacities. The present study featured a number of strengths, including a longitudinal research design with a large and diverse community sample, and the use of multiple methods and informants. However, despite these strengths, the obtained findings are qualified by several limitations.

First, the assessment of self-regulation at age 6 via caregiver reports was relatively weak compared to the strength of the parenting observations and the use of the ecologically valid BART-Y at age 10. The present investigation used parent report of

child's self-regulation on the inhibitory control and anger/frustration subscales of the CBQ-SF (Rothbart, Ahadi, Hershey, & Fisher, 2001). Multiple facets of self-regulation (e.g., duration of felt and expressed emotion, soothability) were not assessed. As evidenced by the contrasting findings between behavior regulation and emotion regulation, future research should seek to explore additional facets of regulation and how these interact to contribute to risk-taking.

Second, the present study did not account for known personality correlates on risk-taking, such as impulsivity and sensation seeking. However, consistent with prior studies investigating the validity of the BART-Y (Collado, Felton, MacPherson, & Lejuez, 2014; MacPherson et al., 2010) which show a positive correlation between BART-Y and the Brief Sensation Seeking Scale (Hoyle, Stephenson, Palmgreen, Lorch, & Donohew, 2002), post-hoc analyses in the present investigation display a similar pattern ($r = .145$, $p = .047$).

Third, while the present study does inform our understanding of how mothers may influence risk-taking in childhood, fathers could also differentially influence risk-taking. Specifically, parenting influences on self-regulation have been reported such that it was father's harsh parenting that impacted emotion regulation of boys and girls differently, whereas moms harsh parenting did not differentiate boys' as compared to girls' emotion regulation (L. Chang et al., 2003). Research has also shown that poor supportive parenting by fathers has stronger effects on son's delinquency than the effects of poor maternal support (Hoeve et al., 2009). Thus, future research should investigate

the particular role of father's parenting on childhood risk-taking as compared to mother's parenting and its varying effects across child gender.

Fourth, whereas the present study focused on parenting influences during early childhood, peer influences take on increased importance during later childhood, which is when risk-taking was evaluated in this study. Future work should assess adaptive and maladaptive risk-taking in the peer context. Of note, the current study evaluated risk-taking in a unique and contrived laboratory context. Thus, it may be that the observed relations among parenting and self-regulation not only influence overall risk-taking, but also differentially relate to various types of risk-taking behavior. For example, better behavior regulation might predict lower rule breaking, while emotion regulation may be more predictive of sexual risk-taking. Relatedly, the present study did not include information about children's concurrent risk-taking behaviors in the real world. The inclusion of explicitly maladaptive risky situations, such as initiation of substance use, could further support or refute the proposed interpretation of these data as suggestive that risk-taking on the BART-Y and/or in middle childhood may be relatively more adaptive than maladaptive.

Fifth, although the present study covaried out the effect of child intelligence, which has not been considered in previous studies using the BART-Y. Child intelligence evidenced non-specific effects with the constructs examined here. It may be that alternate indices of cognitive adaptation, such as executive functioning skills, are related to children's ability to understand the risks and rewards in a risk-taking situation. Thus, cognitive abilities generally, and particularly executive function skills, may help explain

individual differences in risk-taking and warrant further consideration in future research. Executive function skills include goal-setting, cognitive flexibility, attentional control, and information processing, all of which may be relevant to risk-taking by allowing individuals for example, to better assess the situation, their goals, and flexibly think through multiple outcomes in the context of a risky situation.

Finally, despite the marked diversity and size of the current sample, the data did not support the evaluation of the proposed mediation model within individual racial/ethnic groups. Combining non-Hispanic racial/ethnic groups into a single group may have obscured meaningful differences if, for example, Blacks and Whites evidenced opposite effect patterns. For example, authoritarian parenting is more common among Black, as compared to White families (Garcia-Coll, Meyer, & Brillon, 1995). However, unlike in White families, this discipline style prevents problem behaviors among Black adolescents (Abar, Carter, & Winsler, 2009). Given that parenting practices are known to vary in expression across ethnic groups (Quintana et al., 2006) with culturally specific effects on child adjustment (Abar et al., 2009; Garcia-Coll et al., 1995), future research with larger subsamples of children within discrete racial/ethnic groups will further clarify the sociocultural context of childhood risk-taking. However, as discussed earlier, studies of Hispanic versus non-Hispanic cultures may provide unique information about cultural influences on risk-taking. While relations between parenting and outcomes may vary similarly across African Americans and Hispanic groups, research and outcomes among African Americans are often studied in the context of correlated risks, such as poverty and violence exposure, and Hispanic groups are, on average, more closed tied to their

countries of origin. For example, Mowen and Schroeder (2015) found that relations between adolescent delinquency and authoritarian parenting is moderated by neighborhood disadvantage for Black youth but not for Hispanic youth.

**Implications and Future Directions**

The current effort to identify early markers and pathways to childhood risk-taking has important implications for future research and offers specific guidance for the design and implementation of programs to prevent maladaptive risk-taking, as well as of approaches to promote adaptive risk-taking. Moreover, observed differences in the developmental processes underlying risk-taking as a function of race/ethnicity and poverty status encourage increased awareness of the sociocultural context of childhood risk-taking.

Risk-taking varies in form and frequency across the life span, as do the factors that influence it. For example individual differences in children's abilities to understand the consequences of behavior are very important in early development (Bjorklund, 2012), whereas peer influences are more important in later development (Steinberg & Monahan, 2007). Likewise, different facets of parenting may be differentially salient across developmental periods. Sensitive and positive parenting may be more strongly associated with risk-taking at younger ages, whereas monitoring and psychological control can be more important during the adolescent period. In addition, early parenting influences on children's self-regulatory capacities can be magnified across development as children's regulatory skillset may, in turn, elicit different parenting practices (Bernier et al., 2010).

Future research should seek to evaluate if and how early parenting and regulatory capacities transact over time to influence risk-taking.

Although risk-taking is widely associated with negative outcomes among adolescents and adults, the current evaluation of a developmental model of risk-taking in childhood offered unique evidence that the adaptive implications of risk-taking may vary over time or contexts, and highlighted the need to clarify the meaning and measurement of risk-taking using the BART-Y in childhood. Risk-taking has been conceptualized as a largely negative and maladaptive set of phenomena in the extant literature, and these assertions are supported by its significant relations with some health-related risk-taking (e.g., smoking, substance use). However, not all risk-taking is negative. The present findings suggest that the BART-Y may provide a context in which modest elevations in risk-taking may be adaptive. Future research should continue to evaluate the validity of the BART-Y as a measure of risk-taking, generally, but perhaps specifically of adaptive risk-taking among relatively young children.

In contrast to adolescent studies that point to significant associations between levels of risk-taking in the BART-Y and (some) real-world risk behaviors (Hamilton, Felton, Risco, Lejuez, & MacPherson, 2014; Williams et al., 2010), post-hoc analyses revealed significant concurrent correlates of risk-taking that suggest the BART-Y may, in fact, index adaptive risk-taking at this age. Table 7 depicts correlations between risk-taking and parent report of child competencies across child gender, child race/ethnicity, and poverty status. Child competencies as reported by parents were measured using the Achenbach Child Behavior Checklist (2000). The CBC is a widely used, standardized

assessment of behavioral and emotional problems among children ages 4 to 18 years old (Achenbach & Ruffle, 2000). In this sample, BART-Y does index relevant concurrent competencies. Specifically, risk-taking was associated with lower depression ($r$ = -.126, $p$ = .09), lower attention problems ($r$ = -.123, $p$ = .099), lower rule breaking behavior ($r$ = -.149, $p$ = .087), and higher social competence ($r$ = .163, $p$ = .029). Importantly, these relations seem to have different meaning across child gender, child race/ethnicity, and poverty status, with some relations being stronger than others.

Together, these findings may inform future intervention and prevention efforts aimed at reducing maladaptive (and promoting adaptive) risk-taking. For example, these findings encourage parents and providers to incorporate self-regulation and positive parenting practices in applied efforts to not only prevent maladaptive risk-taking, but to support the development of adaptive risk-taking. Moreover, evidence of significant moderating effects by race/ethnicity and poverty status highlight the need to incorporate sociocultural values, behaviors, and beliefs into efforts to understand and influence the emergence and expression of childhood risk-taking (Schwartz et al., 2013).

Table 7

*Post Hoc Concurrent Correlations of Risk-Taking Across Child Gender, Child Race/Ethnicity and Poverty Status*

| | | Risk-Taking at Age 10 | | | | | |
|---|---|---|---|---|---|---|---|
| | Total | Boys | Girls | Non-Hispanic | Hispanic | Below Poverty | Above Poverty |
| | | $n = 95$ | $n = 99$ | $n = 103$ | $n = 91$ | $n = 85$ | $n = 103$ |
| Withdrawn/ Depression | -.126 | -.341***[a] | .086[b] | -.164 | -.090 | -.093 | -.148 |
| Attention Problems | -.123 | -.130 | -.096 | -.105 | -.135 | -.002 | -.216* |
| Rule Breaking | -.149 | -.144 | -.069 | -.157 | -.094 | -.138 | -.116 |
| Social Competence | .163* | .182 | .155 | .067 | .229* | .164 | .163 |

*Note*: *$p < .05$; **$p < .01$; ***$p < .001$. Superscripts denote significant differences in each subgroup.

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