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# Social-Contextual and Psychological Influences on Emerging Adult Risk Taking: An Experimental Investigation of the Balloon Analogue Risk Task

A Dissertation submitted in partial satisfaction
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ABSTRACT OF THE DISSERTATION

Social-Contextual and Psychological Influences on Emerging Adult Risk Taking: An Experimental Investigation of the Balloon Analogue Risk Task
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Health and safety risk taking behaviors (e.g., substance abuse, reckless driving, and unprotected sex) are most prevalent during emerging adulthood (ages 18-25). A burgeoning body of research points to the social nature of risk taking, yet there is a gap in understanding how and why peer influence is associated with risk taking. Study 1 used a novel laboratory experiment to examine peer socialization effects by manipulating exposure to peers during a behavioral risk taking task. Participants ($N$ = 137) played a computerized behavioral measure of risk taking, the Balloon Analogue Risk Task-Youth (BART-Y; Lejuez, Aklin, Daughters, Zvolensky, Kahler, & Gwadz, 2007) once alone and once with a same-sex confederate peer. Participants were randomly assigned to one

of three peer conditions: a condition in which peers encouraged risk taking, a condition in which peers discouraged risk taking, or a peer-neutral condition. Results indicated that there were significant between-group differences whereby levels of riskiness in the peer-encouraging risk condition were significantly higher than either of the other peer conditions. Within-person comparisons indicated individuals were more risk taking relative to baseline in both peer-encouraging and peer-neutral conditions. In contrast, participants reduced their risk taking in the context of a more cautious peer. Susceptibility to peer influence and risky decision-making during the post-adolescent years are discussed.

Study 2 used a subsample (n = 68) of the participants from Study 1 who played the BART-Y in the alone condition first in order to explore methodological questions not addressed in Study 1regarding the underlying meaning of the BART-Y in relation to self-report risk taking. Furthermore, questionnaires assessed how psychological processes in multiple domains including perceptions of risks and benefits, identity exploration and risk self-schema, as well as trait fearfulness correspond to BART-Y. Findings demonstrated that participants who perceived fewer risks, had a relatively fearless personality, and identified as a risk-taker were more risk taking on the BART-Y. However, the BART-Y was not correlated to self-report risk taking, suggesting different methodologies assess distinct components of riskiness. In conclusion, this dissertation illustrates the utility of multi-method approaches to study psychological and social correlates of emerging adult risk taking.

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# CHAPTER 1 – INTRODUCTION AND RESEARCH OVERVIEW

## Introduction

The marked increase in health and safety risk taking behaviors during emerging adulthood (ages 18-25) has been well documented (Arnett, 2000; National Health and Medical Research Council 2001). For example, emerging adults are more likely than adults over 25 to binge drink, smoke cigarettes, have casual sex partners, engage in violent or other criminal behavior, and be in fatal or serious car accidents (Mulye, Park, Nelson, Adams, Irwin, & Brindis, 2009; Steinberg, 2008). More specifically, data from the National Adolescent Health Information Center (2006) reveals that young adults (ages 20-24) have five times the mortality rate of younger adolescents (ages 10-14) and that motor vehicle collisions are the leading cause of death among young adults. Also, college students are more likely to have multiple sexual partners than adolescents (Fromme, Corbin, & Kruse, 2008) with less than a third of those regularly using condoms (American College Health Association, 2008). National prevalence data from the Substance Abuse and Mental Health Services Administration (2010) indicate that one quarter of college students smoke cigarettes, with almost as many students using illegal substances, and almost half involved in heavy alcohol consumption. Illustratively, binge drinking, a pattern of drinking alcohol that brings blood alcohol concentration to 0.08 gram-percent or above (National Institute on Alcohol Abuse and Alcoholism (NIAAA), 2007), reaches a peak among 21 to 22-year olds (Schulenberg & Zarrett, 2006). Reckless driving is also a major concern as 51% of drivers between the ages of 21 and 24 who

were killed in a traffic accident tested positive for alcohol (Insurance Institute for Highway Safety, 2008).

For developmental psychologists, this increase in health and safety risk taking is a curious phenomenon. That is, linear increases in cognitive maturation and abilities during adolescence and emerging adulthood, which are supposed to be protective against poor decision-making and risky behavior, are juxtaposed against poor health and safety decision-making and behavior. Several leading scholars have called this phenomenon the health paradox (Arnett, 2000, Boyer, 2006; Casey, Getz, & Galvan, 2008; Casey, Jones, & Somerville, 2011; Dahl, 2004). This paradox is mainly discussed in the context of adolescent development, but it also applies to the post-adolescent years between 18 and 25 (Arnett, 2000), when risk taking behaviors peak despite continued improvements in response inhibition, information-processing, and decision-making processes (Casey, Tottenham, Liston, & Durston, 2005; Steinberg, 2007).

As young people transition from adolescence into adulthood, they are particularly vulnerable to the lure of risky behavior. From an evolutionary perspective, normative levels of risk taking are relatively adaptive as young people seek out new relationships and settings for adult engagement (Arnett, 2000; Dworkin, 2005; Steinberg, 2008). In some cases, risk taking translates into extremely daring and challenging activities. More typically, it leads to a range of unhealthy behaviors including alcohol and substance abuse, high-risk sexual behavior, reckless driving, and violence that increase risk of injury or loss of life and that create an economic and public health burden on society (Reyna & Farley, 2006). Still, despite increased vulnerability for risk taking, the majority

of young people are not involved in harmful risk taking behaviors. In order to inform prevention and intervention efforts, it is important to examine more carefully what social and individual factors distinguish high risk taking emerging adults from their more conventional counterparts.

In the subsequent sections, theoretical perspectives including Arnett's conceptualization of emerging adulthood (Arnett, 2000, 2007) and a dual-system model of risk taking (Casey et al., 2008; Steinberg, 2010) are reviewed. Specifically, the five key features of emerging adulthood and their relation to high rates of health and safety risk taking are described. This is followed by a review of key social developmental changes in emerging adulthood, particularly regarding the salience of peers on risky decision-making and risk taking behaviors. Next, the psychological correlates of risk taking, including decision-making, risk self-schema and a dispositional tendency towards fearfulness, are discussed. The chapter concludes with a research overview including the purpose of this dissertation, aims and hypotheses, and a conceptual model of emerging adult risk taking developed and used for the current investigations.

## Theoretical Perspectives

Progress in research on risk taking behaviors during emerging adulthood has been hampered by the use of the term "adolescence" as a loosely defined developmental stage. Developmental scholars have used "adolescence" as an umbrella term to cover a wide age range of young people. One can find researchers referring to their emerging adult samples as adolescents, youth, college students, young adults, and young people, as though these terms are all equally interchangeable. This problem is ubiquitous even in

the studies of the World Health Organization (WHO), which "defines adolescents as those between the ages of 10 and 19 years, whereas youth are aged 15 to 24 years, and young people include all those between the ages of 10 and 24 years" (Blum & Nelson-Mmari, 2004, p. 403). Given the definitional issue, studies of emerging adulthood have been enmeshed in adolescent research, making it challenging to disentangle the two different developmental stages of life. However, emerging adulthood deserves special attention in the field of risk taking behavior because compared to those younger and older, emerging adults are most at risk for engaging in health compromising behaviors (Arnett, 2000, 2005). Therefore, the proposed project is intentionally sensitive to developmental considerations unique to understanding emerging adult risk taking and draws on Arnett's (2000, 2007) conceptualization of emerging adulthood – described in depth below– as a period of heightened risk taking, developmental changes, and identity exploration between adolescence and adulthood. Because the majority of the extant research has focused on early adolescence only or not made a clear distinction between adolescence and emerging adulthood, the present investigation draws heavily on theories and empirical evidence on adolescent risk taking.

**Emerging Adulthood – A New Name for a New Period**

G. Stanley Hall defined adolescence as the period between ages 12 and 24 (Dahl & Hariri, 2005). Developmental psychologist Erik Erikson described adolescence as starting at puberty and ending in the late teens with young adulthood following immediately and spanning from the late teens through age 40 (Arnett, 2007). Modern perspectives use the onset of puberty to define when adolescence begins, although the

end of adolescence is less clearly defined and culture-sensitive (Blakemore, 2008; Spear, 2000). In contrast to previous conceptualizations that assumed a rather abrupt shift form adolescence to adulthood, Arnett (2000) proposed a more gradual developmental process of change from adolescence to adulthood. The idea of an extended period of time between adolescence and adulthood is relatively new to life span psychology, and is argued to be the result of socio-historical changes, particularly in industrialized societies. The socio-historical landscape young people currently experience is different from that of previous generations in a number of ways (Settersten & Ray, 2010). For instance, upon completing high school individuals are more likely to change jobs multiple times, pursue higher education, cohabitate, and wait longer to marry and have children (Arnett, 2007). These historical shifts afford youth in Western societies a unique opportunity for increased identity exploration.

Similar to other developmental transitions, Arnett (2000, 2007) emphasizes the gradual and fluid process of transition from adolescence to emerging adulthood to adulthood. The question of when adolescents become adults has baffled the American Psychological Association, which has held inconsistent positions regarding adolescent maturity (Steinberg, Cauffman, Woolard, Graham, & Banich, 2009). For example, because different legal decisions involve different levels of adult-maturity, leading developmental scholars have argued that the idea that "…a single line can be drawn between adolescence and adulthood for different purposes under the law is at odds with developmental science" (Steinberg et al., 2009, p. 583). Thus, the use of correct terminology around these formative years of the life span is not only a definitional issue,

but can pose conceptual and methodological challenges for developmental researchers conducting applied research. By labeling 18 to 25 year olds "adolescents", researchers not only ignore the developmental considerations unique to those during this period, but also incorrectly assume that key milestones of adolescence (i.e. puberty) are the same as those experienced by older individuals who experience distinct changes (i.e., leaving home, entering college, beginning serious romantic relationships, searching for meaningful vocation) (Arnett, 2007). Whereas adolescents may live with their parents, undergo physical changes of puberty, attend secondary school, and are part of a school-based peer culture, these characteristics do not readily apply to emerging adults.

Furthermore, in the United States and other Western countries, there are a number of legal transitions and privileges bestowed upon individuals during this period including voting, the ability to join the armed forces, signing legal documents, the ability to purchase tobacco and alcohol, and the right to make autonomous medical decisions (Scott, Reppucci, & Woolard, 1995). Additionally, in terms of criminal culpability, 18-year-olds are tried as adults by the legal justice system (Steinberg & Scott, 2003). These legal rights illustrate society's sentiment that individuals 18 and over differ significantly from those younger.

Emerging adulthood is also a period that fosters an opportunity for personal growth, allowing individuals to reexamine their worldviews and social relationships as well as try on different identities. Identity exploration, for example, is vastly different today from the 1950's. For instance, young people now have more time to become adults, which allows for more active exploration, trying on different roles, and gaining

varied life experiences (Arnett, 2004; Schwartz, Cŏté, & Arnett, 2005). Emerging adulthood is not simply a transition period but is a distinct developmental period characterized by five key features: (1) continued identity explorations, (2) instability, (3) self-focus, (4) a feeling of being in-between, and (5) a sense of endless possibilities (Arnett, 2000, 2004).

*Continued Identity Explorations*. Continued identity development is a key developmental task during emerging adulthood (Arnett, 2000). Although the majority of 18 to 25-year olds do not consider themselves to have reached adult status (Blinn-Pike, Worthy, Jonkman, & Rush, 2008), research shows that self-classification as an adult is positively correlated with higher levels of psychosocial maturation (Luyckx, Schwartz, Goossens, & Pollock, 2008). Historically, research on identity development has relied on taxonomies using varying combinations of high/low commitment and high/low exploration across different areas of life such as work, religion, and political views (Marcia, 1966). Accordingly, identity exploration involves "active questioning" and considering "various identity alternatives" whereas identity commitment "refers to the presence of strong convictions or choices" (Luyckx, Goossens, Soenens, Beyers, & Vansteenkiste, 2005, p. 605).

However, there are individual differences in the degree to which emerging adults proactively approach this unstructured, open-ended extended time of personal exploration. Based on traditional identity formation models, those high in identity commitment have made decisions regarding relevant identity domains such as vocation, education, religious and political beliefs (Luyckx et al., 2008). Identity consolidation,

through which emerging adults identify and integrate various subcomponents of their identity into a coherent system of self as an adult (Schwartz et al., 2010), has been shown to be a protective factor against emerging adult health compromising behaviors like binge drinking, substance use, risky sex and risky driving, regardless of gender and ethnicity (Schwartz et al., 2010). There is also evidence that effective coping skills and positive self-perceptions are especially important factors related to emerging adults' individualization (Schwartz et al., 2005) as well as decision-making processes and behavior (Corte & Szalacha, 2010; Markus & Wurf, 1987). Taken together, it is clear that, at least in Westernized cultures, emerging adulthood is an important time for developing autonomy and a coherent sense of self, and most importantly for this dissertation, identity processes are believed to have implications for engagement in health compromising behaviors (Arnett, 2005).

*Instability.* Given the salience of continued identity explorations across several areas of one's life, there is significant overlap among Arnett's (2000) key characteristics. Although not a central focus of prior empirical studies, emerging adulthood is also marked by instability and is considered one of the most heterogeneous periods of development, though there is limited prevalence data to indicate exactly how frequently emerging adults change jobs, romantic partners, or adapt their sense of self. One example of instability is that emerging adults are more likely than any other age group to change residences (Arnett, 2000). Anecdotally, individuals may leave their family's home for college to live in a college dormitory, then cohabitate with a romantic partner or live with friends, and then return back home after college. Indeed, the transition to

adulthood is gradual and fluid and for many, fluctuations in multiple domains of development including in employment, romantic relationships, living arrangements and educational status are expected (Arnett, 2005).

*Self-Focus.* Emerging adults are also described as self-focused, which is differentiated from selfishness in that it emphasizes self-discovery (Arnett, 200). Despite little direct empirical evidence for Arnett's description of emerging adults as self-focused, it is clear from prevalence data that emerging adults gain autonomy from parents, attain higher education than previous generations, and also wait longer than prior generations to get married and have children (Bynner, 2005). These factors collectively provide more social freedom in lifestyle choices, fewer relational obligations and perhaps less accountability. Emerging adults, then, may be more likely than adolescents or older adults to make independent decisions based on self-focused goals and needs.

This period of self-focus also has implications for psychological outcomes. Longitudinal data has shown that depressive symptoms decline and self-esteem increases from late adolescence to emerging adulthood (Galambos, Barker, & Krahn, 2006). Arnett argues many emerging adults use this exploratory period to foster more autonomous views of the self while enjoying what he has called "self-focused freedom" (Arnett, 2007, p. 70). Emerging adults themselves view accepting responsibility for one's self and making independent decisions (including financial autonomy) as most important for feeling like an adult (Arnett, 2001; Nelson & Barry, 2005). Illustratively, in a unique exploratory study of emerging adults, college students reported that their primary reason for engaging in a variety of physical, social, and intrapersonal experiences

was that they viewed this to be the optimal time in their life to be exploratory (Ravert, 2009). This provides some evidence that the general lack of adult role commitments is a primary explanatory factor for the self-focused nature of emerging adulthood.

*Feeling In-Between.* According to the Clark University Poll of Emerging Adults, the majority of emerging adults, particularly those in the earlier years (18-20) of this period, report feeling like an adolescent in some ways and like an adult in other ways (Arnett & Schwabb, 2012). This feeling of being "in-between" developmental stages is typically assessed by asking emerging adults whether they feel like they are a teenager, an adult, or somewhere in the middle. Further, this period appears to be marked less by the emergence of specific developmental tasks or chronological age, and is instead more effectively assessed using subjective age, or an individuals' perception of their developmental status (Nelson & Barry, 2005). Most emerging adults experience a personal or subjective feeling that while they are not quite adolescents they are also not fully adults, but rather somewhere in the middle.

Although marriage has been a traditional proxy for adulthood, the Poll found that less than 5% of emerging adults regarded getting married as important for feeling like an adult. As described earlier, financial independence and personal responsibility were regarded as the most important indicators of adult status. In short, it appears that based on their own self-conceptualizations, emerging adults recognize that their experience during these years represents a unique and prolonged period of development that begins after adolescence and continues until attaining full adult status.

*Sense of Endless Possibilities.* Emerging adults are generally optimistic about the future. Illustratively, 83% believe that during this period "it seems like anything is possible" and 89% feel confident that they will eventually get what they want out of life (Arnett & Schwabb, 2012). The Poll found that such optimism existed even among lower socio-economic status emerging adults. This optimistic outlook is believed to be related to emerging adults' reduced risk perceptions associated with risk taking behavior (Arnett, 2005). Perhaps related to this optimism are feelings of invulnerability and increased risk taking behaviors. One study showed that optimistic, fearless individuals may put themselves at harm by paying less attention to risks (Ravert, Schwartz, Zamboanga, Kim, Weisskirch, & Bersamin, 2009). Interestingly, despite some evidence for the positive association between optimism and health compromising activities (e.g., Friedman, Tucker, Tomlinson-Keasey, Schwartz, Wingard, & Criqui, 1993), adolescents and young adults may actually *overestimate* risk outcomes (e.g., Millstein & Halpern-Felsher, 2002a), making conclusions about the association between emerging adults' sense of optimism and risk taking unclear. Thus, an alternative explanation for increased risk taking in emerging adulthood is less centered on feelings of invulnerability to risk, and more on the discrepancy between expectations of risk and actual experience with risk behaviors (Goldberg, Halpern-Felsher, & Millstein, 2002). Accordingly, when a young person engages in health or safety risk taking but does not experience harmful or negative consequences, that individual may adjust, or lower, perceptions of risk which lead to mixed findings about the direct effect of young people's risk perceptions on behavior (Goldberg et al., 2002). Because arguments about emerging adults' optimism and risk

taking behaviors are not founded on strong empirical evidence, it is not clear whether or how this feature may impact decisions to engage in health compromising behaviors.

Taken together, these five key features of emerging adulthood explain increased risk taking behaviors as a result of sociocultural changes that allow greater freedom from parents, fewer social responsibilities, more opportunity for risk activities, and continued identity explorations relative to developmental periods preceding or following ages 18-25.

**Dual-System Models of Risk Taking: A Focus on Contextual Influences**

Whereas traditional theories of cognitive development assumed a linear increase with age in the maturation of cognitive processes (e.g., risk perception) associated with risky behaviors (Boyer, 2006), prevalence data, as described earlier, show a substantial increase in risk taking behaviors during emerging adulthood (Arnett, 2005; Steinberg, 2008). Dual-system process models challenge traditional beliefs about cognitive development by suggesting adolescents and emerging adult are especially sensitive to contextual, or socieoemotional influences, such as peer impact on decision-making in risk situations (Boyer, 2006; Gardner & Steinberg, 2005). Specifically, as described below, dual-systems models suggest that cognitive control and socieoemotional or contextual factors together help explain developmental trends in risk taking (Galvan, Hare, Voss, Glover, & Casey, 2007; Steinberg, 2010).

Although there are various versions of the dual-process and dual-system model (i.e. Casey et al., 2008; Gerrard, Gibbons, Houlihan, Stock, & Pomery, 2008; Klaczynski, 2004; Steinberg, 2010), a key commonality among these approaches is that cognitive

development is described as encompassing two distinct modes of decision-making including analytic and experiential information processing systems that develop along different timetables (Kuhn, 2006). In essence, risky decision-making can be driven by either deliberate, effortful, and conscious cognitive processes, referred to as cold cognition, or it can be influenced by past experiences and affective responses to environmental cues which lead to gist-based, or intuitive emotionally-driven processes influenced by social and contextual factors, referred to as hot cognition (Kuhn, 2006; Reyna & Farley, 2006). Specifically, cognitive control refers to the ability to inhibit task-irrelevant responses (Casey, Tottenham, & Fossella, 2002).

The prefrontal cortex, implicated in executive decision-making, response inhibition, planning and consequence consideration (Kuhn, 2006), continues to undergo maturation into the early twenties. In contrast to late maturing prefrontal control systems, it is believed that subcortical regions linked to increases in sensation seeking and reward sensitivity (e.g., ventral striatum) develop earlier during pubertal development (Casey et al., 2011; Martin et al., 2002). The result is what Casey et al. (2011) have referred to as a mis-match in the development of the brain's braking and accelerating systems thought to explain the nonlinear trajectory of risk taking behaviors from childhood to adulthood. This account, while more specific to adolescent behavior given the emphasis on early maturing subcortical systems during pubertal development, is also important for understanding emerging adult risk taking. It suggests that despite the ability for rational decision-making, adolescents and emerging adults are more susceptible to social, emotional, and contextual influences (e.g., peer influence, college environment)

compared to either children or adults. In other words, by focusing on the socieoemotional and contextual piece of the dual-system model, this perspective becomes a useful approach to study emerging adulthood risk involvement. It highlights the role of context in emerging adults' risk taking , including the college environment in shaping social norms and attitudes and peer influences that appear to motivate risk taking behaviors during this period (e.g., Borsari & Carey, 2006; Lau, Quadrel, & Hartman, 1990; Rolison & Scherman, 2003). Consistent with an emphasis on context, Boyer and Byrnes (2009) showed that college students' risk taking behaviors was strongly and positively correlated with opportunities for risk taking which increased with age. Peer groups in college may provide young people with social norms and opportunities for risky behaviors. Illustratively, evidence has shown that there may be a kind of "culture of college" that promotes risk activities through misconceptions about peer behaviors and perceived social norms (Dawson, Grant, Stinson, & Chou, 2004; Grucza, Norbert, & Bierut, 2009). By explaining emerging adult risk taking as first and foremost socially motivated and context-sensitive, dual-system models reconcile the apparent health paradox between developmental improvements in decision-making and reasoning abilities and increased health and safety risk taking behaviors.

As a whole, then, research suggests that emerging adult risk taking might best be studied under varying levels of arousal conditions and with consideration for the roles of social norms and opportunity for risk activities—both of which may lead to deficits in the cognitive control system and make risk taking more likely. This dissertation focuses more narrowly on the social meaning of risk taking by assessing the effect of different

forms of peer influence on behavior. In summary, this dissertation draws on the developmental importance of context both from broader traditional theories of development (Bronfenbrenner, 1979) and incorporates a dual-system model of risk taking with a particular focus on the impact of emotional arousal from contextual influences (i.e., peers) on risky decision-making.

**Social Development: Peer Influences on Risk Taking in Emerging Adulthood**

To understand peer effects in emerging adulthood, it is important to note that developmental change occurs in the domain of interpersonal relationships with parents, romantic partners and friends during this phase of life. Although close friendships (Andrews, Tildesley, Hops, & Li, 2002) and parents (Aquilino, 2006) remain important during emerging adulthood, social norms derived from peer groups exert particularly unique and powerful influences on health behavior choices during the college years (Jackson, Sher, & Park, 2005).

For emerging adults in college, the peer group serves multiple functions. For example, emerging adults "identify, affiliate, and seek acceptance and approval" from members of the peer group (Kuh, 1995, p. 546). It is this student peer culture that is argued to influence perceived social norms, one of the strongest correlates of college student risk taking behaviors (Neighbors, Lee, Lewis, Fossos, & Larimer, 2007; Perkins, 2002). Research supports the continued importance, beyond adolescence, of peer influence in emerging adulthood. In a unique study of its kind, LaFontana and Cillessen (2010) examined developmental changes in peer groups and the priority of perceived status in adolescents and college students. They found a positive and robust correlation

between age and willingness to violate rules to increase status. In other words, the correlation between age and willingness to violate rules was stronger for emerging than adolescents and underscores the continued and perhaps increasing relevance of peer processes in the post-adolescent years. In an experimental study, college students were socially influenced by peer confederates in a driving simulation task and those that were encouraged to drive risky did so more than those who were encouraged to drive carefully (Shepherd, Lane, Tapscott, & Gentile, 2011). This study indicates that susceptibility to peer influence is not limited to adolescence, in contrast with self-report findings that suggested a peak in peer susceptibility to antisocial influence occurs at age 14, subsiding thereafter (Steinberg & Monahan, 2007).

Whereas some argue that antisocial peer influences decline after adolescence when peer groups lose salience (Moffitt, 2003), the studies described above demonstrate that peers do not lose their salience in emerging adulthood, but rather peers continue to shape the social landscape after adolescence. There remains, however, a need for more active scholarly endeavors that identify the dynamic social influences related to risk taking during emerging adulthood.

Whereas it is generally acknowledged that peers influence individuals' risk taking behaviors, the mechanisms that underlie peer influences are still being investigated. For instance, Dishion and colleagues proposed a peer contagion model, explaining that peer deviancy training (i.e., dyadic antisocial peer processes) is one mechanism by which adolescents influence one another toward antisocial behaviors (Dishion & Tipsord, 2011). However, peer deviancy training has been exclusively applied to antisocial children and

adolescents, and is thus somewhat limited in terms of its application to emerging adult health and safety risk taking behaviors. Nevertheless, the general idea that peer influences operate outside of conscious awareness and that individuals engage in such behaviors to meet personal or social needs may also be relevant for studying peer group effects in emerging adult.

From another theoretical framework, peer influence on emerging adult risk taking may also be explained from a social psychological perspective, i.e., the risky shift hypothesis. The tendency for risk taking to be greater in groups than when individuals are alone is referred to as the risky shift and has been extensively studied (e.g., Burnstein & Vinokur, 1973; Lamm, Schaude, & Trommsdorff, 1971; Moscovici & Zavalloni, 1969; Vinokur, 1971). Although the finding that college students are more risk taking in groups than when alone (e.g. Gardner & Steinberg, 2005) is important, it does not reveal underlying mechanisms responsible for shifts in risk behavior. Accordingly, and consistent with a developmental approach regarding the salience of peers as a reference group (e.g., O'Brien et al., 2011), social comparison processes have been tested to explain individuals' shifts in riskiness in group contexts. One experimental study paired dyads together as they completed a hypothetical risky decision-making task based on how much each person in the dyad valued (low or high) risk taking (Lamm et al., 1971). Findings demonstrated that dyads who valued risk shifted more significantly toward risk relative to their prior individual decisions, suggesting that shifts in riskiness were partly explained by the value that dyads placed on risk taking. Other evidence indicates that specific elements of the group's persuasive argument in favor of risk taking such as

exposing individuals to novel ideas, as well as the validity or acceptability of the group's persuasion underlies changes in risky decision-making between individual and group risk taking (Vinokur & Burnstein, 1978). These data provide some support for the argument that emerging adult group-induced risk taking may be related to specific group processes involving attitude changes and verbal or informational influences. To explain the process by which peers influence risk taking, this dissertation draws on both a social psychological framework, the risky shift, and developmental findings on peer socialization and the salience of peers as a reference group.

## Correlates of Risk Taking Behaviors in Emerging Adulthood

Although conceptual frameworks suggest risk taking behaviors result from multiple, simultaneously influential factors (Boyer, 2006; Steinberg, 2005), with few noteworthy empirical exceptions that have assessed multiple domains of risk taking (e.g., Boyer & Brynes, 2009; Duangpatra, Bradley, & Glendon, 2009; Rolison & Scherman, 2003) there are limited investigations that have included direct assessment of constructs from differing perspectives. Full understanding of risk taking behaviors in emerging adulthood requires attention to multiple domains of development that are salient during emerging adulthood. Therefore, the following sections include descriptions of the cognitive and identity processes as well as personality differences believed to be related to emerging adult risk taking behaviors.

### Decision-Making: Risk and Benefit Perceptions

Drawing from Gullone and Moore's (2000) definition, this study operationalizes risk-taking as "behavior which involves potential negative consequences (loss) but is

balanced in some way by perceived positive consequences (gain)" (p. 347). Accordingly, it is assumed that cognitive processes, or more specifically, decision-making processes, are key explanatory factors in understanding who takes risks and why. As a leading framework in risk taking research, decision-making models typically emphasize the role of cognitive processes including perception and probabilistic reasoning skills (Boyer, 2006). Furthermore, the development of decision-making skills is recognized as critically important to healthy adjustment, in large part because of the implication it bears on risk taking behaviors (Byrnes, 1998; Halpern-Felsher & Cauffman, 2001; Mann, Harmoni, & Power, 1989). Put differently, the ability to avoid excessive risk is a fundamental aspect of development (Byrnes, 1998) and is described as a core area of competence promoting positive youth development (Guerra & Bradshaw, 2008).

Risk perception, or the estimation of negative outcomes associated with specific risk behaviors and the likelihood of these outcomes, is considered a central component in many cognitive models of health behavior change (Thornton, Gibbons, & Gerrard, 2002). Some research has found that individuals are more likely to engage in risk taking behaviors if they pay less attention to negative consequences and believe that these consequences are unlikely to occur (Boyer & Byrnes, 2009; Song et al., 2009; Zimmermann, 2010). However, other studies have indicated that individuals involved in risky behaviors perceive themselves to be at *greater* risk of negative outcomes than those not involved in risky behaviors, suggesting that those who take health and safety risks are in fact aware of the potential for negative consequences (Millstein & Halpern-Felsher, 2002a). Thus, despite the conceptual importance of considering risk perception, mixed

findings, inconsistent measurements across studies, and correlational research preclude full understanding of how this cognitive ability is used in real world risk situations (Curry & Youngblade, 2006; Slovic, 2000).

A clearer understanding has emerged regarding perceptions of benefits and risk involvement. Decision-making models of risk taking have consistently demonstrated a positive association between perceptions of benefits (or perceived rewards and gains of risk activities) above and beyond the effect of perceived risks on risk taking behaviors (Boyer & Byrnes, 2009; Gullone & Moore, 2000; Rolison & Scherman, 2003; Song et al., 2009). For example a study of emerging adults revealed that perceived benefits (i.e. pleasure) of unprotected sex was a better determinant than perceptions of risks (i.e. unwanted pregnancy or the spread of sexually transmitted infections) (Parsons, Halkitis, Bimbi, & Borkowski, 2000).

Based on the importance of perceived benefits in predicting risk taking behaviors, one area of investigation has focused on emerging adults' perceptions of the social rewards of risk taking. Social rewards may include peer acceptance or approval and behavioral conformity (Steinberg & Monahan, 2007). In support of the association between perceived benefits of risk taking behaviors and peer perceptions, evidence using a risky choice task has suggested that the presence of peers (even without direct verbal influence) is associated with a preference for immediate gains over consideration of potentially riskier outcomes in a study of 18 to 20-year olds (O'Brien, Albert, Chein, & Laurence, 2011). O'Brien and colleagues assumed that the presence of peers may make the implications of a decision on social status more salient. Researchers from the same

laboratory have similarly argued that the presence of peers increases risk taking because peers activate reward-sensitive decision-making processes that result in a preference for short term benefits as opposed to weighing longer term risk outcomes (Albert, Chein & Steinberg, 2013). These findings, while speculative, illustrate that emerging adults are not impervious to peer influence on decision-making.

Research in this area also illustrates the salience of peers as a reference group and suggests peers shape perceptions, attitudes and behaviors in emerging adulthood (Maggs, 1997). Some perspectives such as pluralistic ignorance (e.g., Schroeder & Prentice, 1998) and attribution theory (e.g., Perkins, 1997) suggest that college students typically overestimate their peers' alcohol approval and use, motivating them to adjust their behavior to be more in line with perceived norms (Borsari & Carey, 2006). Thus, normative beliefs about the peer group's attitudes and behaviors are believed to motivate individuals to act in ways that are more aligned with social expectations. The association between emerging adults' desire for peer acceptance and risk taking behaviors however likely depends on, or is moderated by, individual difference factors. Accordingly, to the degree that it is important for some young people to avoid negative peer evaluation, they are assumed to modify their behavior in order to improve their *perception* of their peers' approval (Schroeder & Prentice, 1998). Still, explanatory processes that identify how the peer reference group influences risk taking behaviors during emerging adulthood are not entirely understood. In summary, decision-making models of risk taking have provided consistent evidence on the positive association between perceptions of benefits, which are believed to include peer processes, on risk taking behaviors.

**Risk Self-Schema**

Although identity exploration as described earlier is a key developmental task in emerging adulthood thought to contribute to greater risk taking behaviors by way of experimentation with identity roles, the relation between other facets of identity such as self-perceptions and risk taking has not been fully examined. From the paucity of research on this association, one potential linkage between identity development and risk taking may be explained by the need to maintain self-conceptions (Josephs, Larrick, Steele, & Nisbett, 1992). One may internalize a self-conception, which motivates certain behavioral decisions to maintain a coherent sense of self that is consistent with self-conceptions (Josephs et al., 1992). Similarly, social identity theory describes identity as relatively stable and enduring but also amenable and sensitive to proximal situational or contextual factors (Hogg, Terry, & White, 1995). In other words, the self-concept is believed to be subject to fluctuations based on the social context. This dissertation defines *risk self-schema* as one's perceptions of the self as a risk-taker. Thus, in relation to risk self-schema more specifically, social identity theory would suggest that having the salience of an internalized identity as a risk-taker should motivate or increase risk taking behaviors, especially in social contexts with peers who promote such behaviors.

Self-schemas are defined as "cognitive generalizations about the self, derived from past experience, that organize and guide the processing of self-related information contained in the person's social environment" (Markus, 1977, p. 53). Evidence has shown that adolescents develop self-schemas in various domains that influence decision-making in associated areas. For example, body weight self-schema (Stein, 1996),

exercise self-schema (Sheeran & Orbell, 2000), sexual self-schema (Houlihan, Gibbons, Gerrard, Yeh, Relmer, & Murry, 2007) and deviant self-schema (Stein, Rosser, & Markus, 1998) each predict behavioral intentions within corresponding domains (Estabrooks & Courneya, 1997). Self-verification theory (Swann, 1983; Swann & Reid, 1981) proposes that beliefs about the self organize reality and guide behavior and that individuals go to great lengths, even modifying their behavior, to preserve their self-view. For emerging adults, the salience of identity exploration and experimentation (Arnett 2000) together with a college context that promotes health and safety risk taking (Borsari, & Carey, 2001; Jackson et al., 2005) underscore the importance of considering self-views as a risk-taker. As a whole, research on self-schema indicate that a person's view of themselves as a risk-taker may stem from social feedback from the environment such as peer reinforcement, social comparisons based on perceived social norms as well as their own prior experience with risk taking behaviors (Swann, Chang-Schneider, & McClarty, 2007).

In summary, because of the parallel importance of identity development in adolescence and emerging adulthood, this dissertation investigates how having a self-schema as a risk-taker explains individual variation in risk taking behaviors. Specifically, to the degree that emerging adults regularly face decisions about taking risks, it is likely that they also develop a risk self-schema associated with whether or not they see themselves as someone who takes risks. In this manner, risk self-schema also should play a role in decision-making processes linked to risk behaviors.

**Fearfulness: A Disposition Tendency Away From Risk Taking**

There is a wealth of research examining the role of individual differences in personality and psychological dispositions on health behavior outcomes (Booth-Kewley & Vickers, 2006; Friedman, 2000; Shiner, Masten, & Roberts, 2003; Vollrath, Knoch, & Cassano, 1999). This dissertation focuses on fearfulness, conceptualized as a dispositional feature linked to risk-related propensities, or "personal qualities of an individual that could explain why he or she might engage in a risky behavior when confronted with an opportunity to do so" (Boyer & Byrnes, 2009, p. 24).

Fear of negative consequences is believed to deter individuals away from health and safety risk taking behaviors and is an example of emotional reactivity that functions to produce specific action or behavioral tendencies (Rothbart & Bates, 2006). For example, those high in fearfulness may be more behaviorally inhibited, especially in high-risk situations. However, few empirical investigations take seriously developmental and individual differences in young people's orientation toward risk outcomes. Although developmental studies of risk taking have not typically examined fearfulness as dispositional tendency among emerging adults, the concept of fearfulness as a mechanism of approach and avoidance behaviors has been assessed in studies of early childhood. For example, in one study of children's compliance, researchers observed fearfulness by asking children to do certain "risky activities" such as putting their hand in a mysterious black box (Kochanska, Coy, & Murray, 2001). It remains unclear whether children who demonstrated less fear under "risky" conditions in early childhood grew up to be more risk taking in adolescence and emerging adulthood. To the degree that fearfulness is

biologically based, it is likely that there is some level of continuity in the tendency to approach or avoid potentially dangerous situations (Rothbart & Bates, 2006).

The effect of fearfulness on risk taking behaviors can be explained by Gray's (1970) early theoretical work on individual differences in the Behavioral Inhibition System (BIS) and Behavioral Approach System (BAS). Those higher in BIS sensitivity are believed to engage in less risk taking behaviors because they seek to avoid activities or situations that may lead to harmful or negative outcomes (Carver & White, 1994). Thus, BIS sensitivity is believed to be related to feelings of fear and anxiety. In contrast, BAS sensitivity is related to engagement in impulsive or antisocial behaviors (Carver & White, 1994). As such, individual differences in fearfulness may reflect differences in behavioral motivation systems that ultimately lead to different self-regulatory processes and behavioral decisions. Although BIS/BAS studies have traditionally focused on describing differences in introversion and extraversion (e.g. Gray, 1970), behavioral inhibition in particular has been extensively examined within a variety of research areas such as children's development of social anxiety (Natsuaki, Leve, Neiderhiser, Shaw, Scaramella, Ge, & Reiss, 2013), factors related to Attention Deficit Hyperactivity Disorder (Barkely, 1997), and most importantly for the present investigation, health and safety risk taking (Cooper, Shairo, & Powers, 1998). In essence, fearfulness represents negative affectivity and contains components of behavioral inhibition (Rothbart, 2007), and at relatively higher levels should thus deter individuals away from health and safety risk taking behaviors.

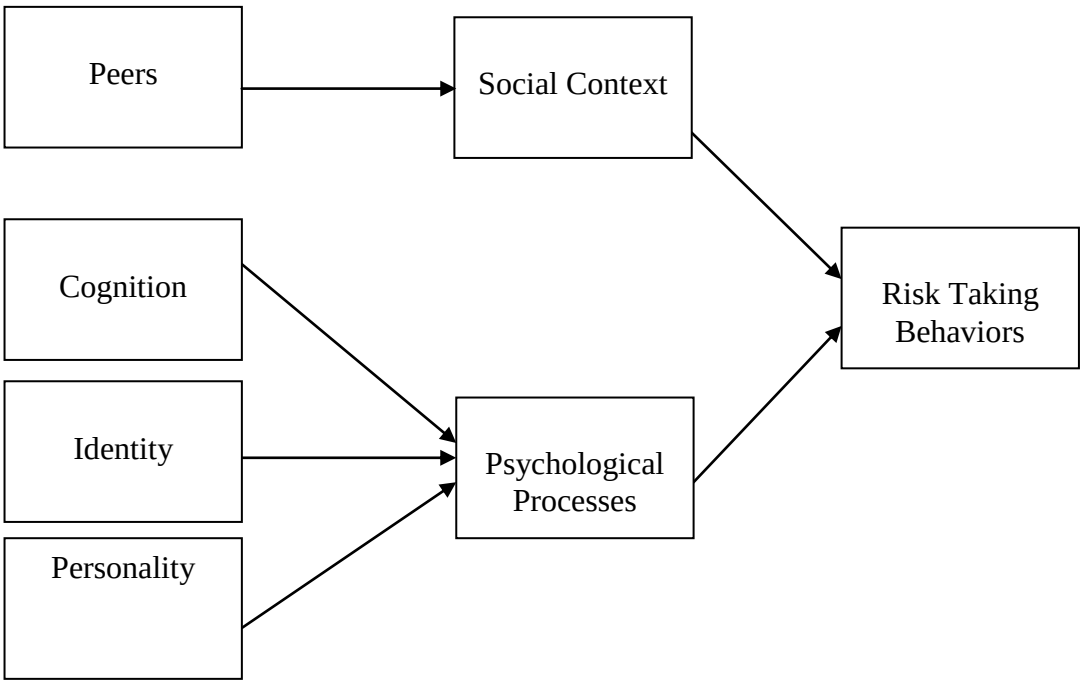
Rather than assessing fearfulness directly, studies of emerging adult risk taking have examined related constructs such as *harm avoidance* on one end and *sensation seeking* on the other end. Harm avoidant individuals prefer "a certain (100% chance of occurrence) outcome to a risky one (less than 100% chance of occurrence)" (Josephs et al., 1992, p. 26). For emerging adults, individual differences in harm avoidance, a conceptually similar construct, at age 18 has been shown to predict fewer health compromising behaviors at age 21 (Caspi, Begg, Dickson, Harrington, Langley, Moffitt, & Silva, 1997). On the opposite end of the continuum are individuals who tend to experience a reduced fear of harmful consequences, or sensation seekers who desire intense and novel stimuli (Zuckerman, 1979, 2007). Evidence has indeed suggested that sensation seeking peaks during emerging adulthood (Arnett, 2005) and that emerging adults who are higher in sensation seeking and danger invulnerability are more risk taking with their health and safety (e.g., Ravert et al., 2009; Duangpatra et al., 2009). Although indirect and tentative, collectively these findings provide initial support for the relevance of considering the role of fearfulness as a correlate of emerging adult risk taking by highlighting important individual differences in the tendency to approach or avoid potentially harmful activities.

## Research Overview

The purpose of the current investigation was to broaden scientific understanding of the many influences (social, cognitive, identity, and personality) underlying emerging adult health and safety risk taking behaviors. Figure 1 displays a depiction of the conceptual model used in this dissertation.

Figure 1-1

*Conceptual Model of Emerging Adult Risk Taking*




This dissertation is founded on two significant aims: (1) to assess social-contextual influences (peers) on college student risk taking and (2) to investigate the effects of psychological or individual-level factors (cognition, identity, and disposition) on college student risk taking. The following research overview provides a context for the study of emerging adult risk taking and highlights the importance of addressing the proposed research questions. To achieve these aims, this dissertation is composed of two related studies. Study 1 (Chapter 3) examined the social contextual piece of the model in

Figure 1 by assessing different forms of peer influence. Study 2 (Chapter 4) examined the other primary influences on risk taking, those that reflect individual-level processes such as the effect of decision-making, self-schema and personality.

Because of the methodological challenges of measuring risk taking behaviors directly, researchers have examined risk taking propensity as a proxy of behavior, defined as a trait "characterized by a willingness to take risks that ultimately is reflected in an increased probability of engage in risk taking behaviors" (Botella, Narváez, Martínez-Molina, Rubio, & Santacreu, 2008, p. 529). Risk taking propensity, while not extensively applied in developmental psychology, has been studied in other areas such as in clinical practice focused on medical decision-making (Harrison, Young, Butow, Salkeld, & Solomon, 2005) and behavioral economics (McAlvanah, 2009). For example, one study using an adult sample found that willingness to take risks in general predicted risky behavior across multiple domains (Harrison, Lau, & Rutstrom, 2007). Although some developmental scholars have considered willingness to take risks (i.e., Gerrard et al., 2008), it has not been a major focus in developmental psychology and studies of emerging adult risk taking, perhaps due to methodological challenges of measuring risk taking propensity.

In recent years, however, there has been a surge of new behavioral measures that use gambling paradigms inspired by behavioral economic frameworks that attempt to measure individual differences in risk propensity. Some examples of these include the Balloon Analogue Risk Task (BART; Lejuez, et al., 2002), The Iowa Gambling Task (IGT; Bechara, Damasio, Tranel, & Damasio, 2005), and The Bechara Gambling Task

(BGT; Bechara, Damasio, Damasio, & Anderson, 1994). Illustratively, the BART-Y (discussed further in Chapters 2-4) is a computerized behavioral measure of risk taking propensity that requires participates to pump a balloon through several trials in order to accrue fake money by inflating the balloon up to a certain point as long as it does not burst, in which case all money is lost (Lejeuz et al., 2002; Lejuez, Aklin, Daughters, Zvolensky, Kahler, & Gwadz, 2007). This behavioral measure should be thought of as a proxy or index of one's tendency to make risky decisions by emulating real world risky decision-making where there is some potential for negative consequences but also an opportunity for perceived positive consequences or rewards (Lejuez et al., 2002). Illustratively, risk taking propensity on the BART is positively correlated, though the effect sizes are small to moderate, with self-report health and safety risk taking behaviors (Lejeuz, Aklin, Zvolensky, & Pedulla, 2003a). Therefore, a variant of the BART, the BART-Y was used as the primary outcome measure of risk taking in Study 1 (Chapter 3). Study 2 (Chapter 4) examined how risk taking on the BART-Y corresponds with self-report risk taking behaviors and the psychological factors (cognition, identity, and personality) described above.

Broadly, in Study 1(Chapter 3), a unique experimental paradigm was designed to test social-contextual influences on risk taking tendencies wherein emerging adults played a behavioral measure of risk taking propensity under varying conditions of peer exposure, assessed as direct verbal messages. It was hypothesized that different kinds of peer exposure would exert distinct influences on emerging adults' risk taking on the task. Specifically, it was expected that individuals would be more risk taking on the BART-Y

relative to baseline when they received encouragement to be more risk taking from a peer. In contrast, hearing more cautious comments from peers was expected to discourage individuals from being risky. A third condition was included for comparison purposes in which individuals played the task with a neutral peer who neither encouraged nor discouraged risk. No a priori hypotheses were formed about whether or how the presence of peers in a neutral context would influence risk taking on the task.

The purpose of Study 2 (Chapter 4) was to more broadly explore relations between psychological correlates (i.e., decision-making processes, identity exploration and risk self-schema, and fearfulness) and the BART-Y. The main aim was to elucidate potential underlying mechanisms of behavior on the BART-Y. Although some studies show significant associations between self-report and laboratory measures of risk taking (e.g., Lejuez et al., 2003a), there are also inconsistent findings regarding the relations among self-report and behavioral measures of riskiness (e.g., Reynolds, Ortengren, Richards, & de Wit, 2006). Therefore, a secondary goal was to investigate whether the psychological processes assessed correlate similarly with distinct measures of riskiness (i.e. the BART-Y and self-report risk taking). Because of the exploratory nature of Study 2, no a priori hypotheses were made.

# CHAPTER 2 – PILOTING THE BALLOON ANALOGUE RISK TASK: PRELIMINARY ANALYSES

## Introduction

An overarching aim of this dissertation was to examine contextual peer influences of emerging adult risk taking. To this end Study 1 (Chapter 3) employed an experimental paradigm that used The Balloon Risk Task-Youth Version (BART-Y; Lejuez, et al., 2007) with three distinct conditions of peer influence wherein participants played the BART-Y twice consecutively. To ensure that findings generated from the BART-Y would be interpretable, a pilot study was conducted to examine the task more carefully. The purpose of this pilot study was to address two potential methodological issues of the BART-Y: (a) carryover effects that could potentially be generated from the administration of the BART-Y multiple times to each participant; and (b) appropriateness of the original BART-Y (youth version) for college-aged students. Carryover effects were considered because in Study 1 (Chapter 3), participants played the BART-Y twice consecutively, once alone and once with a confederate peer. Therefore, given the study design, it was important to inspect task-related issues associated with within-person analyses including practice, fatigue and carryover effects that may result in ambiguous peer effect findings (Greenwald, 1976).

The BART-Y is a modified version of the original, adult version (known as the BART) and both have shown good psychometric prosperities (Lejuez et al., 2002; Lejuezet al., 2003a; Lejeuz et al., 2007). Like the original version of the task, the BART-Y is a laboratory-based behavioral measure of risk taking propensity that has been

uniquely constructed for use with youth. In a study of at-risk high school adolescents, the BART-Y showed adequate validity as indicated by its correlation with a risk behavior composite (Lejeuz et al., 2007). Although there is some empirical evidence for the reliability and validity of the BART-Y and the BART (Lejeuz et al., 2003; Lejeuz et al., 2007), studies using the tasks have generally not examined reliability of the measure across multiple assessments. A notable exception comes from a study by White, Lejuez, and Wit (2008). The researchers examined stability on the BART across multiple days and found acceptable test-retest reliability ($r = .77$, $p < .001$) suggesting that how individuals behave on the task on one day is likely to be similar to how they play it on another day (White et al., 2008).

The pilot study also served to assess appropriateness of the BART-Y for emerging adults. The original BART, for example, has been used across several age groups including studies of 18 to 25-year olds (Lejuez et al., 2002), 18 to 30-year olds (Lejuez, Aklin , Jones, Richards, Strong, Kahler, & Read, 2003b), 18 to 35-year olds (White, et al., 2008), 18 to 42-year olds (Vigil-Colet, 2007) and in one study both 14 to 17 and 33 to 55-year olds were included (Mitchell, Schoel, & Stevens, 2008). Because the BART was not intentionally developed for use exclusively with one age group, it was worthwhile to investigate whether the youth version of the task, the BART-Y (Lejuez et al., 2007) was appropriate for college students who are in a unique developmental period (Arnett, 2000, 2007). Although the BART has been administered to adolescents and revealed parallel findings to those of adults (Aklin et al., 2005), a consideration for monetary incentives used in the adult version of the BART as unethical for younger participants prompted the

modified youth version (Lejuez et al., 2007). The BART-Y, used primarily with high school students, thus replaces monetary reward on the task with a paradigm whereby points are accumulated in exchange for a prize (e.g., Bornovalova, Gwadz, Kahler, Aklin, & Lejuez, 2008; Lejuez et al., 2007).

Two sets of pilot data were collected. First, the BART-Y was piloted to inspect short-term, or same-day, within-person fluctuations in risk taking propensity on the task. This pilot data was collected to examine whether properties of the task (e.g., practice effects, fatigue) would interfere with subsequent interpretations of peer effects. If observed, such changes may render experimental findings in the present investigation difficult to interpret. Second, in addition to examining the stability and consistency of the task, a separate but comparable sample ($N$ = 44) was recruited to determine whether there were significant differences between two versions of the same task, the BART-Y (Lejuezet al., 2007) and the BART (Lejeuzet al., 2002). This was done to determine whether one version of the task would be more appropriate for emerging adults.

## Method

### Participants

Students ($N$ = 138) enrolled at a university in Southern California participated in this study for course credit. Participants (54.5% female, 45.5% male) were between 18 and 23-years old ($M$ = 19.34, $SD$ = 1.20), and ethnically diverse (approximately 44% Asian or Asian American, 34% Hispanic, 6% Caucasian, 2% Black or African American, 1% Pacific Islander or Native American, 3% Middle Eastern, and 9% identified as mixed or other). The majority of students reported that they were currently receiving financial

aid (80%). About half of the students reported living on campus (50%), compared to living off campus with friends or roommates (37%) or living at home with family (13%). A separate sample ($N$ = 44) from the same university subject pool with a similar demographic background was also recruited to play the adult version of the BART for task-based comparative purposes only.

**Measures**

**Balloon Analogue Risk Task.** Two versions of the same task were assessed. In the BART-Y (Lejuez et al., 2002), participants attempted to earn points by pumping up balloons presented on the screen. The goal of the game is to pump up each balloon as much as possible without causing it to explode. To obtain points, participants were told to click the "Save Points" button before the balloon explodes to transfer points. If the balloon was pumped up past its explosion point, the balloon on the screen made a popping sound and all potential points were lost. Points were given based on the number of pumps for trials in which the balloon was successfully saved. A new balloon appeared after each instance points were saved as well as after a balloon exploded, until the participant pumped up all (30) balloons. In the game, there was a column on the left side of the screen reflecting the amount of points earned and indicating the level of the prize won (small, medium or large prize). Whereas previously published studies of the BART-Y offer compensation (either monetarily or with an actual prize), participants in the present study were told to imagine they were playing for a prize, but did not actually receive one.

In line with prior research (Lejuez et al., 2002, 2003a), the adjusted average number of pumps (only averaging the pumps on balloons where points were saved and not constrained on balloons that exploded) was the primary dependent variable indexing risk taking on the BART-Y.

The BART (Lejuez et al., 2002) is nearly identical to the BART-Y. The primary distinction is the player's perception of compensation. Specifically, rather than playing for a prize in the BART-Y, participants played for money in the BART. Thus, in place of the prize meter, participants pumped up each balloon and saved points in an effort to accrue more (hypothetical) money. Specifically, each pump added 5 cents to a temporary reserve, however when a balloon was pumped passed its explosion point a popping sound effect occurred and all money in the temporary bank was lost at which time another balloon appeared. Participants were told that that they could stop pumping the balloon and click the "Collect $$$" button at any time in order to transfer money from the temporary bank to the permanent bank, reflected by a slot machine payoff sound effect. As with the BART-Y, the dependent variable in the BART used the adjusted average number of pumps, or the average number of pumps on each balloon before money was collected.

**Procedures and Study Design**

Participants played the BART-Y (or BART) twice, consecutively in a private laboratory room. A trained research assistant read modified standardized instructions aloud to each participant and provided a brief demonstration. In addition, the participant read a brief onscreen summary of the task before beginning the assessment. Participants

were not given any information about why they were asked to play the BART-Y (or BART) twice. Participants were asked to return to the main waiting area when the first trial ended. They were told that at that point the research assistant would begin their second and final trial. The lapse in time between trials was thus very brief (1-2 minutes). This study was approved by the university's Institutional Review Board.

## Results

### Psychometric Properties of the BART-Y

Based on those who played the youth version ($N$ = 138), the test-retest correlation between Trial 1 ($M$ = 37.09, $SD$ = 13.13) and Trial 2 ($M$ = 38.64, $SD$ = 14.47) was positive and significant ($r$ = .79, $p$ < .001). This suggested the BART-Y is internally reliable. However, a paired-samples $t$-test showed a small but significant increase in risk taking on Trial 2 relative to Trial 1, $t(137) = -1.66$, $p$ = .03. Therefore, for the analyses in Study 1, the experimental order (whether one played the BART-Y alone first or with a peer first) of the BART-Y was counterbalanced to avoid the uninterruptable confounding situation in which it would be unclear whether increased risk taking with a peer at Trial 2 is explained by fatigue / practice or peer influence.

### Comparisons of the BART and BART-Y

Descriptive data also showed that the BART-Y ($M$ = 35.92, $SD$ = 13.15) and the BART ($M$ = 34.70, $SD$ = 15.13) were not significantly different from each other, $t(86)$ = .40, $p$ = .69. However, contrary to expectations, the BART-Y and BART were not significantly correlated, ($r$ = .02, $p$ = .91).

## Discussion

Two main findings emerged from this pilot study. First, pilot analyses of the BART-Y revealed that while scores from Trials 1 and 2 were highly correlated, there was a significant increase in risk taking propensity between assessments. The finding that risk taking on the BART-Y increased across two trials is somewhat consistent with other findings that have shown a learning effect on the same task (Holmes et al., 2009) and small but significant increases in risk taking among individuals who were assessed three times within the same day (Lejuez et al., 2003a). However the present findings are in contrast to other work that indicated the task is resistant to learning and habituation effects (White et al., 2008). Specifically, White and colleagues' study did not show differences in BART risk taking when it was administered to the same participant on two separate days.

For the purposes of this dissertation, the findings here elucidated the need for counterbalancing experimental order to more accurately observe within-person effects in Study 1 (Chapter 3). Counterbalancing is a commonly used statistical approach used in experimental designs to handle carryover effects whereby participants are randomly assigned to experience the experimental condition either before or after a comparison condition (Pollatsek & Well, 1995). To the extent that participants become more skillful, or conversely become more fatigued and reckless at playing the task, the findings would be subject to misinterpretation without controlling for order. Thus in Study 1, half of the participants played the BART-Y alone first and with a peer second whereas the other half of the participants played the game with a peer first and alone second.

Second, these preliminary findings are the first to directly compare both the adult and youth versions of the BART in an emerging adult sample. Although the BART-Y was designed for the use with high school adolescents, these findings suggest that the youth version is equally applicable for emerging adults and that both versions appeared to capture similar levels of risk taking propensity. At least one other study has used the BART-Y in non-adolescent adult samples (ages 21-60) and showed that risk taking propensity on the task was related to prior alcohol use among both clinical and nonclinical individuals (Holmes et al., 2009). Therefore, it appears that the use of points and a prize meter are just as effective at capturing levels of risk taking propensity as the monetary paradigm, at least for emerging adults. However, it is unclear why the tasks were uncorrelated with each other. Nonetheless, for the purposes of this dissertation, the main goal of the pilot study was to determine general performance on the BART-Y and thus Study 1 and Study 2 were conducted with the youth version.

# CHAPTER 3 – AN EXPERIMENTAL INVESTIGATION OF PEER INFLUENCE ON EMERGING ADULT RISK TAKING

The finding that the presence of peers increases risk taking behaviors, especially among adolescents and emerging adults is well documented (Andrews et al., 2002; Chein, Albert, O'Brien, Uckert, & Steinberg, 2011; Gardner & Steinberg, 2005; Hartup, 2005; O'Brien et al., 2011; Prinstein, Boergers, & Spirito, 2001; Simons-Morton et al., 2011). However, it remains unclear what exactly it is about peers that affect emerging adults' tendency to engage in risky behavior. Illustratively, as Gardner and Steinberg noted, "For reasons not yet understood, the *presence* of peers makes adolescents and youth, but not adults, more likely to take risks and more likely to make risky decisions" (2005, p. 634). Indeed, leading researchers in the field have recently called for further examination of the situations and circumstances under which peers lead to changes in behavior (Hartup, 2005).

Therefore, the purpose of the present study was to address the gap in current understanding of why and how peers influence risk taking and risky decision-making, especially during the post-adolescent years of emerging adulthood (Arnett, 2000). Investigation of risk taking behaviors and peer influences in emerging adulthood is important because this is when risk taking activities such as binge drinking, risky sex, and reckless driving behaviors peak in prevalence (Arnett, 2000; Patrick, Covin, Fulop, Calfas, & Lovato, 1997; Patrick, Covin, Fulop, Calfas, & Lovato, 2010; Steinberg, 2008), and is also a period when individuals spend a significant portion of time with peers who serve as salient social references during the college years (Arnett, 2007;

Borsari & Carey, 2001). Indeed, the influence of peer culture among college-enrolled individuals is of particular relevance as the peer ecology operates to shape attitudes, norms and behaviors (Renn & Arnold, 2003).

**Peer Influences on Risk Taking in Emerging Adulthood**

Do peers lose their valence in the post-adolescent years? Some research has suggested that the effect of peers on delinquent and problem behaviors decreases from early adolescence to later in development when peer approval may wane in significance (Moffitt, 1993). However, a study that compared findings from an 18 to 25-year-old sample with those from a 10 to 18-year old sample showed marked similarity in the salience of peer status across both developmental periods (LaFontana & Cillessen, 2010). Further, college students' report of their peers' participation in risky behaviors is predictive of their own risk taking behaviors (Rolison & Scherman, 2003), suggesting peer influence may operate through perceived social norms. Despite these findings, few studies *directly* assess peer influence during emerging adulthood; the paucity of research in this domain may be explained by the difficulty of assessing peer groups that are less structured by school setting in college relative to the high school years (Lansu & Cillessen, 2011).

**What Peers Tell Each Other Matters**

Theories of peer socialization, rooted in social learning theory, are believed to account for engagement in risk behaviors. Illustratively, peer influence on antisocial behaviors has been explained by pointing to the role of peer contagion which suggests that youths who affiliate together tend to share attitudes and behaviors (Kandel, 1978). In

an experimental investigation designed to assess the mechanism involved in peer socialization, Cohen and Prinstein (2006) provide evidence that peer influence operates, at least in part, through perceived peer status. In their experiment, late adolescent boys (ages 16-17) were more likely to conform to a confederate peers' attitudes and behaviors when that peer was believed to be of high social status. Theoretically, socialization effects and peer pressure are thought to influence behavior through overt peer influence, modeling and by shaping social norms (Borsari & Carey, 2001). Of particular importance for the current investigation, overt or direct peer influence often comes in the form of verbal messages, such as when an emerging adult is blatantly offered or encouraged to partake in a drinking game at a college party for example. While there is evidence that the presence of peers can elicit greater risk taking (e.g. Gardner & Steinberg, 2005), there is some, albeit, scarce support from experimental studies on the effects of direct or verbal peer influence (e.g. Shepherd et al., 2011). Moreover, the extant literature often emphasizes negative peer influence, showing that peers increase involvement in risky behaviors. However, peers' direct or verbal messages may be encouraging of risk taking, discouraging of risk taking, or more apathetic or neutral in any given real-world risk-conducive context. Thus, the variation of peer message and its effect on risk taking behavior need to be evaluated.

**Hypotheses**

The primary aim of Study 1 was to examine the influence that different kinds of direct, verbal messages have on emerging adults' risk taking on a behavioral task. An experimental design was used to test the effects of distinct kinds of peer behaviors

including: a peer-encouraging risk taking, peer-discouraging risk taking, and a peer neutral condition. The strength of assessing observed risk taking in an experimental design is that the problem of peer selection effects on risk taking behavior, which often occurs in survey data, is minimized. In correlational, cross-sectional designs, peer soclialization and selection effects can be confounded, as peers can influence one's behavior (i.e., socialization effect) while individuals with similar risk taking behavior form peer groups (i.e., selection effect). The present experimental design in which a confederate plays a role of a peer minimized this confound, allowing a focus on the examination of peer socialization effects.

Furthermore, finding from a self-report, cross-cultural study assessed youth's motives for risk taking behaviors and found that both adolescents (14-17) and emerging adults (18-20) reported that impressing their peer group was *not* a motivating factor for their risky decisions and behaviors; instead, risk behaviors appeared to be motivated by calculated assessment of attaining perceived goals (Kloep, Güney, Cok, & Simsek, 2009), which is in line with prior findings on the importance of perceived benefits of risk taking (e.g. Rolison & Scherman, 2003). Importantly for this investigation, Kloep and colleagues suggested two explanations as to why impressing peers was not found to motivate youth's risk taking behaviors. They argued either adolescents and emerging adults are not susceptible to peer influences—an interpretation inconsistent with findings from experimental studies described above (e.g., Chein et al., 2011; Gardner & Steinberg, 2005; Shepherd et al., 2011), or, alternatively, that youth did not perceive themselves to be motivated by their peers' opinion. This dissertation, thus, addresses the potential for

emerging adults' self-report biases in reporting the degree to which their risk taking behaviors are driven by a peer context. Risk taking in laboratory settings was assessed via the Balloon Analogue Risk Task (BART-Y; Lejuez et al., 2007), and this allowed more objective measurement of peer influences relative to self-report measures of perceived susceptibility.

It was hypothesized that the simple presence of peers would increase risk taking tendencies relative to completing the task alone. Furthermore, significant differences between group conditions was expected such that peer-encouraging conditions would be associated with elevated risk taking compared to the peer-discouraging and peer-neutral conditions.

## Method

### Participants

Students ($N$ = 139) enrolled at a university in Southern California participated in this study for course credit. Given the focus on the emerging adult years, two participants were excluded from the study due to age (one reported being 15-years old, another 29-years old) resulting in a final sample of $N$ = 137. Participants (54% female) were between 17 and 24-years old ($M$ = 19.39 , $SD$ = 1.34), and ethnically diverse (approximately 37% Asian or Asian American, 35% Hispanic, 13% Caucasian, 4% Black or African American, 2% Pacific Islander or Native American, 1% Middle Eastern, and 8% identified as mixed or other). The majority of students reported they were currently receiving financial aid (65.5%). More than half of students reported living off campus

with friends or roommates (47.5%), compared to living at home with family (28.8%) or living on campus (21.6%).

**Measures**

**Risk taking propensity**. As described elsewhere in Chapter 2, the BART-Y (Lejeuez et al., 2007) was used as the behavioral measure of risk taking propensity.

**Procedures and Study Design**

In an effort to reduce self-selection biases, participants were not told that the study was designed to assess risk taking. Instead, participants signed up for the study, "College Student Health Behaviors." Upon arriving to the laboratory, participants were told that they would be playing a computer game (i.e., the BART-Y) twice, once alone and once with another study participant. Trained undergraduate research assistants served as peer confederates. Prior to starting the task, a research assistant provided a verbal and thorough explanation of the task, with a brief visual demonstration using a separate computer. The research assistant then asked the participant to draw a number out of a box to determine whether they would be the "player" or the "onlooker" during the peer conditions. Whichever number the participant drew, the research assistant informed them that this card indicated they would be the primary player. The gender of the confederate was matched to the gender of the participant.

Participants were randomly assigned to one of three peer behavior conditions: the peer-encouraging condition (i.e., peers encouraged participants to take risks on the BART-Y), the peer-discouraging condition (i.e., peers discouraged risk taking on the BART-Y), and the peer-neutral condition (i.e., peers were present but neither discouraged

nor encouraged risk taking). Similar to procedures used by Gardner and Steinberg (2005), participants in the peer group conditions were told that while playing the game, their peer (confederate) would be allowed to call out advice about whether to pump up the balloon or save points. As the player, however, they could choose whether or not to follow the advice of their peers. In addition to playing the BART-Y with peer confederates, participants also played the BART-Y alone (the alone condition). Table 3-1 provides actual comments used by confederates to encourage, discourage, or neutralize risk taking behavior in each experimental condition. Confederates followed a memorized script during all interactions with participants.

Table 3-1

*Script Used by Confederate Peers*

| Peer-Encouraging Risk Taking | Peer-Discouraging Risk Taking | Peer-Neutral |
|---|---|---|
| I wonder how big this balloon can get | Shouldn't you click 'Save Points'? | [Reads to self from screen] Click 'pump' to make the balloon bigger or click 'save points' to stop and fill up prize meter |
| You should keep pumping it [the balloon] | Aren't you worried the balloon will explode? | That pink background is really bright, huh? |
| Wait, keep going, and don't [Save Points] | I feel like it [the balloon] is about to burst! | I kind of like all these game sound effects |

As described in Chapter 2, due to practice effects on the task, experimental order was counterbalanced so that half of the participants randomly completed the task alone first, and with a peer second whereas the remaining half completed the task in the reverse order. Participants received debriefing through email after completion of all data collection. This study was approved by the university's Institutional Review Board.

## Results

A power analysis using the statistical software program G*Power (Faul, Erdfelder, Lang, & Buchner, 2007) indicated that the total sample size needed to detect a medium effect size with three conditions, two measurements, and a correlation of .70 between repeated measures would be $N = 135$ at significance level .05 and power .80. There was no missing data on the BART-Y.

### Manipulation Check

Upon completing both trials of the task, participants filled out a brief, 2-item questionnaire as a manipulation check to determine whether participants reported feeling influenced by the confederate as well as whether they suspected anything unusual about the confederate. The majority of participants reported that they were somewhat influenced by the other student's comments during the computer game (72.7%), and (97.1%) described the confederate as "overall, they seemed like any other student". Four participants reported that they felt the person they played the game with was "really unusual". However, these participants did not differ significantly on the BART-Y compared to those who reported the confederate seemed like any other typical student,

$F(2, 135) = .26$, $p = .77$, suggesting that the confederates were effective and did not evoke suspicion among participants.

**Primary Analyses**

This research was guided by two primary goals. The first aim was to examine group-level differences to assess whether emerging adult risk taking would vary as a function of different forms of peer influence. The second aim was to determine within-person changes in risk taking as a function of the social context. Specifically, this research examined changes in participants' own baseline risk taking (during the alone condition) relative to their risk taking on the task in the presence of a peer. To examine the first aim, group-level differences on risk taking as measured by the BART-Y for the three peer conditions were examined using an analysis of covariance (ANCOVA) to account for experimental order and gender. The second aim was evaluated using paired-samples *t*-tests to examine how individuals changed their risk taking tendencies on the task across two different contexts, alone and with a peer.

*Between-Person Differences on BART Risk Taking as a Function of Peer Exposure*

Descriptive findings, including means and standard deviation by peer conditions are presented in Table 3-2. Experimental order and gender were included as covariates in the ANCOVA model. Gender was a significant predictor of the BART-Y, during the alone trial; males demonstrated greater risk taking ($M = 43.25$, $SD = 12.95$) than females $M = 36.65$, $SD = 14.63$; $t(134) = 2.76$, $p < .01$. Although not a central question in this investigation and therefore no a priori predictions were made the effect of gender was further explored. However, the interaction between gender and experimental condition

on risk taking in the peer conditions was not significant, $F(2,130) = .62$, $p = .54$). Experimental order was not significantly associated with the BART-Y scores when participants played the game alone first and with a peer second, $F(1,130) = .42$, $p = .52$. However, a significant effect of experimental order was observed on BART-Y scores when participants played the BART-Y with a peer first, regardless of condition, $F(1,131) = 9.08$, $p = .003$, suggesting that the strategy to counterbalance eliminated order effects in one direction (i.e., for the alone-first order) but not the other (i.e., for the peer-first order).

Table 3-2

*Means and Standard Deviation for BART-Y Scores by Experimental Condition*

| Experimental Condition | Alone | With Peer |
|---|---|---|
| Encouraging Risk Taking | 45.31 (13.96) | 51.87 (14.92) |
| Discouraging Risk Taking | 37.29 (13.56) | 34.39 (14.06) |
| Neutral | 36.04 (13.84) | 39.99 (17.80) |

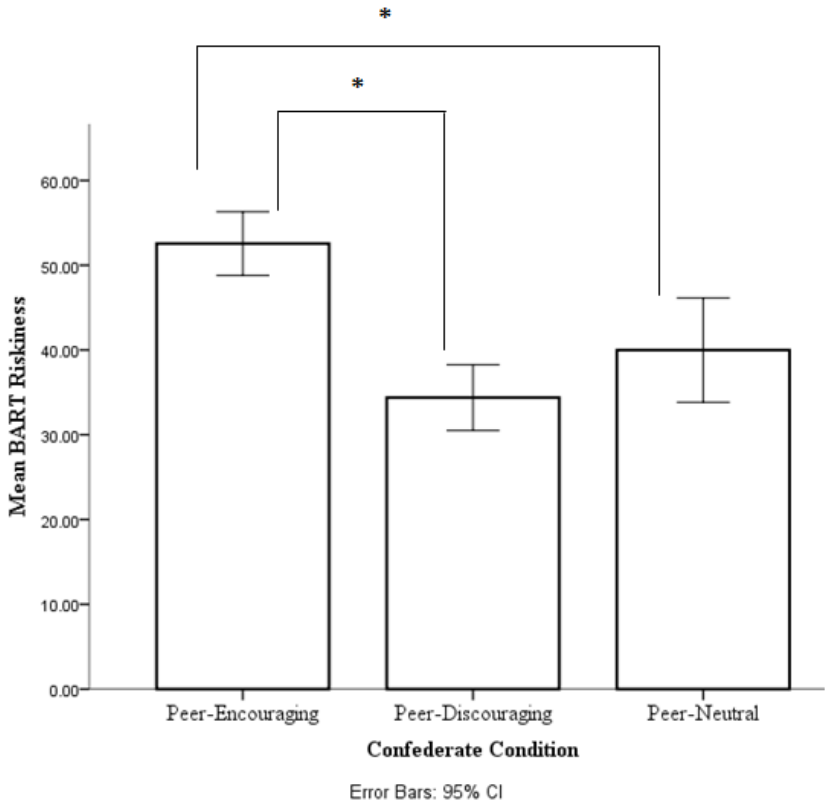
*Note*: $N = 137$

Most importantly for this study, there was an effect of the confederate conditions, $F(2,133) = 20.58$, $p < .001$. To further probe the peer condition effects, posthoc analysis with Bonferroni was conducted to evaluate pairwise differences between peer conditions. As depicted in Figure 3-1, the peer-encouraging condition ($M = 51.87$) yielded significantly greater risk taking on the BART-Y compared to the peer-discouraging ($M =$

37.30, $p < .001$) and peer-neutral conditions ($M = 40.75$, $p < .001$). Risk taking in the peer-neutral condition was not significantly different than the peer-discouraging condition.

Figure 3-1

*Mean BART-Y Scores by Experimental Condition*



*Within-Person Changes on BART-Y Risk Taking*

Next, to examine whether individuals changed their risk taking behaviors from the alone to peer conditions, a series of paired samples *t*-tests was conducted. As displayed in Figure 3-1, in line with expectations, there was a significant increase in the BART-Y scores in the peer-encouraging condition, $t(49) = 4.02$, $p < .001$, indicating that participants had significantly higher BART-Y scores when they played the BART-Y with peers who encouraged risk taking ($M = 52.89$, $SD = 13.09$) than when they played the BART-Y alone ($M = 45.79$, $SD = 13.67$). Similar findings emerged between the alone and peer-neutral condition, $t(33) = 2.19$, $p = .04$; participants in the peer-neutral condition also demonstrated higher BART-Y scores when they were with peers ($M = 40.75$, $SD = 17.56$) than when they played the BART-Y alone ($M = 36.77$, $SD = 13.35$). The opposite effect occurred for participants in the peer-discouraging condition; compared to their BART-Y scores when they played alone ($M = 37.30$, $SD = 13.57$), participants were less risk taking on the task when peers discouraged them from taking risks, $M = 34.40$, $SD = 4.06$; $t(53) = -2.65$, $p = .01$.

*Supplemental Analysis*

It bears in mind that the experimental order was counterbalanced to eliminate potential order effects. However, given the abovementioned finding that the presence of peers itself was effective enough to increase the participants' BART-Y score (as shown in the results regarding the changes in the BART-Y from the alone to neutral peer condition), there was a possibility of a carryover effect of peers for those who played the

peer conditions first. To supplement the abovementioned analysis, a series of more conservative paired-samples *t*-tests with a subset of the sample ($n$ = 68) was conducted that focused on those who completed the task alone first, followed by a second trial in one of the three peer conditions. In this case, the alone scores reflected a baseline score. Participants' risk taking on the measure in the alone condition was significantly different than their risk taking with peers $t(67) = 4.27$, $p < .001$. Thus, even addressing order effects and with a subsample, the results paralleled the aforementioned findings.

## Discussion

The overarching aim of this investigation was to extend previous research (e.g., Gardner & Steinberg, 2005; Shepherd et al., 2011) and more fully explain peer influences on risk taking and risky decision-making. In general, findings from this study provide empirical support for the influential nature of peers' direct verbal messages on emerging adult risk taking behaviors as assessed by the BART-Y. Several important findings emerged. First, peers do influence emerging adult risk taking on the task, but the *content* of their verbal messages matters. Specifically, between-group comparisons showed that being with peers who endorse risk taking is related to significantly more risk taking relative to playing the game with a more cautious peer in the discouraging condition who makes risk-averse statements (e.g. "Aren't you worried the balloon will explode?"). At the group level, individuals exposed to peers who overtly encouraged risk with direct statements (e.g. "Wait, keep going, and don't save points yet") demonstrated more risk taking than those who heard neutral comments which neither endorsed or discouraged riskiness (e.g. "I kind of like all of these game sound effects"). These findings indicate

that social influences on risk taking, at least as measured using the BART-Y, are dynamic and depend largely on the verbal messages peers provide. As expected, peer effects were not always negative suggesting that some peer groups (i.e. those that discourage one another from risky decisions) may protect young people from risk involvement.

The second major finding is based on within-person comparisons; each individual played the BART-Y in two contexts, alone and with a peer. There was a significant shift in risk taking on the task between playing the alone and with a peer that also varied with the content of peers' verbal messages. Emerging adults were more risk taking on BART-Y relative to their alone or own baseline when they received peer-encouraging risk messages whereas individuals were less risk taking compared to their baseline when the content of the peer's message was to discourage risk. Even the simple presence of peers in the peer-neutral condition was associated with greater risk taking compared to *alone* risk taking.

**Implications**

While the mechanism underlying peer influence may involve direct verbal messages, more subtle and indirect mechanisms of influence such as social norms are relevant as well. Illustratively, the finding that individuals became more risk taking on the task around a peer-neutral confederate compared to their baseline risk taking indicates that social influence operates in multiple ways. Emerging adults may be more likely to conform to social influence not only based on overt peer pressure but if they believe there is something socially to be gained by risk taking. Individuals who value group membership and have particular social goals such as affiliation or peer approval may be

more likely to modify their behavior – in *either* direction– when in the presence of peers. It is interesting that experimental order had a significant effect on risk taking only when participants played the game with a peer first. Although this may be an artifact of laboratory assessment, it may also suggest something about the power of peer influence in more ecologically valid risk situations. Illustratively, if an individual is with a group of peers and is encouraged to be reckless or careless with their health or safety, this influence may carry over into other decision-making situations.

Peer presence, particularly for adolescents and emerging adults, is known to activate parts of the brain associated with reward sensitivity (Galvan et al., 2007; Steinberg, 2008) leading some researchers to argue that compared to adults, young people in general are more likely to processes social stimuli with incentive-motivational regions of the brain (Blakemore, 2008). This study adds to other research showing like younger adolescents, emerging adults exhibit heightened responsiveness to social rewards (O'Brien et al., 2011). One explanation is that because of social and emotional influences, peer evaluation is particularly salient during adolescence (Steinberg, 2005), and the findings here suggests this effect continues for emerging adults.

Taken together, the current study suggests that preventive interventions seeking to reduce health compromising behaviors among college-enrolled students can begin by educating young adults about the potential for biases in decision-making in social situations. Equipping them with knowledge about how their behavioral decision-making may be subject to contextual factors can empower young adults to recognize how their

behavior changes from one context to the other thereby offering them an opportunity to assess the underlying reasons they choose to engage or not engage in risk activities.

**Limitations and Future Directions**

Some of the unique strengths of this study are in its experimental design. The extant studies of risk taking use self-report instruments alone. The experimental design utilized here allowed for both between and within-person analyses and suggested that peer influence can in fact cause emerging adults to be more or less risk taking on a behavioral task. Moreover, the use of a mixed-subjects design with multiple experimental conditions show that it is not only the presence of peers that matters at an individual level, but also reveals the importance of group level differences depending on the direction of their influence in a given situation. Thus, a major contribution of this research is the use of a unique and developmentally-sensitive approach to examining the role of peer effects during emerging adulthood.

However, the findings reported here need to be considered in the context of study limitations. The research here varied exposure to distinct kinds of peer influence by using confederate peers who were similar in status, age and gender. However, these broader peer relations may differ from more intimate friendship dynamics, though it is likely that the observed effects would be in the same direction and stronger with greater relatedness (Brechwald & Prinstein, 2011). Similarly, the dyadic nature of peer influence assessed may not reflect larger group dynamics and power structures. Yet, classic studies from social psychology provide support for the idea that a similar, but more pronounced shift, would occur with larger group size (Teger & Pruitt, 1967).

Further, primarily for feasibility purposes, this investigation was limited to a focus on same-gender dyads. It is not clear whether female peers (as opposed to male peers) would exert different influences on male participant risk taking and whether such mixed-gender effects would vary by condition. It is also unclear how psychological processes and personality differences moderate susceptibility to peer influence across varying peer interactions. It may be that individuals who are less tolerant of risk in general are less influenced by peer pressure. Individuals who are more psychosocially mature may also be less swayed by negative peer influences. Moreover, an important next step will involve delineating social goals (e.g., is it peer pressure to conform, desire for affiliation, peer approval or status) associated with risk taking. Based on prior research that has shown more heavy alcohol consumption among college students compared to their non-college counterparts (Dawson et al., 2004) and the fact that more attention has been given to college student peer culture as opposed to socialization influences on non-college emerging adults (Renn & Arnold, 2003), this study focused on emerging adults in college. However, how rates of health and safety compromising behaviors differ between college and non-college emerging adults is not clear, though some have argued that prevalence data indicate the importance of prevention efforts that target all emerging adults (Higgins, Heeren, Zakocs, Kopstein, & Wechsler, 2002). Additionally, there is virtually no research that has examined whether predictors of risk taking behaviors are similar for emerging adults regardless of college status.

Furthermore, because the goal was to measure peer influence, this study used a behavioral measure believed to be associated with risk taking behaviors. However,

whether these findings of peer influence generalize to self-report risk taking is unclear. These limitations provide opportunity for further research to identify other processes by which peer influence operates. As such, study 2 (Chapter 4) examined the psychological variables that underlie potential similarities and differences between laboratory and self-report risk taking.

**Conclusion**

In sum, evidence points to the importance of peers, and more specifically, what peers say, as a critical component of risky decision-making and risk taking behaviors. The simple presence of peers also increased risk taking, but the finding that the direction of peer influence mattered highlights the need for further research to examine peer dynamics more specifically. This study contributes to the body of research that risk taking is social in nature and that peers continue to exert an influence during the college years.

# CHAPTER 4 – METHODLOGIAL CONSIDERATIONS AND PSYCHOLOGICAL CORRELATES OF THE BALLOON ANALOGUE RISK TASK

The findings from Study 1 suggested risk taking on the BART-Y was contingent upon specific peer influences, namely the content of peers' verbal messages. However, underling psychological processes that may contribute to risk taking on the task were not considered. Moreover, Study 1 assessed risk taking in a laboratory setting using a computerized game. To the degree that risk taking on the BART-Y is distinct from risk taking behavior in real world settings, the generalizability of the observed peer findings in Study 1 may be limited. Therefore, in this chapter, methodological and validity considerations regarding the meaning of the BART-Y were addressed. First, however, an introduction to methodological approaches to the study of risk taking is considered that highlights the strengths and weakness of various kinds of assessment approaches.

## Measures of Risk Taking

There are a number of methodological approaches available to study developmental and individual differences in risk taking behaviors. Advances in neuroimaging-based research represent one increasingly popular approach to study risky decision-making and risk taking behaviors. Accordingly, neurodevelopmental studies attempt to elucidate developmental differences in brain structure and function among individuals from different age groups that may explain age-related changes in risk-related decision-making and behaviors (Bjork, Lynn-Landsman, Sirocco, & Boyce, 2012; Casey, et al., 2008; Steinberg, 2010). It is argued that there is a mismatch between the maturation of the neural mechanisms underlying heightened responsive to perceived

rewards that develop in early adolescence and the more slowly developing cognitive control systems (Casey et al., 2008). At some point towards the end of emerging adulthood, the development of these two modes of decision-making are believed to overlap resulting in reduced risk taking. This proposal is supported by the findings that emotion-laden incentive-motivational systems related to perceptions of reward (e.g., linked to neuronal activation in the nucleus accumbens, amygdala and ventral striatum) are most sensitive during adolescence and that this is juxtaposed against a more gradual linear increase in frontocoritical cognitive and inhibitory control system across the emerging adulthood years (Bjork et al., 2012; Blakemore & Choudhurry, 2006). Much of the research in this area typically involves experimental designs that draw on reward based paradigms to assess neuronal activity by examining blood oxygenation changes in the brain using fMRI and neuroimaging techniques (Galvan, 2006, 2010; Guyer, McClure-Tone, Shiffrin, & Nelson, 2009; Van Leijenhorst, Zanolie, Van Meel, Westenberg, Rombouts, & Crone, 2010).

There are several major limitations to this line of work, however, and the implications of observed brain differences between adolescents and adults must be stated with caution. Those who oppose neurodevelopmental approaches to risk taking argue that these findings are biodeterministic, ignore socieocontextual influences that account for individual variation in risk taking, and that too little is known about the connection between the brain and behavior to make causal inferences (Males, 2009). Additionally, there are some inconsistencies in interpreting the meaning of neuronal activity (Galvan, 2010). For instance, whereas some research indicates greater ventral striatal activation in

adolescents (14-15) relative to children (10-12) and emerging adults (18-23) in response to receiving a reward (e.g., van de Moortele, Zanolie, Van Meel, Westenberg, Rombotus, & Crone, 2010), others have suggested that adolescents (12-18) show less ventral striatal activity than those older and engage in risky behaviors to compensate for this deficit (e.g., Spear, 2000). This inconsistency may be a product of the definition of "adult". As Galvan (2010) points out, adult comparisons in studies of the adolescent brain sometimes use young adults whose brain may still be developing (e.g., Halpern-Felsher, & Cauffman, 2001). It is thus even less clear how neuroimaging research findings apply uniquely to emerging adult risk taking relative to later adulthood when risk health and safety risk taking behaviors decline.

More traditionally, researchers have taken advantage of the relative simplicity of questionnaire or self-report data to collect information about emerging adults' past risk taking behaviors and related constructs (e.g., Duangpatra et al., 2009; Quinn & Fromme, 2011; Rolison & Scherman, 2003; Schwartz et al., 2010). Illustratively, findings from self-report studies have revealed that involvement in risk taking behaviors is negatively related to psychosocial maturity as indexed by an established and coherent sense of self (Schwartz et al., 2010), positively associated with perceptions of benefits (Parsons et al., 2000), and positively correlated with individual differences in sensation seeking (Ravert et al., 2009). Although these studies have revealed important correlates of risk taking behaviors, self-report findings alone may be subject to biases such as self-presentation or social desirability effects leading to inaccurate reporting of risk behavior involvement. Whereas some studies have been conducted with more direct attention to these limitations

(e.g., Bradley & Wildman, 2002), a major disadvantage to questionnaire data is the difficulty of capturing some of the key explanatory factors of emerging adult risk taking including social, emotional, and contextual influences. Unfortunately, despite the relatively widespread agreement that risky decision-making involves two driving processes– one that is analytic and deliberate and one that is more affective and situational (Albert et al., 2013; Casey et al., 2008; Gerrard et al., 2008) –, self-reports lack ecological validity by removing the contextual (or "in-the-moment") nature of risk taking.

Given the limitations of self-report measures alone, an alternative methodological approach involves the use of behavioral measures of risky decision-making and risk taking propensity (Boyer, 2006). The propensity to take risks has been assessed with a number of gambling paradigms. Some examples of these include the Balloon Analogue Risk Task (BART; Lejuez et al., 2002), The Iowa Gambling Task (IGT; Bechara, Damasio, Tranel, & Damasio, 2005), and The Bechara Gambling Task (BGT; Bechara, Damasio, Damasio, & Anderson, 1994). Performance on laboratory tasks, particularly the BART, have typically been correlated to actual health and safety risk behaviors such as substance use, sexual behavior, and delinquency, *r*s ranging between 0.3 and 0.5 (Aklin et al., 2005; Lejuez et al., 2007). However, at least one study failed to observe a significant correlation between the BART behavior and self-report risk taking (Mishra & Lalumière, 2011).

Despite the growing number of publications using laboratory-based behavioral measures including the BART, the meaning and mechanisms underlying behavior on the

task remain unclear. The BART-Y, the version of the task used in this dissertation, assesses one's tendency to take risks when given the opportunity to do so (Lejuez et al., 2007). Although it is assumed that individuals higher in risk propensity may be relatively tolerant or accepting of risk, the BART has been inconsistently correlated with the personality factors of impulsivity and sensation seeking (Vigil-Colet, 2007). Further, the BART does not appear to be related to other personality domains (neuroticism, extraversion, openness, agreeableness, and conscientiousness) as assessed using Costa and McCrae's NEO-Five Factor Inventory (Skeel, Neudecker, Pilarski, & Pytlak, 2007). The BART is also not correlated with other similar types of behavioral behaviors such as the IGT and BGT (Skeel et al., 2007). To more fully understand findings from the BART, more research is needed to examine underlying mechanisms of behavior on this task.

The present investigation was motivated by the methodological considerations of assessing risk taking discussed above. This study aimed to identify what is and is not reflected by "risk taking" on the BART-Y and to determine whether this is indeed an appropriate proxy for risk taking in real world settings for a non-clinical sample of emerging adults. Accordingly, this exploratory investigation examined (a) whether risk taking behaviors on the BART-Y was associated with self-report risk taking in real world settings; and (b) how known correlates of self-report risk taking behavior including cognitive or decision-making processes (risk and benefit perceptions), identity development (identity exploration and risk self-schema), and disposition (fearfulness) related to behavior on the BART-Y. The two main research questions were thus, 'Is

BART-Y a proxy for actual risk taking behavior?' and 'Do psychological correlates of self-report risk taking behavior operate similarly for this behavioral measures of risk taking?' In what follows, four known psychological correlates of risk taking are reviewed: risk and benefit perceptions, self-schema, and fearfulness.

**Risk and Benefit Perceptions**

*Development of risk perception*. Research on judgment and decision-making has traditionally focused on the differences between adolescents and adults, and on specific cognitive processes such as risk perception, i.e., the ability to estimate risk (Albert & Steinberg, 2011). Recent research has indicated that adolescents and emerging adults are just as capable as older adults at assessing the risks associated with health compromising behaviors (e.g., Millstein & Halpern-Felsher, 2002a). There also exists consistent evidence to support a developmental trend in the increasing importance of benefit perceptions or perceived gains and rewards of partaking in risky behaviors during adolescence and emerging adulthood relative to prior and later developmental periods (Millstein & Halpern-Felsher, 2002b; Rolison & Scherman, 2003; Siegel, Cousins, Rubovits, Parsons, Lavery, & Crowley, 1994). For example, one study showed that whereas children (ages 7-11) do not appear to perceive positive consequences of risk taking, the association is positive and robust for emerging adults (ages 23-29) as well as for adolescents (ages 13-17) (Galvan et al., 2007). Risk taking behaviors are thus believed to be motivated by perceptions of reward such as financial gains, novelty, or social rewards, linked to the changes in the dopamine system (Galvan, 2010). Illustratively, in one study, college students' perceptions of the benefits of having

unprotected sex was related to sexual risk behaviors (Parsons et al., 2000). The perceptions of benefits of risky behaviors were more important determinants than were perceptions of benefits for having healthy or safe-sex practices. Interestingly, in this study perceived risks associated with unprotected sex were not significantly related to sexual behavior. Together with research that has suggested minimal age-related differences in perceptions of harm associated with risky behaviors (Millstein & Halpern-Felsher, 2002b), these findings indicate that young people may be more likely to be motivated by perceived gains or subjective evaluations of the positive consequences of engaging in certain risky activities.

Therefore, rather than explaining risk taking as due to young people's feelings of invulnerability to harm, a more accurate account of risky behaviors may focus on the important role of perceived benefits (Goldberg et al., 2002). Accordingly, Goldberg and colleagues have suggested that risk taking can be understood as a "discrepancy between respondents' expectations and their experiences" whereby with age individuals modify their perceptions of risks based on their positive experiences and their lack of experiencing negative consequences (Goldberg et al., 2002, p. 482). Despite the wide spread application of decision-making models to emerging adult risk taking behaviors, it is surprising that no study to date has examined whether cognitive processes such as risk and benefit perception are related to risk taking propensity on the BART or BART-Y. Given that the BART-Y measures inherent learning about gains and losses (Lejuez et al., 2002), there may be associations between risk and benefit perceptions and the BART-Y

behavior, similar to those observed in the literature of actual risk taking behaviors and risk and benefits perceptions (Siegel et al., 1994).

**Identity Development & Risk Self-Schema**

There is widespread consensus that for many, emerging adulthood is a period of identity exploration (Arnett 2000; Benson & Elder, 2011; McLean & Pratt, 2006; Nelson & Barry, 2005; Schwartz et al., 2005). Identity development involves experimenting with different perspectives and behaviors in the areas of romantic relationships, work/education, and worldviews. The exploratory nature of this period is assumed to also be positively associated with health and safety risk behaviors such as substance use (Arnett, 2005) and risky driving and unsafe sex practices (Schwartz et al., 2010). Therefore, it was hypothesized that identity exploration would be implicated in both self-report and BART-Y risk taking, assuming the BART-Y is a proxy of behavior outside laboratory.

Although there is some evidence to support a linkage between identity development and risk taking behaviors, findings are limited, as only one facet of identity—exploration—has been assessed, ignoring another important aspect of identity: self-schema. Self-scheme includes cognitive generalizations about the self in a particular area (Markus, 1977). Individuals construe a schema about themselves in each domain which guides information-processing and behavioral decisions within that particular domain (Markus & Wurf, 1987). For example, body weight self-schema (Stein, 1996), exercise self-schema (Sheeran & Orbell, 2000), sexual self-schema (Houlihan et al., 2007) and deviant self-schema (Stein, Rosser, & Markus, 1998) have been associated

with corresponding behaviors as well as behavioral intentions (Estabrooks & Courneya, 1997). To the extent that adolescents and emerging adults regularly face decisions about taking risks, it is likely that they also develop a risk self-schema associated with whether or not they see themselves as someone who takes risks. In this manner, risk self-schema also should play a role in decision-making processes linked to risk taking.

To address the lack of research on self-conceptions and risk taking among emerging adults, a novel self-report questionnaire was developed and validated to examine the degree to which an individual internalizes or identifies with being a risk-taker across a variety of risk domains *(*Sadek & Chou, 2012). More specifically, this measure assessed how beliefs about the self as a risk-taker, or having a risk-taker identity influence health and safety compromising behaviors. In a series of unpublished studies (e.g., Sadek & Chou, 2012) by the investigator, scores on the risk self-schema measure consistently evidenced a robust and positive association as well as predictive utility in explaining individual variation in emerging adult risk taking, and showed that college students with a relatively higher risk self-schema (i.e., identified as being a risk-taker) were more likely to engage in health compromising behaviors. Therefore, it was of interest to assess whether risk self-schema is also related to risk taking behavior in a controlled laboratory assessment using the BART-Y.

**Dispositional Influences on Risk Taking: The Role of Fearfulness**

There is ample evidence that individual differences in personality and dispositional tendencies influence health and safety risk taking behaviors (Caspi et al., 1997; Friedman, 2009; Gullone & Moore, 2000). Contemporary approaches to the study

of personality and health suggest that personality traits influence behavioral outcomes by making certain lifestyles choices more (or less) likely, which in turn lead individuals on trajectories of health-promoting or health-compromising behaviors (Friedman, 2000; Ozer & Benet-Martinez, 2006). For example, individuals with certain personality traits (i.e. conscientiousness) may engage in more health-promoting behaviors and thus engage in fewer risk taking activities (Friedman et al., 1993). Accordingly, the effect of personality on lifestyle choices has consequential implications for developmental outcomes (Ozer & Benet-Martinez, 2006).

One such facet of personality is fearfulness, or the tendency to be harm avoidant (Ashton & Lee, 2007). Accordingly, *fearless* individuals show little trepidation or fear of injury and are relatively indifferent to physical pain especially, whereas *fearful* individuals demonstrate inclinations to avoid physical harm (Lee & Ashton, 2010). Thus, individual differences in fearfulness, a facet of emotionality, are believed to influence approach and avoidance tendencies (Rothbart & Bates, 2006).

Some work has shown that fear, anxiety, and risk avoidance are negatively associated with risk taking on the BART (Maner, Richey, Cromer, Mallott, Lejuez, Joiner, & Schmidt, 2007). Loewenstein and colleges argued that fear is an example of an anticipatory emotion that produces visceral reactions to risk outcomes (Loewenstein, Weber, Hsee, & Welch, 2001). According to the risk-as-feelings hypothesis, reactions to risky situations are influenced by fear, worry or anxiety leading to risk-averse decision-making (Loewenstein et al., 2001) believed to be linked to pessimistic risk assessments (Lerner & Keltner, 2000).

Previous research on fearfulness has more typically focused on the experience of fear of physical harm (i.e. Lee & Ashton, 2004), however this dissertation also draws on a conceptualization of fearfulness as a broader facet of emotionality linked to temperamental differences in the fear of potential risk outcomes. Whereas fearfulness should make risk taking less likely, sensation seeking, a related yet opposing construct, is assumed to propel individuals towards risky activities (Duangpatra, et al., 2009; Horvath & Zuckerman, 1992; Ravert et al., 2009). However, there is inconsistent evidence for whether and how sensation seeking relates to emerging adult risk taking (Boyer & Byrnes, 2009). For example, in a study of college students, only the disinhibition subscale of a sensation seeking measure was associated with risk behaviors (Rolison & Scherman, 2003). Importantly for the present study, some findings have revealed a positive correlation between sensation seeking and the BART (Lejuez et al., 2002), whereas other data from the same research group failed to replicate this association (Lejuez et al., 2003a). Although there may be issues with sample sizes that partly account for the inconsistent findings, an alternative explanation is that traditional measures of sensation seeking that assess a desire for novel and intense stimuli (i.e., the Sensation Seeking Scale developed by Zuckerman, Eysenck, & Eysenck, 1978) do not consider individual differences in emotionality that bear on the decision-making processes implicated in risk taking behavior. In support of this, a study that examined the HEXACO model of personality—a six factor alternative personality structure to the Big Five— with sensation seeking and risk taking showed that "emotionality is strongly related to sensation seeking through its facet fearfulness" (de Vries, de Vries, & Feij,

2009, p. 539). In sum, not only have previous studies not directly measured this facet of personality as it relates to behavioral risk taking on the BART-Y, but few self-report studies in emerging adulthood have considered this particular dimension of personality. Therefore it was of interest in the present study to assess whether trait fearfulness is associated with individual variation in risk taking across both self-report and behavioral methodologies.

**The Present Study**

The purpose of this study was to build on findings from Study 1 (Chapter 3) to explore descriptive-level and zero-order correlations among the key constructs identified above and risk taking on the BART-Y. Specifically, the goal of this study was to inspect how these constructs (i.e., cognitive [perceptions of risks and benefits], dispositional [fearfulness] and identity [identity exploration and risk self-schema]) relate to risk taking propensity on the BART-Y. A secondary goal of the present study was to assess associations between these key constructs and their potential differential association with self-report behaviors and the BART-Y (a laboratory-based behavioral measure) to determine whether and how psychological processes relate to two distinct methodological approaches of risk taking. Such information may reveal important similarities and differences that contribute to scientific understanding of the causes and correlates of riskiness. Due to the paucity of research addressing the psychological correlates of behavioral measures of risk taking, no explicit a priori hypotheses were made.

## Method

### Participants

Data from a subsample of the original study participants (Chapter 3) were used for the following analyses. As noted earlier, the original sample included undergraduate students (*N*= 137) who were enrolled at a university in Southern California. As part of a larger investigation, participants were randomly assigned to play the BART-Y in one of three experimental peer influence conditions (peer-encouraging risk taking, peer-discouraging risk taking and peer-neutral). In all of the three conditions, participants played the task alone (the alone condition) and with a peer (the peer condition). The order of the alone and peer conditions were counterbalanced. In this investigation, the BART-Y score on the alone task only was the focus of the study. Approximately half of the participants completed the task alone prior to playing with a confederate peer (*N* = 68), whereas the rest of the participants completed the task in the reverse order (*N* = 71). As described elsewhere (Chapter 2), an order effect was identified in the piloting of the task. Preliminary analyses from the larger sample (*N*= 137) showed that counterbalancing reduced the order effect to non-significance when the task was played first with a peer and then alone, $t(66) = -.4.27$, $p < .001$. However, as described in Study 1, despite counterbalancing, there was still a significant effect of order when participants played the game with a peer first and then alone, $t(70) = -.65$ $p = .52$). Accordingly, to examine underlying mechanism of performance on the task in the alone conditions only, a conservative analysis using the subset of the sample who completed the task alone first

($N$ = 68) was used. A power analysis indicated that 67 people would be needed to test correlations at significance level .05 and power .70 (Faul et al., 2007).

Among these participants (n = 68) were 39 males and 28 females between the ages of 17 and 24-years old ($M$ = 19.36, $SD$ = 1.44). Participants were either in their first (10%), second (21%), third (24%), fourth (27%) and fifth or sixth (18%) year of college. The subsample was ethnically diverse (approximately 43% Hispanic, 32% Asian or Asian American, 10% Caucasian, 3% Black or African American, 2% Pacific Islander or Native American, 2% Middle Eastern, and 9% identified as mixed or other). The majority of these students also reported currently receiving financial aid (66%). Nearly half of students reported living off campus with friends or roommates (49%), compared to living at home with family (28%) or living on campus (23%).

**Measures**

**Risk Involvement and Perceptions.** *The Risk Involvement and Perceptions Scale* (RIPS; Siegel, et al., 1994) was used to assess frequency of health and safety risk taking (Cronbach's alpha = .85), perceptions of risks associated with each behavior (Cronbach's alpha = .95) as well as perceptions of the benefits associated with each behavior (Cronbach's alpha =. 89). For *risk involvement*, participants responded to 17 items to report the frequency of engagement in risk behaviors (e.g., binge drinking, riding with a drunk driver, having unprotected sex) on a 9-point scale (*0* = never to *8* = daily or more). For *risk perceptions*, participants also indicated how risky it would be if they engaged in the specific behaviors on a 9-point Likert scale (*0* = not at all risky to *8* = extremely risky). Benefit perceptions were rated based on the items that assessed how

beneficial it would be if they engaged in those specific behaviors (*0* = no potential for benefits to *8* = extremely high potential for benefits). Thus, higher risk perceptions scores suggest the behaviors are viewed as very risk while higher benefit perceptions scores reflect the belief that engaging in the behaviors carries the potential for positive consequences or gains.

**Identity.** *The Ego Identity Process Questionnaire* (Balistreri, Busch-Rossnagel, & Geisinger, 1995) is a measure that yields continuous scores on exploration and commitment, two primary dimensions of identity development. Eight facets of identity are assessed including occupation, religion, politics, values, family, friendships, dating and sex roles. The 16-item identity exploration subscale (Cronbach's alpha = .58) was used for the following analyses. Example questions included, "I have considered adopting different kinds of religious beliefs" and "My idea about men's and women's roles have never changed as I became older". Participants responded on a 6-point scale (0 = *s*trongly disagree to *6* = strongly agree). Item scores were summed to create a total score for exploration. Higher scores reflect relatively greater identity exploration.

**Risk Self-Schema**. A modified version of the *Risk Self-Schema Scale* (Sadek & Chou, 2012) was used to assess the degree to which a person identifies as a risk-taker. For example, participants were asked to think about how much the term "risk-taker" describes them at this time in their life when it comes to each behavior including "Risky sexual activity (i.e. unprotected sex, being promiscuous)" and "Heavy or binge drinking (4 drinks within a 2 hour period for women, or 5 drinks within a 2 hour period for men). Participants responded to each question on 5-point Likert scale from (*0* = not me at all to

*4* = that's me!). The 10-item measure demonstrated adequate reliability (Cronbach's alpha = .80). A total score was summed so that higher risk self-schema scores indicated greater self-conceptions as a risk-taker.

**Fearfulness.** A measure of fearfulness was obtained from the International Personality Item Pool (IPIP), a public domain resource for obtaining questionnaire items validated against commonly used scales (Goldberg, 1999; International Personality Item Pool, 2005). The 10-item fearfulness measure (Cronbach's alpha = .84) assessed negative emotionality regarding the tendency to experience fear included in Lee and Ashton's (2004) HEXACO Personality Inventory. Participants were asked to rate (*1* = strongly disagree to *5* = strongly agree) how much each statement was true of them. Example statements that were rated by participants included, "Begin to panic when there is danger" and "Like to do frightening things." Items were appropriately reverse coded and totaled so that higher scores indicate greater levels of trait fearfulness.

**The Balloon Analogue Risk Task-Youth.** The BART-Y (Lejuez et al., 2007) was administered and has been described elsewhere (in Chapters 2 and 3). Among Study 1's participants, only participants who completed the task alone first were assessed in this study to ensure a pure baseline risk taking on the measure.

**Procedures and Study Design**

Because this study is part of the larger investigation, the procedures used here are identical to those described in Chapter 3. Following the laboratory portion of the study, participants completed an online questionnaire that was emailed to them and this included all of the self-report measures described above.

## Results

Analyses were performed using SPSS Version 20. Missing data was minimal, therefore pairwise deletion was used to include all available data. Accordingly the bivariate correlations among study variables are based on slightly different sample sizes (*n*s = 65-68). Table 4-1 provides means, standard deviations, and bivariate correlations for all study variables. Detailed inspection of descriptive findings for self-report risk taking behavior (not shown in Table 4-1) indicated that emerging adults reported involvement in a variety of high-risk behaviors. In the past year, approximately 40% reported riding in a car with a drunk driver, 56.7% reported excessive or heavy drinking, more than 30% have used marijuana, 73.1% speed when driving while 64.2% text when driving. Of those who are sexually active, nearly 39.4% had sex without a condom one or more times in the past year, putting them at risk for sexually transmitted infections and unwanted pregnancies.

Table 4-1

*Means, Standard Deviation, and Bivariate Correlations among Study Variables*

| | M (SD) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. BART-Y | 36.14 (13.07) | 1.00 | | | | | | | | | |
| 2. Self-Report Risk Taking | 42.81 (17.70) | 0.03 | 1.00 | | | | | | | | |
| 3. Gender | - | -0.34** | -0.13 | 1.00 | | | | | | | |
| 4. Age | 19. 36 (1. 44) | -0.18 | 0.19 | 0.08 | 1.00 | | | | | | |
| 5. Year in College | 3.24 (1.31) | -0.19 | 0.27* | 0.25* | 0.87** | 1.00 | | | | | |
| 6. Risk Perception | 101.34 (32.25) | -0.30* | -0.09 | 0.14 | -0.17 | -0.08 | 1.00 | | | | |
| 7. Benefit Perception | 36.95 (17.35) | 0.22† | 0.54** | -0.33** | 0.06 | 0.08 | -0.06 | 1.00 | | | |
| 8. Fearfulness | 29.34 (6.70) | -0.25* | -0.36** | 0.51** | -0.14 | -0.04 | 0.28* | -0.39** | 1.00 | | |
| 9. Identity Exploration | 61.83 (9.40) | 0.01 | -0.32** | -0.25* | 0.16 | 0.05 | -0.06 | 0.19 | -0.36** | 1.00 | |
| 10. Risk Self-Schema | 10.63 (5.76) | 0.24* | 0.59** | -0.32** | -0.05 | -0.02 | 0.23†† | 0.47** | -0.49** | 0.32** | 1.00 |

Note: *$p < .05$, **$p < .001$, ††$p = .06$, †$p = .07$. Male = 1, Female =2. $N$ = 65-68

Self-report risk taking behavior was not significantly correlated with the BART-Y ($r$ = .03, $p$ = .81). Some of the psychological characteristics assessed were similarly related to both the BART-Y and self-report risky behavior. Specifically, fearfulness was negatively correlated to both the BART-Y ($r$ = -.25, $p$ < .05) and self-report risk taking ($r$ = -.36, $p$ < .001), showing that fearful individuals engaged in fewer risky activities both inside and outside the laboratory. Individuals who identified as a risk-taker on the risk self-schema measure demonstrated more risk taking on the BART-Y ($r$ = -.24, $p$ < .05) as well self-report risk taking ($r$ = .59, $p$ < .001).

However, there were also some differences between the BART-Y and self-report risk taking in the patterns of associations between psychological constructs and the risk measures. Emerging adults who scored higher on identity exploration reported taking more risks with their health and safety than those with lower on identity exploration ($r$ = .35, $p$ < .05), but they did not necessarily display greater risk taking on the BART-Y. Individuals who scored higher on the self-report measure of risk perceptions took fewer risks on the BART-Y ($r$ = .30, $p$ < .05), but risk perception was not significantly correlated with real world risk taking behavior, though the direction of the effect was also negative ($r$ = -.09, $p$ = .47).

There were some differences in the associations between demographic characteristics and risk taking on the BART-Y and self-report risk taking behaviors. In the test of gender differences on the mean levels of the BART-Y and self-report risk taking, findings indicated that whereas males ($M$ = 40.01, $SD$ = 12.93) were more risk taking than females ($M$ = 30.99, $SD$ = 11.74, $t$(65) = 2.97, $p$ < .01) on the BART-Y there

were no gender differences for self-report risk taking. Participants' year in college was positively associated with self-report risk taking ($r = .27$, $p < .05$) but was not significantly correlated with risk taking on the task.

## Discussion

Developmental approaches to the study of emerging adult risk taking have relied on either self-report measures of past behavior or laboratory measures, leaving unanswered questions about what piece of the story each methodology contributes to understanding correlates of risky behavior. Although conceptual frameworks suggest risk taking behaviors, regardless of how they are measured, result from multiple, simultaneously influential factors (Boyer, 2006; Steinberg, 2005), with few exceptions (e.g., Boyer & Brynes, 2009; Duangpatra et al., 2009; Rolison & Scherman, 2003), there are limited empirical investigations that examine whether the putative correlates and risk taking behavior are associated similarly or differentially by the assessment of riskiness (i.e., self-report risky behavior in real world settings vs. behavioral measures in the laboratory). The purpose of the present study was to address these gaps by exploring how decision-making (i.e. risk and benefit perceptions), psychosocial (i.e. identity processes), and dispositional influences (i.e. fearfulness) bear on emerging adult risk taking on behavioral and self-report measures of risk taking.

Several important findings emerged. First, findings indicated that behavioral and self-report assessments of prior risk involvement were not correlated to each other, suggesting each methodological approach assesses distinct facets of risk taking behaviors. This is in contrast to correlations between the BART-Y and risky behaviors

reported by Lejeuz and colleagues earlier (Lejuez et al., 2007). However, self-report and laboratory measures do not necessarily overlap empirically in the way researchers hypothesize from a conceptual standpoint. For instance, Reynolds, Ortengren, Richards and de Wit (2006) failed to observe significant associations across several self-report and behavioral measures of risk taking (including the BART). Other studies, particularly those measuring impulsivity, have also failed to find evidence that behavioral and self-report methods represent the same construct of risk taking (Lane et al., 2003; Swann, Bjork, Moeller, & Dougherty, 2002). This is not too surprising as questionnaire measures require self-perceptions of one's behavior across several contexts (e.g., risky sex, reckless driving, substance abuse), and these self-evaluations may not always be accurate whereas behavioral tasks like the BART and BART-Y likely assess more specific aspects such as reward sensitivity (Reynolds et al., 2006). The findings are also consistent with other research suggesting there is an important distinction between actual risk taking behavior (i.e. self-reports) and implicit risk preferences that are likely being assessed as a propensity to take risks on behavioral measures (i.e. the BART) (Blais & Weber, 2001)

Second, some of the proposed correlates of risk taking were associated with both the BART-Y and self-report risk taking behaviors. Specifically, the most important overlapping factors associated with increased risk taking on both the task and in real world settings included greater levels of risk self-schema and lower levels of fearfulness. In other words, those with an identity as a risk-taker were more likely to exhibit risky choices whereas those with dispositional fearfulness showed risk-averse behaviors,

regardless of how risk taking is measured. In line with prior research on the role of perceived benefits in predicating self-report risk taking (Goldberg et al., 2002; Parsons et al., 2000), perceptions of benefits of risky behaviors were positively related to self-report behavior, though only marginally significant, to risk taking on the BART-Y. While preliminary, this suggests that subjective evaluations about potential rewards or gains may influence risk taking even in a relatively de-contextualized laboratory assessment.

However, there were also differences in the patterns of the associations between the two measures of risk taking. Perceptions of risks were negatively related to risk taking on the BART-Y only. Given prior work that has suggested perceptions of risks do not directly influence risk taking behaviors (Thornton et al., 2002), it is not perhaps not surprising that perceptions of risks were unrelated to self-report risk taking. These findings can be interpreted within a dual-system model that proposes both cognitive and affective influences on risk taking (i.e., Steinberg, 2005). Despite emerging adults' cognitive competencies, namely their assessment of risks under controlled, low-arousal conditions, they are particularly susceptible to social and emotional factors that are associated with more risky decisions outside the laboratory (e.g., Gardner & Steinberg, 2005; Shepherd et al., 2011). In relation to the findings here, whereas risk taking on the BART-Y may have evoked more effortful decision-making processes that involve considering risks, self-report risk taking behaviors in real world settings, such as having unprotected sex, appear to be driven by perceived benefits and socieoemotional factors (e.g. Gardner & Steinberg, 2005), prior experience with risk behaviors (e.g. Pomery Gibbons, Reis-Bergan, & Gerrard, 2009) and individual differences in personality (e.g.

Caspi et al., 1997) that are likely less salient in a laboratory-based risk taking context. Another divergent finding was that higher levels of identity exploration, a key developmental task in emerging adulthood was related to self-report of past risk taking behaviors, consistent with previous research (Arnett, 2000, 2005), but not to the BART-Y.

Because of the exploratory nature of these analyses, there were no expectations about whether and how age and gender would relate to BART-Y risk taking. Prior work has suggested mixed findings with some research showing males are more risk taking on the BART than females (Cross, Copping, & Campbell, 2011; Hunt et al., 2005) and other studies observing no gender differences on the BART (White et al., 2008). Consistent with other self-report studies, the self-report findings here revealed that men and women reported similar levels of real world risk taking behaviors (Quinn & Fromme, 2010). However, that men were more risk taking than women on the BART-Y was somewhat unexpected and may be explained by gender differences regarding the nature of BART-Y risk taking, namely that it utilizes a behavioral economics framework and gambling-based paradigm.

Specifically, Powell and Ansic (1997) suggested that males demonstrated a greater preference for risk taking in their study using financial decision-making tasks perhaps due to differences in strategies employed by men and women, where men showed longer decision times. Men were more willing to experiment with a wider range of strategies, which Powell and Ansic (1997) interpreted as evidence for gender differences in motivation and risk preference. Thus, although the youth version of the

BART-Y used in the present investigation involved a prize system based on points earned, the underlying premise may nonetheless evoke gender differences similar to those observed in behavioral economics studies and gambling studies (e.g., Kassinove, 1998; Rettinger, & Hastie, 2001). Some have argued that gender differences in risk propensities are more likely to arise in hypothetical or abstract gambles, such as how the BART-Y was used in the present study, because men may be more likely to focus on gains whereas women attend to losses (Schubert, Brown, Gysler, & Brachinger, 1999). Moreover, the *type* of decision-making underlying risk taking on the BART-Y may have thus yielded gender differences where self-report findings did not because the *content* of decision-making differed significantly between the two measures (Blais & Weber, 2001; Rettinger, & Hastie, 2001). Whereas the form of risk taking associated with the BART-Y involved consideration for the potential of losing points during the game, decisions to be risk taking in real world settings can result in serious negative consequences that may impact one's health or safety. That gender was inconsistently correlated with different forms of risk taking in this study is somewhat consistent with prior research that has indicated the complexity of understanding the effect of gender on risk taking (e.g. Byrnes, Miller, & Schafer, 1999; McDaniel & Zuckerman, 2003).

Other demographic differences were observed in relation to time spent in college and risk taking. Compared to their relatively inexperienced college peers, those who have been in college longer were more likely to report more risky behaviors in the self-report measure of risk taking. This is consistent with others who have suggested that the college environment may lead to misperceptions in social norms that promote risky

behaviors (Jackson et al., 2005; Neighbors et al., 2007; Quinn & Fromme, 2011). Interestingly, however, such a pattern of association was not observed on the BART-Y. This may be explained partly by differences in the social contexts between the task and real world settings. Specifically, research has suggested that risk taking in emerging adulthood is social in nature, that is, that these behaviors tend to occur in groups and under conditions of high emotional arousal (e.g. Casey et al., 2008; Steinberg, 2007). However, the BART-Y assessment was administered under a low emotional condition and in the absence of peers who are believed to elicit social norms that influence behavioral decisions (e.g. Neighbors et al., 2007). In other words, whereas relatively older college students likely engage in risk taking behaviors in the presence of peers, the BART-Y may not have been sensitive to college status because the task lacked components (i.e., peers) that are integral to understanding behavior in real world settings.

Taken together, these findings reveal that although the BART-Y is not directly associated with self-report risk taking, its correlation with key cognitive, identity, and personality factors suggests that it reflects a different, yet related, form of riskiness than is assessed by self-reports. The BART-Y appears to assess a dimension of risk taking behavior that involves sensitivity to risk outcomes, temperamental differences in fearfulness which is a component of behavioral inhibition, and internalized beliefs about the self as a risk-taker. Thus, whereas behavioral measures assess implicit attitudes and propensities towards risk taking, self-report measures reflect individuals' overt or conscious evaluation of themselves as risk taking resulting in slightly different psychological correlates of actual behavior.

**Limitations**

The findings here are the first to examine how decision-making, identity processes, and a fearful personality relate to risk taking on the BART-Y. However, because of the exploratory nature of these analyses, further research is needed with lager sample sizes before firm conclusions about the meaning of BART-Y can be made. Furthermore, this study focused on descriptive-level association, therefore additional research is needed to seek explanations of why the BART-Y and self-report risk taking did not correlate significantly and why they differed in the patterns of associations with correlates of risk taking.

Other important considerations of BART-Y risk taking not addressed here include the role of cultural differences and developmental changes in relevant psychological processes. To date, studies of adolescent and emerging adult risk taking have largely ignored, or only considered as a secondary question, the potential influence of culture on correlates and predictors of risk taking behavior as assessed by self-report studies, let alone laboratory measures using the BART or BART-Y. Therefore, the potential for cultural differences in risk taking propensity was not assessed here. Although some data has shown ethnic differences in substance use (e.g., Kilpatrick, Acierno, Resnick, Saunders, & Best, 1997) and disparities in mortality rates by ethnicity have been well documented (Mulye, Park, Nelson, Adams, Irwin, & Brindis, 2009), it is surprising that underlying mechanisms and correlates that lead to differences in risk taking behaviors have not been well researched among either self-report or experimental studies of risk taking.

## Conclusion and Implications

In an effort to extend prior research (e.g., Aklin et al., 2005; Lejuez et al., 2002, 2003, 2007), the present study further probed the meaning of a relatively new and increasingly used behavioral measure of risk taking, the BART-Y, by assessing its relation with psychological constructs and real world risk taking behaviors. Findings demonstrated that the BART-Y is not significantly related to self-report risk taking behaviors. The data, however, revealed several parallel patterns between psychological constructs and their associations with both the BART-Y and self-report risk taking. This highlights the importance of including multiple assessments of risk taking, as each methodology contributes both shared and unique determinants of behavior.

# CHAPTER 5 - GENERAL DISCUSSION

The overarching aim of the current investigations was to broaden scientific understanding of social, cognitive, and psychological factors that underlie emerging adult risk taking (Figure 1). Findings are further summarized as follows. All together, the results from these studies show that the BART-Y is a somewhat reliable behavioral measure that captures individual variation in emerging adults' risk taking *propensity*, or tendency to take risks when given the opportunity (Boyer & Byrnes, 2009), a distinct component from self-report risk taking *behaviors* in real world settings. Moreover, Study 1 showed that peers' verbal messages influenced risk taking on the task in expected directions. Specifically, between-person comparisons revealed that whereas emerging adults took more risks on the BART-Y when they received direct verbal encouragement to "keep pumping", individuals took significantly fewer risks when they heard more cautious suggestions from a risk-averse peer. Interestingly, in Study 1 participants also demonstrated significantly more risk taking on the BART-Y in the presence of a *neutral* peer relative to their baseline during the alone condition, suggesting that the mere presence of a peer may be sufficient to increase an individual's risk taking propensity.

Study 2 attempted to contextualize Study 1 findings and extend understanding of the BART-Y by examining associations between task behavior with self-report of past risk taking behavior and psychological factors. Despite the lack of correlation between task risk taking and self-report risk taking, the BART-Y and self-report measures may share overlapping underlying mechanisms. Illustratively, those who endorsed a self-schema as a risk-taker and those with a relatively fearless dispositional tendencies

exhibited more risk taking on both measures. In the following section, methodological and theoretical implications of these findings are disused for understanding the factors associated with emerging adult risk taking behaviors.

**Peer Influence**

The current investigation contributes to the literature on peer influences on youth's risk taking in three ways. First, findings generated from Study 1 show that peers continue to shape individuals' risk taking tendencies beyond adolescence. The majority of developmental studies of risk taking behavior have focused on adolescence, leaving emerging adulthood unexamined. Although the data from Study 1 are limited by Study 2 findings, namely that the BART-Y and self-report risk taking behaviors were uncorrelated, what remains clear is that peer behavior did effect the degree to which emerging adults showed a propensity towards risk taking, and that peers remain an important socialization agent after adolescence. The current findings are consistent with findings on peer effects on drinking behavior in college students (Bartholow, Sher, &Krull, 2003; Jackson et al., 2005; Martin & Hoffman, 1993).

Second, the use of experimental design yielded the rigorous testing of the process through which peers influence emerging adults' risk taking. In what Hartup (1999, 2005) refers to as "the process problem", developmental studies generally lack a grand theory of *how* peers influence one another. Hartup has argued, that "peer socialization has been regarded by some investigators over the years as a field without a good theory ….Choosing among paradigms to use in studying peer socialization is not so much the task of choosing a social learning perspective, a biological perspective, an information

processing perspective, or a cognitive-developmental perspective as choosing constructs and notions that "fit" the socialization domain with which one is concerned" (Hartup, 1999, p. 178). Studying peer influences is complicated by the challenges of disentangling two intertwined processes: selection and socialization processes (Kandel, 1978). Evidence suggests that peer group socialization has a significant effect on adolescent substance use, for example, whereby peers who affiliate with the same peer group become more similar to each other over time (Kandel, 1980). Selection effects, or the tendency to befriend those who share common attitudes and interests, represent another way dyadic interactions influence youth's behaviors (Kandel, 1980).

One methodological approach that addresses the challenge of disentangling selection and socialization effects involves experimentally manipulating individuals to varying forms of peers influence and measuring subsequent behavior (e.g. Cohen & Prinstein, 2006). Whereas other experimental findings have relied on the target individual to bring their friends to the laboratory which may provide more ecological validity (e.g. Centifanti & Modecki, 2012; Gardner & Steinberg, 2005), Study1 was designed to control for peer selection biases. A key strength of Study 1 is that a behavioral measure of risk taking propensity was assessed in the presence of a confederate who did not have any prior interpersonal relationship with participants, which makes selection effects unlikely. As such, findings from Study 1 indicate that the observed changes in risk taking on the BART-Y across the varying conditions reflect peer socialization processes.

Results from the present investigation suggests that one of the mechanisms underlying peer effects on individuals' risk taking behavior is through socialization via verbal messages. These socialization effects are believed to occur because the peer context provides support, reinforcement and opportunities that shape attitudes and behaviors (Prinstein & Wang, 2005). As clearly shown in results from Study 1, individuals who received encouraging messages showed higher risk taking propensity while individuals whose peer discouraged risk taking did indeed desist from taking risks on the game.

Third, the findings identified an important component of the socialization processes. That is, verbal messages from a peer function as a socialization agent. Findings from Study 1 are consistent with research on "deviancy talk", a mechanism assumed to explain peer influence by focusing on social interaction (Dishion, Spracklen, Andrews, & Patterson, 1996; Dision, & Tipsord, 2012). As proposed by Dishion and colleagues' work on delinquent and antisocial peer influences and social reinforcement models, emerging adults in Study 1may have modeled the behaviors of their peer, perhaps by internalizing perceived peer attitudes and norms expressed in their verbal messages.

**The BART-Y: What Is and Is Not Known**

The goal of Study 2 was to investigate the meaning of BART-Y risk taking by assessing its relation with real world risk taking behavior and several psychological factors. Studies using the BART-Y have generally not attempted to identify underlying mechanisms of task behavior beyond a small subsets of personality variables (i.e.,

sensation-seeking and impulsivity) and reward sensitivity (Chein, Albert, O'Brien, Uckert, & Steinberg, 2010; Galvan et al., 2006; Rao et al., 2008). Results indicated that the BART-Y and self-report risk taking behavior in real world settings were not significantly correlated. Given the absence of a significant positive correlation between the two measures, findings from Study 2 suggest that the BART-Y may be best used as part of a multi-method assessment of risk taking behaviors, and better conceptualized as a measure of individual differences in the tendency to make risky decisions in a specific context in which it is administered rather than a proxy for actual risk behaviors more broadly.

Part of the challenge of interpreting task behavior in the absence of a correlation with self-report behavior is the lack of a clearly defined operational definition of *risk taking propensity*. The interpretation of the BART-Y in the current study is in line with other conceptualizations of risk propensity as a changeable trait or attitude that varies as a function of experience and context rather than a stable individual difference trait (Sitkin & Weingart, 1995; Weber, Blais, & Betz, 2002). Therefore individuals who reported greater risk taking behaviors in real world settings may have displayed less risk taking propensity on the BART-Y due to characteristics of the situation that reduced socioemotional influences and ecological validity.

A dispositional perspective on the BART-Y is consistent with findings that task behavior was related to individual differences in fearfulness, a trait that orients one towards or away from potentially risky outcomes. Although the linkages between personality and health risk behaviors are complex (Friedman, 2000), it appears likely that

*fearless* individuals may be more prone to risk taking behaviors due to a lack of concern or worry about risky situations and behaviors. Thus, despite inconsistent findings regarding its relation to other individual difference factors such as sensation-seeking and impulsivity discussed in Chapter 4, behavior on the BART-Y appears to reflect a dimension of personality, namely fearfulness, that has not been examined in prior research. In what may be the most informative definition of BART behavior, Lejuez and colleagues have suggested that the BART behavior "captures the appetitive processes underlying a behavioral tendency to take risks in response to cues for potential reward with a probability for undesirable results" (Macpherson, Richards, Collado, & Lejuez, 2011, p. 187). To the degree that unmeasured individual-level and environmental factors may mediate the relationship between dispositional tendency and actual behavior, it is perhaps not surprising that behavioral and self-report were uncorrelated. As such, the BART-Y might be better assessed as a component of risk taking behaviors that is only related to health and safety risk taking under some conditions.

It is noteworthy that the lack of significant correlation between the BART-Y and self-report behavior observed in this study is inconsistent with prior work showing the existence of a significant correlation between the two (Aklin et al., 2005; Lejuez et al., 2007). Accordingly, an alternative and equally plausible explanation for the inconsistencies in findings may be discrepancies between task administration in this dissertation and prior work. As discussed in Chapters 2 and 3, participants were asked to *imagine* that they were playing for a prize of varying value (i.e., small, medium, large, and bonus), and were not actually given a tangible incentive. This is in contrast to other

studies that have used monetary compensation at the conclusion of the task (e.g. Rao, Korczykowski, Pluta, Hoang, & Detre, 2008). Perhaps, offering a real and tangible incentive may have produced more affective decision-making on the task and thus resulted in significant associations between BART-Y and self-report measures.

Still, the BART-Y appears to be a relevant method of risk taking propensity, as shown in the Study 2 findings that suggested perceptions of risk were negatively related to BART-Y behavior. Although somewhat preliminary, the current investigation presents initial supporting evidence that the BART-Y is related to responsiveness to costs and reward that are believed to influence risky decision-making (Goldberg et al., 2002; Parsons et al., 2000; Rolison & Scherman, 2003).

Finally, the findings that the BART-Y scores were related to the content of emerging adults' self-representations deserve further attention. Specifically, individuals who viewed themselves as more of a risk-taker, and thus had a relatively higher risk self-schema, were more risk taking on the task *and* in real life. In other words, regardless of how risk taking was measured (behaviorally or through self-reports) risk self-schema was strongly and positively related to risk taking. Given the salience of' identity development during adolescence (Marcia, 1980) and the acknowledgement that identity formation continues through emerging adulthood (Arnett, 2000), this dissertation is consistent with prior emphasis on the importance of the self-concept and is the first data to measure identity processes in relation to a behavioral measure of risk taking. Whereas other scholars have examined youth's perceptions of the prototypes or images of the typical person who engages in risk behaviors (i.e. Gerrard et al., 2008), less direct attention has

been given to youth's *own* self-schema as a risk-taker. In summary, the finding that those with a relatively higher risk self-schema reported more real world health and safety risk taking behaviors than those lower on risk self-schema is consistent with research on the implications of having a self-schema for a particular behavior (Markus, 1977; Markus & Wurf, 1987; Stein, Rosser, & Markus, 1998; Swann & Read, 1981).

**Conclusion**

Prior empirical work on the BART and BART-Y have been largely focused on a limited set of personality correlates. The present investigation revealed that an individual's risk taking propensity on the BART-Y is susceptible to various influences, including verbal messages by peers, risk-related cognitions, risk self-schema, and fearfulness. Furthermore, in exploring the meaning of the BART-Y, the study findings suggested that the behavior observed in the task represents a construct of risk taking propensity, which is distinct yet closely related to real world risk taking behavior.

Bronfenbrenner famously stated that "Much of developmental psychology, as it now exists, is the science of the strange behavior of children in strange situations with strange adults for the briefest possible periods of time" (1979, p. 19). This dissertation suggests that further research considering the underlying meaning of behavioral measures is needed before strong causal inferences can be made about how presumably risky behavior in a laboratory setting may generalize to real world risk taking. These findings underscore the importance of developing increasingly creative and ecologically valid behavioral measures that help explain developmental and individual differences in emerging adult health and safety risk taking.

Furthermore, each study in this dissertation assessed a distinct component of the proposed conceptual model of emerging adult risk taking (Figure 1). Whereas Study 1 disentangled the effect of the peer context on risk taking on the BART-Y, Study 2 examined more closely the psychological processes that contribute to risk taking, including the influence of decision-making, self-conceptions and dispositional fearfulness. Future research should build on the findings here by more directly assessing the interplay between social and individual correlates on behavior. Specifically, the model can be used to consider unexamined yet important moderators of young people's susceptibility to peer influences. For instance, perhaps individuals who perceive more benefits of a risky behavior are even more likely to engage in such activities in the presence of peers who are pro-risk taking.

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Appendix A

Informed Consent

You have been asked to participate in a two-part, online study about adolescent behavior. This study is being conducted by Shelly Sadek from the Department of Psychology at the University of California, Riverside. I am interested in understanding how adolescents and young adults make decisions. All of your responses will help us better understand how young adults make decisions related to their health or safety.

If you agree to participate in this study, you will be asked to complete a computer game for one part of the study and take an online survey for the second part of the study. The computer game will take approximately 45 minutes, and the survey will take approximately 60 minutes. For the computer game, you will play it twice, once alone and once with another student. Survey questions will address the following areas: typical scenarios that require risky decision-making during adolescence, sense of self, personality and social influences, and your physical and psychological health. All responses will be kept confidential. In addition, any identifying information will be shredded immediately after your answers are entered in a database.

Your participation is completely voluntary. If you choose not to participate in one or both parts of the study you will be advised by your instructor of alternative methods for satisfying this course requirement. As a participant, if you feel you do not want to answer any particular question, you will be free to stop playing the computer game and/or skip any survey question. You are free to discontinue participation at any time with no penalties.

It is not anticipated that you will experience any discomfort or risk as a result of participating in this online study. However, if any discomfort does occur from answering some personal questions, you may contact the researcher Shelly Sadek (shelly.sadek@email.ucr.edu) with concerns and will be referred to the appropriate school counselors, if desired. You may also call the UCR Counseling Center for a free visit at (951) 827-8255. Additionally, if you have any questions regarding the conduct of this research or your rights as a research participant, please contact the UCR Office of Research Integrity at 951-827-4811, 951-827-6332 or to contact them by email please use IRB@ucr.edu.

Please click on the button below if you consent to participate in this study. All participants must be 18 years of age or older. If you choose to not participate you will not

experience any negative consequences and will be asked to attend a lecture in order to fulfill course credit requirements. Thank you.

☐ I understand that by checking this box, I am providing my consent to participate in this study.

Appendix B

Measure of Fearfulness

The following section asks you questions about your personality. There are no right or wrong answers. Please indicate how much each statement describes you using a 5-point scale.

| | Strongly disagree | Disagree | Neither disagree nor agree | Agree | Strongly agree |
|---|---|---|---|---|---|
| Am a physical coward. | ○ | ○ | ○ | ○ | ○ |
| Begin to panic when there is danger. | ○ | ○ | ○ | ○ | ○ |
| Would fear walking in a high-crime part of a city. | ○ | ○ | ○ | ○ | ○ |
| Tremble in dangerous situations. | ○ | ○ | ○ | ○ | ○ |
| Would never go riding down a stretch of rapids in a canoe. | ○ | ○ | ○ | ○ | ○ |
| Like to do frightening things. | ○ | ○ | ○ | ○ | ○ |
| Face danger confidently. | ○ | ○ | ○ | ○ | ○ |
| Love dangerous situations. | ○ | ○ | ○ | ○ | ○ |
| Would be good at rescuing people from a burning building. | ○ | ○ | ○ | ○ | ○ |
| Am willing to take risks. | ○ | ○ | ○ | ○ | ○ |

Appendix C

Risk Involvement and Perceptions Scale

The following questions ask you to report how frequently you participate in the each of the listed activities. Remember that your responses are kept confidential, please answer as honestly as you can.

Specify how often you engage in each of the following

| | Never (0) | - | Rarely (2-3 times/year) | - | Occasionally (2-3 times/month) | - | Often (2-3 times/week) | - | Daily or more |
|---|---|---|---|---|---|---|---|---|---|
| Having sex. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Riding with a drunk driver. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Drinking alcohol. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Drinking 4 - 5 alcohol drinks within 2 hours. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Walking alone at night. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Getting drunk. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Binge eating. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Using marijuana. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Speeding when driving. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Texting when driving. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Having sex without a condom. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Shoplifting. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Driving after drinking. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Riding without a seatbelt. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Using illegal substances other than marijuana. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Smoking cigarettes. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Sunbathing. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

How risky would it be for you to engage in the following activities?

| | 0 (Not at all risky) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 (Extremely risky) |
|---|---|---|---|---|---|---|---|---|---|
| Having sex. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Riding with a drunk driver. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Drinking alcohol. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Drinking 4 - 5 alcohol drinks within 2 hours. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Walking alone at night. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Getting drunk. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Binge eating. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Using marijuana. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Speeding when driving. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Texting when driving. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Having sex without a condom. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Shoplifting. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Driving after drinking. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Riding without a seatbelt. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Using illegal substances other than marijuana. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Smoking cigarettes. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Sunbathing. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

How would you rate the potential benefits of engaging in the following activities?

| | 0 (No potential for benefits) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 (Extremely high potential for benefits) |
|---|---|---|---|---|---|---|---|---|---|
| Having sex. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Riding with a drunk driver. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Drinking alcohol. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Drinking 4 - 5 alcohol drinks within 2 hours. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Walking alone at night. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Getting drunk. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Binge eating. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Using marijuana. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Speeding when driving. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Texting when driving. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Having sex without a condom. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Shoplifting. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Driving after drinking. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Riding without a seatbelt. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Using illegal substances other than marijuana. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Smoking cigarettes. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Sunbathing. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

Appendix D

Identity Exploration Scale

Indicate how much you agree with each statement.

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| Strongly disagree | Disagree | Slightly disagree | Slightly agree | Agree | Strongly agree |

1. I have considered adopting different kinds of religious beliefs
2. There has never been a need to question my values
3. My ideas about men's and women's roles have never changes as I became older
4. I have engaged in several discussions concerning behaviors involved in relationships
5. I have considered different political views thoughtfully
6. I have never questioned my views concerning what kind of friend is best for me
7. I have not felt the need to reflect upon the importance I place on my family
8. I have tried to learn about different occupational fields to find the best one for me
9. I have undergone several experiences that made me change my views on men's and women's roles
10. I have consistently re-examined many different values in order to find the ones which are best for me
11. I have questioned what kind of date is right for me
12. I have evaluated many ways in which I fit into my family structure
13. I have had many experiences that led me to review the qualities that I would like my friends to have
14. I have discussed religious matters with a number of people who believe differently than I do
15. I am not sure that the values I hold are right for me
16. The extent to which I value my family is likely to change in the future

Appendix E

Risk Self-Schema Scale

Some people really enjoy taking risks. Other people prefer not to do anything risky. On the following scale, indicate how much the term "risk-taker" describes you at this time in your life.

Now, think about how much the term "risk-taker describes you at this time in your life when it comes to each of the following behaviors.

0) Not me at all! 1 2 3 4) That's me!

1. Risking your money (i.e. gambling)
2. Risky sexual activity (i.e. unprotected sex, being promiscuous)
3. Illegal substance use
4. Risky driving behaviors (i.e. speeding, driving buzzed, texting while driving)
5. heavy or binge drinking (4 drinks / 2 hours = women; 5 drinks / 2 hours = men)
6. Doing minor illegal activities (i.e. misdemeanors, vandalism, petty theft, possession of illegal drugs)
7. Doing major illegal activities (i.e. felonies, burglary, arson, aggravated assault)
8. Risking your health
9. Risking your safety