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LOYOLA UNIVERSITY CHICAGO

PREDICTING DECISION-MAKING IN RELATION TO HEALTH-RISK BEHAVIOR IN  
COLLEGE FRESHMEN

A DISSERTATION SUBMITTED TO  
THE FACULTY OF THE GRADUATE SCHOOL  
IN CANDIDACY FOR THE DEGREE OF  
DOCTOR OF PHILOSOPHY

PROGRAM IN NURSING

BY

ANNE B. LUCKOSE

CHICAGO, IL

MAY 2019

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## ACKNOWLEDGMENTS

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Your word is a lamp to my feet, and a light to my path.

(Psalms 119:105)

To my husband Biju and daughters, Alina and Athena.

The love of a family is life's greatest blessing.

Thank you for standing by me when I needed you, making me laugh when I felt like I couldn't.

The future belongs to those who believe in the beauty of their dreams.

The woods are lovely, dark and deep,  
But I have promises to keep,  
And miles to go before I sleep,  
And miles to go before I sleep.

“Stopping by Woods on a Snowy Evening,” Robert Frost



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## LIST OF ABBREVIATIONS

ADMQ	Adolescent Decision-Making Questionnaire
AUDsx	Alcohol Use Disorder Symptoms
ACHA NCHA	American College Health Association National College Health Assessment
ADHD	Attention Deficit Hyperactivity Disorder
AUC	Area Under the Curve
ANCOVA	Analysis of Covariance
ANOVA	Analysis of variance
ACC	Anterior Cingulate Cortex
AIC	Anterior Insular Cortex
BART	Balloon Analogue Risk Task
BMI	Body Mass Index
BASICS	Brief Alcohol Screening and Intervention for College Students
CDC	Centers for Disease Control and Prevention
CI	Chronic Illness
CCT	Columbia Card Task
CIRP	Consumer Intelligence Research Partners
CG	Control Group
DAYS	Number of Drinking Days
DRINKS	Drinks Per Occasion
ETV	Exposure to Violence
F/V	Fruits and Vegetables

fMRI	functional Magnetic Resonance Imaging
FTT	Fuzzy-trace theory
GOFER	Goals clarification, Options generation, Fact-finding, consideration of Effects, Review and Implementation
GPA	Grade Point Average
HRG	High-Risk Group
HIV	Human Immunodeficiency Virus
ICDC	Internalization of the College Drinking Culture
ICC	Intraclass Correlation Coefficient
IGT	Iowa Gambling Task
IPFC	Lateral Prefrontal Cortex
MRBURNS	Maryland Resource for the Behavioral Utilization of the Reinforcement of Negative Stimuli
MAX24	Maximum Drinks in 24 h
MANOVA	Multivariate analysis of variance
MDPSS	Multi-Dimensional Perceived Support Scale
NCES	National Center for Education Statistics
NHTSA	National Highway Traffic Safety Administration
NYRBS	National Youth Risk Behavior Survey
NSSI	Nonsuicidal self-injury
NAcc	Nucleus Accumbens
OR	Odds Ratio
PFH	Parental Family History



pBAC	Peak Blood Alcohol Concentration
PNF	Personalized Normative Feedback
PA	Physical Activity
RR	Response Rate
RG	Risk Group
RSE	Risky Sex Expectancies
RSB	Risky Sexual Behaviors
STI	Sexually transmitted infections
SD	Standard Deviation
SPSS	Statistical Package for Social Sciences
SEM	Structural Equation Modeling
SAMHSA	Substance Abuse and Mental Health Services Administration
SSNs	Sugary snacks
SSBs	Sugar Sweetened Beverages
STB	Suicidal thoughts and behaviors
TDV	Teen dating violence

## ABSTRACT

**Method/Measurements:** A cross-sectional correlational design explored the relationships between decision-making, health-risk behaviors and social support systems in college freshmen. The aims of the study were: 1) to explore the relationship between decision-making and health-risk behaviors among college freshmen; 2) to determine whether or not family support and social support jointly predict decision-making among college freshmen; and 3) to ascertain whether or not the effect of family support on decision-making is different for male and female college freshmen. Measurement was collected at one time-point and participants in this study completed on-line questionnaires through a web-based online survey software application with measures of the following variables: decision-making (Adolescent Decision-Making Questionnaire); health-risk behavior (Adapted National Youth Risk Behavior Survey); and family support and social support (Multidimensional Scale of Perceived Social Support). A convenience sample of 200 freshmen aged 18 to 19 years participated from a local, private Catholic university located in Chicago. This study was approved by the institutional review board at Loyola University Chicago.

**Data Analysis:** The primary study hypothesis was that decision-making will be associated with health-risk behaviors in college freshmen. SPSS Statistics version 24 was used to perform all statistical analyses. To test the primary hypothesis, the analysis included descriptive statistics on all study variables and correlations. Findings include the following; positive decision-making was associated with a decrease in health risk behavior, and negative decision-

making was associated with an increase in health risk behavior. The secondary and tertiary hypotheses were tested using linear regression and multiple regression analyses. Family support and social support were found to be significant predictors of positive decision-making and negative decision-making. Hence, social context played a significant role that impacted freshmen decision-making. Also, the effect of family support on positive decision-making was the same for male and female college freshmen and was statistically significant. Correspondingly, regression analysis results found that family support was associated with a decrease in negative decision-making in female college freshmen. Together, these findings extend the evidence that adolescence involves a period of developing decision-making processes which may help explain health-risk behavior, and more specifically, findings demonstrate a synergistic impact of social support systems on decision-making in college freshmen.

**Nursing and Healthcare Implications:** Overall, findings from this study support the need to identify and implement interventions that may be developed to improve freshmen's decision-making skills and to enhance their ability to exercise mature control over their own behavior, leading to better early college experiences. Integrated care team models, comprised of nursing professionals, especially nurse practitioners along with mental health professionals and health promotion educators have been shown to be effective in improving college students' physical, psychological and emotional health. Ultimately, nurse practitioners have the unique opportunity to develop evidence-based practice guidelines to improve freshmen's decision-making and coping skills while engaging in simultaneous collaborative care. The overall benefit could potentially reduce freshmen health-risk behavior thereby achieving positive health outcomes and successful educational outcomes that, in turn may result in improved

undergraduate retention rates. This research, while making an important contribution to the literature, contributes to the health of college freshmen by highlighting key social support systems, hence focusing efforts on strengthening decision-making and coping skills in this subset of students.

*Keywords:* college freshmen, decision-making, health-risk behaviors, family support, social support

## CHAPTER ONE

### INTRODUCTION

#### **Background**

The college years are frequently a transition period when students are gaining independence from their parents and developing healthy lifestyle behaviors (American College Health Association, 2011). It is also a time of transition from adolescence to young adulthood and is a period of considerable development in which individuals are confronted with adapting to several physical, psychological, and social changes (Bakar, Jamaluddin, Symaco, & Darusalam, 2010; Buitelaar, 2012; Salazar-Pousada, Arroyo, Hidalgo, Perez-Lopez, & Chedraui, 2010; Singh, 2012). Colleges can provide a safety net in continuing and or developing healthy behaviors that have strong potential for retention into students' adult years. Over the past several decades, however, the incidence of health-risk behaviors has been increasing among college students, causing increased concern to society at large (O'Neill, 2007).

increased vulnerability to mental health concerns as well (Bakar et al., 2010; Bennett, 2012; Benton, Robertson, Tseng, Newton, & Benton, 2003; Galatzer-Levy & Bonanno, 2013).

According to the National Center for Education Statistics data analyzed by the American Council on Education (2000), freshmen account for more than one-third of undergraduate deaths (35%) studied even though they make up 24% of the population enrolled in four-year institutions. Further, suicide is the second leading cause of death among college students over 19 years of age and the third leading cause of death for students 19 years old and younger (Heron,

2013). Freshmen are more likely to take their own lives: they account for 40% of all undergraduate suicides (U.S. Department of Education, 2015). The proportion of freshmen who die on school property is even higher: 47% of the undergraduates who die on campus are freshmen. These statistics have proven the most surprising and disturbing to analysts, experts, and parents who imagine the campus to be idyllic and safe (Davis & DeBarros, 2006). Among adults aged 18-22 years, similar percentages of full-time college students and other adults in this age group had suicidal thoughts (8.0 and 8.7%, respectively) or made suicide plans (2.4 and 3.1%). However, full-time college students aged 18 to 22 were less likely than other adults aged 18 to 22 to attempt suicide (0.9 vs. 1.9 percent) or receive medical attention as a result of a suicide attempt in the past year (0.3 vs. 0.7 percent) (Substance Abuse and Mental Health Services Administration, 2013).

Although adolescence is usually a relatively healthy life stage, preventable death, illness, and injury do occur. Approximately 42 million adolescents aged 10–19 years, representing 13% of the population, resided in the United States in 2014 (US Census Bureau, 2014). Unintentional injuries, suicide, and homicide are the top three causes of death among adolescents (Sleet, Ballesteros & Borse, 2010). Injuries are also the leading cause of nonfatal morbidity among adolescents. During 2013, approximately 4 million unintentional nonfatal injuries resulted from being struck by something, falling, overexertion, car crashes, and other mechanisms (CDC, 2015). In addition, according to the Center for Disease Control (CDC, 2015), approximately 260,000 youths were treated in emergency departments for nonfatal physical assault injuries, excluding sexual assault. In 2014, 71% of all deaths among persons aged 10–24 years resulted from four causes: motor vehicle crashes (23%), unintentional injuries (17%), suicide (17%), and

homicide (14%). The total costs of injuries and violence in the United States for young people ages 15-19 was \$671 billion in 2013. According to Florence, Haegerich, Simon, Zhou, & Luo (2015), the costs associated with fatal injuries totaled \$214 billion, while nonfatal injuries accounted for over \$457 billion. In 2013, youth aged 15-24 accounted for 4,329 homicides (CDC, 2015). The number of suicides for the same age group and year was 4,878 (CDC, 2015). The estimated lifetime medical and work-loss cost associated with homicide was \$8,622 million in 2013 (CDC, 2015). The estimated lifetime medical and work loss costs associated with suicide was \$9,578 million in 2013 (CDC, 2015). Clearly this is a population that requires further research and expanded healthcare services.

Previous research on health-risk behaviors in college freshmen has focused on the following six areas: injury-related behaviors, substance use, sexual behaviors, nutrition, physical activity, and sleep. Studies clearly indicate that college freshmen are the most vulnerable population within the university community (O'Neill, 2007). Their agendas are no longer dictated by full days of high school classes, after-school sports and activities, and family mealtime rituals (Newton, Kim, & Newton, 2006). Freshmen, in particular, are susceptible to engaging in risky behaviors that may be detrimental to their health (O'Neill, 2007). They may also engage in one risk behavior that may make them likely to engage in another (O'Neill, 2007). For example, a student who partakes in heavy alcohol use also may not make safe decisions regarding sexual practices due to intoxication during an intimate encounter (O'Neill, 2007). Therefore, as Davis & DeBarros (2016) note, it is important to note that many of the risk behaviors overlap.

A national sample of nearly 77,000 first-year U.S. college students showed that risky drinking increased within the first few weeks of college (Nguyen, Walters, Wyatt & DeJong (2011), while protective behavioral strategies i.e., active strategies to reduce alcohol consumption, such as alternating alcohol with water gradually decreased over the same time period (Martens et al., 2005). This may be because during the first few weeks of college, students meet new people, join new social groups, and attend social events where alcohol may be readily available. Through these experiences, perceived norms about college alcohol consumption are formed. Perceptions of typical college student drinking (descriptive norms) as well as perceived peer approval (injunctive norms) during the transition to college predict alcohol consumption during that first year (Neighbors et al., 2008; Pedersen, Neighbors & LaBrie, 2010; Stappenbeck, Quinn, Wetherill & Fromme, 2010).

A consistent finding in the literature is the relationship between the decision-making process that adolescents use and the risk behaviors that result when opportunities arise. Although research on predictors and correlates of risk behavior is plentiful (Jessor, 1998; Rivara, Park, & Irwin, 2009), surprisingly little research has addressed the decision-making process adolescents employ when faced with the opportunity for risk behavior in the real world. Such processes are important to understand, since freshmen students who engage in risky decision-making may be more likely to engage in health-risk behaviors such as risky sexual activity, drug use, alcohol/binge drinking, cigarette use, fighting, and suicide (Rozmus et al., 2005). One study was designed to measure the attitudes, behaviors, and overall participation towards substance abuse and risky sexual behaviors in 18-24 year-olds, African American students enrolled in three sections of a Health and Wellness course at Southern More University. A comparative analysis



was incorporated to investigate if differences exist in attitudes and behaviors in alcohol use, drug use, and risky sexual behaviors prior to and following a peer led instructional intervention. More than 85 % of students for both pretest and posttest data reported being sexually active; however less than 50 % of students reported using condoms during sexual intercourse. Recommendations for further research include exploring risk perceptions and motives for engaging in risky health behaviors (Heaston, 2018).

Another interesting phenomenon that affects adolescent risk-taking is the social environment in which the adolescent lives. The social environment may consist of different support systems that may affect decision making and risk taking in adolescents. The effect of the social environment on individual decision-making is important because many behaviors are conducted in the presence of others. This area of investigation is often studied in the field of social learning (Casey & Rozin, 1989; Galef, 1995; 1996; Laland, 1996; Reeb, 2000), which is focused on situations in which individuals have the opportunity to learn from others' experience. Surprisingly little research has been devoted to individual risk-taking within a social context in which people are able to observe aspects of each other's behavior (Yechiam et al., 2008). Some of the other social variables that may affect decision-making apart from social support are family support, place of residence, peer influences and university support (Wilks, 1986; Nurmi, 1991; Bednar & Fisher, 2003; Brown, 2004; Katz & Somers, 2017; Leung, 2017; Buchanan & McConnell, 2017; Gage, 2017). In a prospective longitudinal survey conducted on undergraduate students on the types and providers of social support that are associated with physical activity across the first year of university, physical activity increased, whereas received family, and number of people providing tangible support decreased over the first year of university. Students

reported engaging in higher amounts of physical activity during times when they had more, compared to less than their average, social network from family and received social support from friends (Scarapicchia, Sabiston, Pila, Arbour-Nicitopoulos, & Faulkner, 2017). Another study was conducted by Quiroga and colleagues (2017) on violence outcomes on depression and gender differences in Mexican adolescents. Parental support versus other sorts of social support was proposed to be a relevant moderator factor for decreasing the negative outcomes of violence exposure on depression, and gender was predicted to play a role in this process. A two-way interaction between violence exposure and parental support was only significant in the case of adolescent girls, whereas there was no evidence of such moderation for adolescent boys. The effect of exposure to violence on girls' depression was stronger when their parental support was relatively low than when their parental support was relatively high. Parental support may serve as a protective factor of depression after violence exposure especially for girls, whereas more research should be conducted in order to detect an efficient protective mechanism for boys who are exposed to violence.

Variables like positive coping strategies, social support, self-esteem, and perceived stress altogether have a unique predictive power on freshmen college adjustment and should be considered together when predicting personal adjustment to college (Chen, 2016). In another study conducted by Bryant (2016), study findings suggested that students who perceive their parents to be caring, involved with their lives, and accepting of them tend to exhibit confidence, motivation, and enhanced ability to navigate the challenges encountered with collegiate life. Social support and family support will be discussed in detail later in this chapter.

College students struggle with multiple challenges related to their college lives (Dauenhauer, 2014). They face new challenges in time management, responsibilities, advanced academics, and maintaining social and intimate relationships (Brougham, Zail, Mendoza & Miller, 2009). The strategies college students use to cope with those challenges can have an impact on their overall well-being and mental health (Mahmoud, Staten, Hall & Lennie, 2012). These coping mechanisms can take the form of health-risk behaviors that may lead to negative health outcomes.

Freshman year is a period of major life transition (Cho et al., 2015). During the transition from high school to the first year of college, critical changes in individual freedoms, responsibilities, and living conditions occur (Arnett, 2000). It is a time that is marked by freedom from parental supervision and independent decision-making (Ghrayeb et al., 2016). It is also a time when some college students transfer to another college. Others drop out entirely. The total first-time freshmen fall enrollment in all postsecondary degree-granting institutions increased by 39 % from 1997 to 2011 and is projected to increase 16 % between 2011 and 2022 (National Center for Education Statistics, 2014). Thus, freshmen represent much more than 25% of college students. Some of the reasons for leaving college during the freshmen year include financial challenges, academic issues, homesickness, or a change in their major. It is not surprising, then, that as many as 1 in 3 college freshmen leave school after their first year (Sheehy, 2013).

Because of the challenges faced when adapting to these life changes, as well as difficulty adjusting to changes, freshmen college students are at risk of developing negative health outcomes and educational outcomes. The incidence of health-risk behaviors can lead to negative

life events in the lives of college freshmen, the most significant of which is suicide (Brandy, 2011).

### **Magnitude and Importance of the Problem**

The leading causes of mortality, morbidity, and social problems among youth and adults in the United States are related to six categories of priority health behaviors: behaviors that contribute to unintentional injuries and violence related deaths; sexual behaviors related to unintended pregnancy and sexually transmitted infections (STIs), including HIV infection; alcohol and drug use; tobacco use; unhealthy dietary behaviors; and physical inactivity. These behaviors frequently are interrelated and are established during childhood and adolescence and extend into adulthood (CDC, 2015). The costs of late adolescent and young adult risk behavior have been startling.

### **Unintentional Injuries and Violence Related Deaths**

Injuries and violence affect everyone, regardless of age, race, or economic status. In the first half of life, more Americans die from violence and injuries such as motor vehicle crashes, falls, or homicides than from any other cause, including cancer or HIV. Each year, millions of people are injured and survive. Many are faced with life-long mental, physical, and financial problems (CDC, 2016). Injuries, including all causes of unintentional and violence-related injuries combined, account for 59% of all deaths among people ages 1-44 years of age in the U.S. That is more deaths than non-communicable diseases and infectious diseases combined. Injuries killed more than 199,800 in 2014, or one person every three minutes. In fact, each year, 2.5 million people are hospitalized and 26.9 million people are treated in emergency departments and released (CDC, 2016). In the United States in 2014, 1,017 adolescents ages 17-19 died from

unintentional injuries (CDC, 2016). There were 58,923 violence-related non-fatal injuries in 2014 (CDC, 2016). The average medical cost for suicide was \$4,726 for adolescents ages 15-19 in 2010 (CDC, 2016). The average work loss cost for suicide was \$1,767,049 for ages 15-19 (CDC, 2016). The average medical cost for homicide was \$11,836 for ages 15-19 (CDC, 2016). The average work-loss cost was \$1,801,410 for ages 15-19 (CDC, 2010). These data suggest that a significant number of adolescents lose their lives from engaging in risky behaviors, resulting in unnecessary death and significant costs to society.

### **Sexually Transmitted Infections**

While sexually transmitted infections (STIs) affect individuals of all ages, they take a particularly heavy toll on young people. The CDC estimates that youth ages 15-24 make up just over one quarter of the sexually active population, but account for half of the 20 million new sexually transmitted infections that occur in the United States each year and almost \$16 billion in health care costs. Each of these infections is a potential threat to an individual's immediate and long-term health and well-being. In addition to increasing a person's risk for acquiring and transmitting HIV infection, STIs can lead to chronic pain and severe reproductive health complications, such as infertility and ectopic pregnancy (CDC, 2015). In spite of these risks and current screening and treatment guidelines, the data suggest that there is a growing number of STIs nationally. For example, according to the CDC (2015), the number of cases reported in 2015 for chlamydia was 1,526,658 (6% increase since 2014); the number of cases reported in 2015 for gonorrhoea was 395,216 (13% increase since 2014); and the number of cases reported in 2015 for primary and secondary syphilis was 23,872 (19% increase since 2014).

## **Alcohol and Drug Use**

Driving under the influence of alcohol and/or drugs is a risk factor for motor vehicle injuries and deaths in late adolescents. Young, inexperienced drivers have much higher crash rates than older, more experienced drivers. There were 1,717 young drivers who died and an estimated 170,000 who were injured in motor vehicle crashes in 2014 (NHTSA, 2014). Nine percent of all drivers involved in fatal crashes in 2014 were 15 to 20 years old. Young drivers accounted for six percent of the total number of licensed drivers in the United States in 2014. Twenty-six percent of young drivers 15 to 20 years old who were killed in crashes in 2014 had blood alcohol concentrations (BACs) of .01 g/dL or higher; 81 percent of those young drivers had BACs of .08 g/dL or higher (NHTSA, 2014).

In addition to car crashes, drug and alcohol overdoses continue to contribute to many adolescent deaths and hospitalizations. More than 1.6 million people between the ages of 12 and 20 reported driving under the influence of alcohol in 2015 (SAMHSA, 2014). This accounts for almost 4.4% of people between these ages (SAMHSA, 2014). Binge drinking accounts for more than half of the estimated 80,000 average annual deaths and \$167.625 billion in economic costs in the United States. Among persons aged 18–24 years, binge drinking prevalence (28.2%) and intensity (9.3 drinks) were highest (CDC, 2012). Daily marijuana use among college-aged young adults has been climbing in recent years. In fact, 11.8 percent of non-college youth (those 1 to 4 years beyond high school) were daily users in 2015—the highest since 1980 (NIDA, 2015). Marijuana is the most commonly used illicit drug in the United States (Asofeifa et al., 2016). Since 2002, marijuana use in the United States has increased among persons 18 and older. A decrease in the perception of risk from smoking marijuana combined with increases in the

perception of availability and fewer punitive legal penalties for the possession of marijuana for personal use might play a role in increased use among adults (Asofeifa et al., 2016). The statistics indicate that alcohol consumption along with drug use is of increasing concern to the society at large.

### **Tobacco Use**

Cigarette smoking harms nearly every organ of the body, causes many diseases, and reduces the health of smokers in general (U.S. Department of Health and Human Services, 2014). Nearly 9 out of 10 cigarette smokers first tried smoking by age 18 (CDC, 2012). Each day in the United States, more than 3,200 youth aged 18 years or younger smoke their first cigarette, and an additional 2,100 youth and young adults become daily cigarette smokers (CDC, 2012). Youth who use multiple tobacco products are at higher risk for developing nicotine dependence and might be more likely to continue using tobacco into adulthood (CDC, 2014). These data demonstrate that behaviors like tobacco use in adolescents are of great public health importance.

### **Unhealthy Dietary Behaviors**

Obesity is a complex health issue. Obesity results from a combination of causes and contributing factors, including individual factors such as behavior and genetics. Behaviors can include dietary patterns, physical activity, inactivity, medication use and other causes (CDC, 2016). The prevalence of obesity in the United States has remained stable at about 17% between 2011 and 2014 and affects about 12.7 million children and adolescents (CDC, 2015). According to The Centers for Disease Control and Prevention, the prevalence of obesity in adolescents was higher among Hispanics (21.9%) and non-Hispanic blacks (19.5%) than among non-Hispanic whites (14.7%) in 2015. In the same year, the prevalence of obesity was lower in non-Hispanic

Asian youth (8.6%) than in youth who were non-Hispanic white, non-Hispanic black, or Hispanic (CDC, 2015). The prevalence of obesity was 20.5% of 12- to 19-year-olds, compared to 17.5% of 6- to 11-year-olds (CDC, 2015). Being overweight or obese is associated with poorer mental health outcomes, reduced quality of life, and the leading causes of death in the U.S. and worldwide, including diabetes, heart disease, stroke, and some types of cancer (CDC, 2016).

Therefore, it is imperative that we address the behaviors that lead to being overweight and obese.

### **Physical Inactivity**

According to the Surgeon's general report on physical activity and health, nearly half of American youths aged 12-21 (CDC, n.d.) were not vigorously active on a regular basis. About fourteen percent of young people report no recent physical activity (CDC, n.d.). Inactivity is more common among females than males (14% and 7%, respectively) and among women, black females are more inactive than white females (21% and 12% inactivity, respectively). Social support from family and friends has been consistently and positively related to regular physical activity (CDC, n.d.). According to the CDC (2016), 49% of adults 18 years of age and over met the Physical Activity Guidelines set by the CDC for aerobic physical activity, but only 20.9% of adults 18 years of age and over met the Physical Activity Guidelines for both aerobic physical and muscle-strengthening activity. The most common negative consequences of physical inactivity in the youth include higher risk for getting overweight and obesity. Adolescents do not usually develop chronic diseases, such as heart disease, hypertension, Type 2 diabetes, or osteoporosis. However, due to physical inactivity risk factors for these diseases can begin to develop early in life (CDC, 2016). Because youth need to actively participate in physical



activities in order to be physically healthy, researchers in adolescent behavior should pay attention to this factor as well.

Understanding the decision-making processes contributing to these adolescent risk behaviors continues to be an important task for developmental researchers, with significant implications for practice and social policy (Wolff, 2012). This task is also vital for nurse researchers in generating new knowledge and providing evidence-based care that can promote quality health outcomes for late adolescents and college freshmen.

### **College Freshmen**

Based on the writer's observations, college freshmen (who are late adolescents the majority of the time) are a unique subset of undergraduate students who enter college with new challenges and dreams. They are different from the other three years of the undergraduate experience in quite a few ways.

Late adolescence (ages 18-24 years) is a time of life when very little is normative. This means that it is a period of frequent change and exploration that covers many aspects of life: home, family, work, school, resources, and role. Some of the attributes of this period include adjusting to new physical sense of self, developing and applying abstract thinking skills, adjusting to a sexually maturing body and feelings, defining a personal sense of identity, renegotiating relationships with parents/caregivers, meeting the demands of increasingly mature roles and responsibilities, adopting a personal value system, and developing stable and productive peer relationships (SAHRC, n.d.).

As students graduate from high school and enter the post-secondary educational environment, some are prepared for the experiences they will face while others struggle through

their first semester of enrollment as they attempt to make meaning of their life situations.

Whether it is due to the social, academic, or situational aspects of the experience, students often find challenges within their first semester transition (Burger, 2016). Simultaneously, as adolescence is a time when brain maturation continues to happen in different regions that enable reasoned thinking, it is also changing in ways that make adolescents to do risky things. Because things feel especially pleasurable during early adolescence, young adolescents go out of their way to seek rewarding experiences. This combination of advanced reasoning and heightened sensation-seeking explains why otherwise intelligent adolescents often do surprisingly foolish things (Steinberg, 2011). These changes in the brain continue into the late adolescent period which is marked by improving brain function but may have variations in the developmental process.

For the purposes of this study, the term “freshmen college students” refers to students aged 18 to 19 who attend college for the first time. The U.S. Department of Education National Center for Education Statistics defines traditional college aged students as 18- to 24-year old undergraduates (NCES, 2015a).

College freshmen make decisions every day about dietary choices, finances, class selection, career preference, and more. For the purposes of this study, the researcher is interested in understanding college freshmen’s decision-making in relation to health-risk behaviors.

### **Decision-Making**

According to Steinberg (2008), it is widely agreed among adolescent health and development experts that the greatest threats to the well-being of young people in industrialized societies come from preventable and often self-inflicted causes, including automobile and other

accidents (which together account for nearly half of all fatalities among American youth); violence; drug and alcohol use; and sexual risk-taking.

One promising theoretical model for understanding adolescent risk behavior is a neurobiological model (a type of dual systems model) which has been developed to explain why adolescents are particularly at increased risk of making poor decisions to engage in risk behavior (Steinberg, 2007; Steinberg, 2008). According to this model, there are two brain systems developing throughout adolescence which are directly related to risk behavior. The first brain system is the socio-emotional system which is sensitive to social and emotional stimuli and has to do with an increase in sensation-seeking behaviors that have been shown to peak in early-to-middle adolescence (Steinberg, Albert, Banich, Cauffman, Graham & Woolard, 2008). The development of the socio-emotional system is hypothesized to be related to remodeling of the dopaminergic system in the brain, affecting attraction to rewarding and novel stimuli and thus resulting in an increase in sensation-seeking behavior (Steinberg, 2008). The other system of the neurobiological model is the cognitive control system which involves controlling impulses, planning ahead, and other executive functions. This system is thought to develop linearly throughout adolescence and is hypothesized to be related to the development of the prefrontal cortex and increased connectivity between cortical and subcortical regions (Steinberg, 2008). Therefore, risk behavior is thought to occur in early to mid-adolescence because the socio-emotional system is highly developed and potent, whereas the cognitive control system is not yet sufficiently developed to control impulses of the socio-emotional system (Wolff, 2012).

Steinberg (2014), a developmental psychologist, specializes in adolescence and teaches and conducts research on the second decade of the life span. His research in 2014 focused on

how adolescents make decisions in relation to risk-taking. Steinberg explained the science behind decision-making in adolescence in this work. He stated that “adolescence is such an important time that determines how adolescents become the way they are. They become the people they are going to be probably for the rest of their lives” (Steinberg, 2014, July 9). He emphasized that the systems of the brain that respond to reward become very easily aroused during this period. He added that people are very attracted to go after rewarding experiences even if it might be a little bit dangerous (Steinberg, 2014). Subsequently, these actions that adolescents take may lead them towards risky behaviors.

Steinberg’s (2014) interest in adolescent decision-making and risk-taking grew out of a project he was involved in that looked at the juvenile justice policy and practice. During the last decade, the U.S. Supreme Court has considered three landmark cases involving juvenile crime. The most important was a case involving the Constitutionality of the juvenile death penalty. The juvenile death penalty limits the use of life without parole as a sentence for juveniles.

Adolescents are different from adults in ways that make them less responsible for their behaviors. They are more impulsive, more shortsighted and, they are more easily influenced by their peers (Steinberg, 2014).

Gardner and Steinberg (2005) examined risk-taking in adolescents, college undergraduates, and adults who were randomly assigned to engage in a simulated driving task alone or in the presence of two friends. They found that adolescents (and undergraduates to a lesser extent), but not adults, took a substantially greater number of risks when observed by peers. Due to the changes that occur in the adolescent brain as noted above, late adolescents operate on a decision-making process that is not fully mature, it can lead to health-risk behaviors

that may result in negative outcomes. Another area of adolescent brain development that has been undergoing research is the anterior insular cortex. A study explored the significance of the anterior insular cortex (AIC) in adolescent decision making. Although the AIC is known for its role as a cognitive-emotional hub, it is included in some models of adult self-regulation and reward seeking. The authors explored the developmental neuroimaging literature which indicated the importance of including the AIC in developmental models of risk taking and decision making. They proposed an extension of the current developmental models that focus on the maturational imbalance between the striatum and the lateral prefrontal cortex (IPFC) to incorporate the AIC into this general framework. More specifically, the authors suggest that the relative immaturity of the AIC and its relationship with cognitive control regions leaves adolescents vulnerable to affectively driven behaviors such as reckless risk taking (Smith, Steinberg & Chein, 2014).

Although rates of certain types of adolescent risk-taking, such as driving under the influence of alcohol or having unprotected sex, have dropped over time, the prevalence of risky behavior among teenagers remains high, and there has been no decline in adolescents' risk behavior in several years. To the extent that normative developmental change (typical patterns of change) makes adolescents more vulnerable to risky behavior, and to the extent that this vulnerability is not mainly due to lack of knowledge about risk or faulty risk perception, a more effective strategy than one designed to make adolescents more informed or more thoughtful, might be to reduce adolescents' opportunities to engage in harmful risk behavior (Steinberg, 2008). Strategies such as raising the price of cigarettes, more vigilantly enforcing laws governing the sale of alcohol, increasing adult supervision of adolescents during after-school hours, and

graduated drivers' licensing would likely be more effective in limiting adolescent smoking, substance abuse, risky sexual behavior, and automobile fatalities than attempts to make adolescents wiser, less impulsive, or less shortsighted (Steinberg, 2010).

Adolescence is a life stage during which individuals are generally at their strongest and healthiest, yet, compared to other life stages, they have increased morbidity and mortality rates from preventable causes. One explanation of this paradox involves adolescents' propensity for risk-taking. Risk taking can be defined as engaging, often impulsively, in behaviors that are high in subjective desirability or excitement but which carry the potential for injury or loss (Geier, Terwilliger, Teslovich, Velanova, & Lunda, 2010). Therefore, risk-taking is the aftermath of decisions made by college freshmen that result in health-risk behaviors.

### **Health-Risk Behaviors**

Adolescents and young adults are more likely than individuals at other life stages to engage in behaviors that involve risks, such as drinking alcohol, taking illegal drugs, having unprotected sex, engaging in delinquent activity, and reckless driving (Arnett, 2000). Health risk behaviors include these activities because they put one's health and safety in danger and tend to ignite societal concern for the well-being of adolescents (Wolff, 2012). For the purposes of this study, behaviors involving unintentional injuries and violence; sexual behaviors related to unintended pregnancy and sexually transmitted infections (STIs), including HIV infection; alcohol and drug use; tobacco use; unhealthy dietary behaviors and; physical inactivity will be the health-risk behaviors that the researcher will be interested in examining.

## **Factors Impacting Decision-Making**

Some of the predictors of risk behavior often include social and cognitive factors. Often, different types of risk behavior tend to have similar risk factors, including social (poor parenting practices and deviant peer affiliations), cognitive (low IQ), temperamental (high impulsivity and poor self-regulation), and economic (low quality education and poor neighborhood quality) (Farrington, 2004; Savin-Williams & Diamond, 2004; Chassin et al., 2004). A study examined the relationship between known risk factors for youthful offenders and rates of recidivism using Poisson regression models. (The Poisson regression coefficient is interpreted as follows: for a one unit change in the predictor variable, the difference in the logs of expected counts is expected to change by the respective regression coefficient, given the other predictor variables in the model are held constant) (IDRE Stats, UCLA.edu, 2018). The sample consisted of 564 male and female juvenile offenders referred to a Juvenile Court Assessment Center (JCAC). Neighborhood factors explained the largest amount of variance followed by peer influence, family functioning, gang involvement, substance use, and academic achievement. The researchers suggest the identification and reduction of specific risk factors as an important step to identify these youth and potentially tailor prevention and intervention programs for their needs (Kennedy, Edmonds, Millen & Detullio, 2018).

Healthy behaviors may also conflict with a decision maker's goals. Reyna & Farley (2006) have conceived of decision-making as a potential factor in risk behavior. Adolescents' goals are more likely to maximize immediate pleasure, and strict decision analysis implies that many kinds of unhealthy behavior, such as drinking and drug use, could be deemed rational. Developmental data also suggest that greater risk aversion is generally adaptive, and that

decision processes that support this aversion are more advanced than those that support risk taking. A key question is whether adolescents are developmentally competent to make decisions about risks. In principle, barring temptations with high rewards and individual differences that reduce self-control (i.e., under ideal conditions), adolescents are capable of rational decision making to achieve their goals. In practice, much depends on the particular situation in which a decision is made. In the heat of passion, in the presence of peers, on the spur of the moment, in unfamiliar situations, when trading off risks and benefits favors bad long-term outcomes, and when behavioral inhibition is required for good outcomes, adolescents are likely to reason more poorly than adults do (Reyna & Farley, 2006).

In spite of the current research being conducted in adolescent health, there is relatively little empirical evidence linking decision-making to real world adolescent risk behavior. However, there are several models of adolescent development that attempt to describe and explain decision-making and risk behaviors. Some of these models include normative decision and dual process models of decision-making (Wolff, 2012). (The dual process model was briefly discussed earlier in this chapter.)

Support like family and social systems may influence the decision-making process in college freshmen in choosing whether or not to participate in health-risk behaviors. As freshmen make the transition to college, they may use available societal supports in multiple ways to aid their decisions.

### **Family Support**

The transition to college presents an important developmental challenge in late adolescence due to increased independence and responsibilities (Hickman, Bartholomae, &



Mckenry, 2000). Since periods of transition are inherently stressful, transition may be more challenging for those with other major life stressors, including chronic illness (CI). Wodka and Barakat (2007) examined the role of family support and coping in the adjustment of college freshmen and sophomores with CI transitioning into college. The CI group reported more anxiety and a trend towards more depression than the primarily positive life events group. The primarily positive life events group was used as a “healthy” comparison group that has experienced minimal reported stress within the college transition. Coping strategy (active and passive) was positively associated with anxiety in the chronic illness group. Family support was negatively associated with depression and anxiety in the primarily negative life events group, and passive coping was positively associated with depression in positive life events group. The authors suggest the development of adaptive coping strategies be the focus of programs aimed at supporting students with CI as they transition to college.

Another challenging health problem for college students is mental illness, affecting more than 19 million Americans each year (Levens, Elrahal and Sagui, 2016). Critically, mental illnesses, like depression, may be especially damaging when they occur during college as they may influence early adulthood development. Lack of family support and stress have been associated with depression (Levens, Elrahal and Sagui, 2016).

A study by Levens, Elrahal and Sagui (2016) analyzed the protective effect of family support on the relationship between perceived stress reactivity and depression in college students. The study assessed depressive symptoms, family emotional and instrumental support, and perceived stress reactivity. The results revealed that when perceived stress reactivity is low, family emotional support significantly protects against depressive symptoms. When an

individual displays high levels of perceived stress reactivity, however, family emotional support is less useful in protecting against depression. These findings suggest that involving family in the college transition to increase emotional support to students beginning college may help protect against depression symptomatology (Levens, Elrahal and Sagui, 2016).

Similar results were found in a study of African-American female college students (N = 78) where those with greater levels of social support from their family reported lower levels of depressive symptoms (Reed et al., 1996). The results of this study indicated that the participants who had mothers that had attended college reported fewer depressive symptoms. The researchers felt that mothers who had attended college had been better able to assist their daughters to prepare for the stressors that they may have faced during the college experience (Reed et al., 1996). Schmidt and colleagues (2018) examined the indirect effect of exposure to violence (ETV) during adolescence on future orientation as a young adult through perceived stress. They also tested the moderating effect of family participation on the relationship between perceived stress and future orientation. Longitudinal data from a sample of 316 African American participants from low socioeconomic backgrounds were recruited from a Midwestern school district. The study contributed to the importance of family participation as a protective factor for youth exposed to violence. Although many researchers have examined parental support, family participation is an understudied family environment characteristic. The buffering effect of family participation as a specific characteristic of the family has been ignored. Findings also suggest that one way to help youth cope with the negative effects of ETV is to create programs designed to increase the amount of time youth and their families spend participating in recreational and supportive activities. While adolescence is a developmental period in which friends become

increasingly more salient, parents and family remain important (Steinberg, 2002). In fact, the study provides evidence that the buffering effect of family participation during adolescence lasts across several years into young adulthood (Schmidt, Zimmerman & Stoddard, 2018). Therefore, family support can be the initial foundation that freshmen can utilize during the transitioning process to college.

### **Social Support**

Individuals' perception of strong social support is important for success in school and life. Several investigations have examined the relationship between social support and depressive symptoms in college students. For example, it has been reported that the greater an individual's perception of family support, friendship support, and a supportive school environment, the lower incidence of depressive symptoms in college freshmen (Hall, Peden, Rayens, & Beebe, 2004; Rayle & Chung, 2007; Reed et al., 1996; Saltzman & Holahan, 2002; Way & Robinson, 2003). One particular study examined relationships among daily stress (i.e., school- and family-related stress), social support seeking through Facebook, perceived social support through Facebook, and depressed mood among adolescents ( $N = 910$ ). Structural equation modeling showed that daily stress positively predicted adolescents' seeking of social support through Facebook. In addition, when social support was sought on Facebook and subsequently perceived, social support seeking through Facebook decreased adolescents' depressed mood. However, when social support was sought on Facebook, but not perceived, social support seeking through Facebook increased adolescents' depressed mood. When comparing these relationships with similar relationships in a traditional social support context, results showed that the exacerbating impact of social support seeking on depressed mood exclusively transpires in a social networking

site context (Frison & Eggermont, 2015). These findings suggest that a supportive environment is important in reducing the incidence of mental illness in college students.

Another study examined if familial and peer social support longitudinally predicted disordered eating for late adolescents in the transitional first year of college, and if body dissatisfaction mediated this relation (Kirsch, Shapiro, Conley & Heinrichs, 2016). Gender differences between support types and disordered eating, and body dissatisfaction as a mediator, were also examined. The results demonstrated that lower levels of familial social support prospectively predicted greater disordered eating, but not greater body dissatisfaction, and lower levels of peer social support prospectively predicted greater body dissatisfaction but not greater disordered eating. Body dissatisfaction did not mediate the relation between familial social support and disordered eating; however, it did significantly mediate the non-significant relation between peer social support and disordered eating, which was further moderated by gender. The findings suggested that parental social support remains a significant predictor of disordered eating for late adolescents even after they transition to college and has a stronger relation to disordered eating than peer support. In contrast, peer social support seems to be especially linked to feelings of body dissatisfaction and may be an avenue for intervention of this type of negative self-perception that is a risk factor for later disordered eating (Kirsch, Shapiro, Conley and Heinrichs, 2016). These findings indicate that social support systems may play an important role in reducing unhealthy dietary behaviors.

Research on supportive communication was examined in relation to students' goals of earning a college degree and their intent to persist. A theory of student departure from college was proposed which informed research questions assessing the impact of how social support

from family members and friends affected commitment to the goal of graduation and how commitment to the goal of graduation influenced intent to persist. First-year college students completed a questionnaire at 2 time points during their first year of college. The results revealed that initial support from family and friends positively impacted initial commitment to the goal of graduation. These findings suggest that subsequent support from family impacted students' subsequent commitment to the goal of graduating, and their commitment to graduating impacted their intention to persist (Tinto, 1993). One qualitative study investigated how close social groups (family, friends, and educators; FFEs) contribute STEM (science, technology, engineering and math) major selection by undergraduate college students. Through purposeful sampling, four first-year college students at a mid-Atlantic, four-year university were surveyed to determine which group or groups students perceive contributed the greatest influence over their major selection. Interviews explored how and why students believe each social group and subgroup affected their decision. Results indicated family members (particularly mothers) play an early and sustained influence over college STEM major selection. High school educators contribute during the college application period, and college STEM professors influence STEM major persistence. Friends may offer support of STEM selection, but do not directly affect student decision. However, at different points of their educational careers, students perceive FFEs collectively contributed to their STEM major selection. Insights from these findings can also help educators advise parents on how to best support students when they face academic challenges and boost their self-efficacy beliefs (Whitehead, 2018). These results extend the evidence that family as a support system plays an important part in academic motivation and career decision-making.

Although it should be noted that there are other individual and social variables that would potentially affect decision-making, for the purposes of this study, only family and social support will be examined. Family support refers to support received from immediate family members and social support relates to support from friends and peers.

While there is fair amount of evidence in the current literature to suggest that family support and social support may influence the decision-making process in college freshmen, this study will investigate whether these factors jointly predict decision-making. These variables were chosen because they may play an important role in adolescent risk behavior. The current research will extend the conceptualization of the dual systems model by introducing social factors, adding breadth to our understanding of this model.

As briefly discussed, the literature sheds some light on the role of family support and social support on different types of decision-making in college freshmen, like college decision-making, career decision-making, financial decision-making, sexual decision-making, etc. Previous research has demonstrated that there are no studies that have focused specifically on the role of family support or social support on the decision-making of college freshmen in relation to health-risk behavior. Therefore, out of keen interest, the researcher would like to determine whether or not these factors may predict decision-making in college freshmen.

### **Purpose and Rationale**

The overall purpose of this study is to investigate the relationships between decision-making and health-risk behaviors among college freshmen. The study will attempt to determine whether or not family support and social support jointly predict decision-making among college freshmen. It will also ascertain whether or not the effect of family support on decision-making is

different for male and female college freshmen. Decision making in regards to health-risk behavior will be assessed in this study.

Understanding the relationship between these variables and their predictors is important for long-term prevention goals for health-risk behaviors. If the researcher were to find that family support and social support jointly impact decision-making in college freshmen, then further studies might be conducted on the analyses of these factors as contributors to college adjustment and the importance of these supports in the academic success of college freshmen.

The results of this study will provide a better understanding of college freshmen's decision-making processes in relation to support systems. Hence, this research may have implications for parents and families of college freshmen. Parents have had an enormous influence on their children in getting them to college and students' college experiences are a reflection of their upbringing. University administrators can play a role in helping families identify encouraging and supportive behaviors that are appropriate given different cultural backgrounds (Weintraub, 2016). Strong parental and family supports may leave a lasting impact on college freshmen with their development of decision-making skills necessary for disengaging in health-risk behavior. This could be one way by which college freshmen can learn to lead a life that promotes successful health outcomes.

### **Study Conceptualization**

The conceptual model for this study is Steinberg's dual systems model of adolescent risk-taking (see Figure 1). According to Steinberg (2008), adolescents begin to be especially stimulated by rewarding and novel stimuli before their self-regulatory capacities can intervene, and increased risk-taking behavior is the result. This model allows for the examination of social

factors that may influence how college freshmen make decisions in relation to health-risk behaviors. When using this model, these factors can be assessed for the impact they may have on decision-making. Through an examination of social factors that may be predictive of decision-making, further information can be gained into the development of health-risk behaviors in college freshmen.

Nurses and advanced practice nurses can take the lead in supporting campuses in improving the health of their students, especially freshmen. They place high priority on the health needs of the community and implement community and individual focused interventions. Healthy Campus 2020 is a framework to support campuses in improving the health of their students, staff, and faculty (Healthy Campus, 2016). Using knowledge gained about the relationship between the variables relating to college freshmen and the predictors of their decision-making, nurses can better serve our communities in the quest for improved health outcomes. The Dual systems model of adolescent risk- taking will be discussed in detail in Chapter 2.

### **Specific Research Questions and Hypotheses**

The aims of this study are:

- 1: to investigate the relationships between decision-making and health-risk behaviors among college freshmen;
- 2: to determine whether or not family support and social support jointly predict decision-making among college freshmen; and
- 3: to ascertain whether or not the effect of family support on decision-making is different for male and female college freshmen.



Testable hypotheses include:

- 1: There is a correlation between decision-making and health-risk behaviors in college freshmen;
- 2: Family support and social support will jointly predict decision-making among college freshmen; and
- 3: The effect of family support on decision-making will be different for male and female college freshmen.

In summary, this study will determine whether social factors play a role in decision-making in college freshmen. Gaining information on these factors may contribute to a positive transition into college. This in turn, may explain how and why college freshmen decide to engage in health-risk behaviors. Such information may allow healthcare professionals who deliver care for college freshman to develop potential strategies (for example, better prevention programs, coping skills training, support programs) that might reduce adolescent risk-taking and improve public health, thus allowing a smooth college transition. The results from this study will also improve our existing knowledge in understanding youth decision-making and its predictors, risk-taking and health-risk behaviors in college freshmen. This knowledge may help to design efforts that can simultaneously reduce risk and promote student health services. The long-term goal of this research is to contribute knowledge that may be used to help college freshmen adapt to an environment so that they will have positive experiences and develop better coping skills while on campus. In this fashion, college freshmen may achieve positive health outcomes and attain successful educational outcomes that may result in improved undergraduate retention rates.

## CHAPTER TWO LITERATURE REVIEW

### **Conceptual Model**

The conceptual model guiding this study is based upon the Steinberg's Dual Systems Model of adolescent risk-taking (see Figure 1). According to the dual systems perspective, risk taking peaks during adolescence because activation of an early-maturing socioemotional-incentive processing system amplifies adolescents' affinity for exciting, pleasurable, and novel activities at a time when a still immature cognitive control system is not yet strong enough to consistently restrain potentially hazardous impulses. The authors reviewed evidence from both the psychological and neuroimaging literatures that has emerged since 2008, when this perspective was originally articulated. Although there are occasional exceptions to the general trends, studies show that, as predicted, psychological and neural manifestations of reward sensitivity increase between childhood and adolescence, peak sometime during the late teen years, and decline thereafter, whereas psychological and neural reflections of better cognitive control increase gradually and linearly throughout adolescence and into the early 20s.

While some forms of real-world risky behavior peak at a later age than predicted, this likely reflects differential opportunities for risk-taking in late adolescence and young adulthood, rather than neurobiological differences that make this age group more reckless. Although it is admittedly an oversimplification, as a heuristic device, the dual systems model provides a far more accurate account of adolescent risk taking than prior models that have attributed adolescent recklessness to cognitive deficiencies (Shulman, Smith, Silva, Icenogle, Duell, Chein &

Steinberg, 2016). Social scientists and casual observers of human development have long noted that the transitional period between childhood and adulthood is a time of heightened risk-taking. Indeed, despite the relative absence of illness and disease during this period, rates of morbidity and mortality increase substantially in adolescence, largely due to risk taking. The question of why adolescents seem predisposed toward recklessness is age-old; however, work in the field of developmental psychology, and more recently, developmental neuroscience, has provided new insights into the phenomenon (Shulman et al., 2016).

For many years, psychologists had attempted to explain adolescent recklessness as a consequence of cognitive deficiencies in young people's thinking, including irrationality, poor information processing, and ignorance about risk. As noted in previous publications, these accounts have been largely undermined by available evidence. Generally speaking, by age 15 or so, adolescents perform as well as adults on tasks measuring logical reasoning, information processing, and risk perception (Shulman et al., 2016).

### **The Emergence of Dual Systems Models**

About a decade ago, the budding field of developmental cognitive neuroscience began to provide insight into how patterns of brain development might explain aspects of adolescent decision-making (Dahl, 2004). In 2008, the labs at Temple University (Steinberg, 2008 and Steinberg et al., 2008) and Cornell University (Casey et al., 2008) simultaneously proposed similar variations of a “dual systems” account of adolescent decision-making. This perspective attributes adolescents’ vulnerability to risky, often reckless, behavior in part to the divergent developmental courses of two brain systems: one (localized in the striatum, as well as the medial and orbital prefrontal cortices) that increases motivation to pursue rewards and one

(encompassing the lateral prefrontal, lateral parietal, and anterior cingulate cortices) that restrains imprudent impulses (Casey et al., 2008; Duckworth & Steinberg, 2015; Evans & Stanovich, 2013; Luna & Wright, 2016, Metcalfe & Mischel, 1999; and Steinberg, 2008). Specifically, it proposes that risk-taking behaviors peak during adolescence because activation of an early-maturing incentive-processing system (the “socioemotional system”) amplifies adolescents’ affinity for exciting, novel, and risky activities, while a countervailing, but slower to mature, “cognitive control” system is not yet far enough along in its development to consistently restrain potentially hazardous impulses (Shulman et al., 2016).

### **Variations of the Dual Systems Model**

Several variations on this dual systems model have been proposed. The version that guides this study’s work (Steinberg, 2008) is very similar to that proposed by Casey et al. (2008). Both conceive of a slowly developing cognitive control system, which continues to mature through late adolescence. However, whereas Steinberg (2008) proposes that the socioemotional system follows an inverted-U shaped developmental course, such that responsiveness to reward increases in early adolescence and declines in early adulthood, Casey and colleagues (2008) have portrayed the socioemotional system as increasing in arousability until mid-adolescence, at which point it reaches a plateau, remaining at this level into adulthood. Furthermore, Steinberg’s version of the dual systems model posits that the decline in socioemotional arousability occurs independently of the development of the control system, whereas Casey et al.’s model proposes that the strengthening of the cognitive control system causes the socioemotional system to become less arousable.

More recently, Luna and Wright (2016) have proposed another variation on the dual systems model (the “Driven Dual Systems” model), which, like Steinberg’s model, hypothesizes an inverted-U shaped trajectory of socioemotional arousability. But, unlike the Dual Systems Model, Luna and Wright’s variation hypothesizes a trajectory of cognitive control that plateaus in mid-adolescence rather than continuing to increase into the 20s, as suggested by Steinberg and by Casey et al. In a similar vein, Luciana and Collins (2012) endorse a model that emphasizes the role of a hyperactive socioemotional system (“subcortical limbic-striatal systems”) undermining the regulatory ability of the cognitive control system (the “prefrontal executive system”), resulting in greater risk-taking during adolescence. Like Luna and Wright, Luciana and Collins argue that the development of cognitive control is complete by mid-adolescence, as evidenced by adolescents’ adult-like performance on non-affective measures of cognitive capacity (Shulman et al., 2016).

Another perspective, Ernst's (2014) triadic model, expands on the dual systems concept by hypothesizing that a third brain system, one responsible for emotional intensity and avoidance, anchored in the amygdala, is also important for understanding the developmental differences in motivated behavior. With respect to the type of reward-seeking risky behavior that the dual systems models endeavor to explain, Ernst (2014) speculates that this emotion/avoidance system may serve to boost impulsive decisions in adolescence by amplifying the perceived cost of delay. She also proposes that this system may become hypoactive, dampening avoidance impulses in the face of a potential reward that activates the socioemotional system. While this model is intuitively appealing, there is not much evidence to date indicating that the emotion/avoidance system and its developmental trajectory help to explain heightened

levels of risk taking in adolescence (Shulman et al., 2016). Also, the role of the amygdala in decision-making is not yet clear (Somerville et al., 2014).

### **Three Main Propositions of the Dual Systems Model**

Evidence from both behavioral and neuroimaging literatures have emerged since the dual systems model was originally articulated in 2008. There are three main propositions of the model: (1) reward sensitivity peaks in adolescence; (2) cognitive control increases linearly during this period; and (3) heightened risk-taking during adolescence is the product of heightened reward-seeking and relatively weaker cognitive control.

A source of confusion in previous discussions of the dual systems perspective concerns levels of analysis, since the perspective refers to overt behaviors (such as risk taking), the psychological states hypothesized to motivate them (such as sensation seeking), and the neural processes believed to undergird these states (such as reward sensitivity). Steinberg suggested that “reward sensitivity” and “cognitive control” be used to refer to the neurobiological constructs that are measured in studies of brain structure or function. These neurobiological phenomena have psychological manifestations (“sensation seeking” and “self-regulation”) that are measured by assessing psychological states or traits through the subjective reports of individuals or their evaluators (Shulman et al., 2016).

Variations in sensation seeking and self-regulation are associated with variations in behaviors, including risk taking, which can be measured through objective reports or observations. In the model, risk taking is a subset of many aspects of decision-making that share some characteristics in common. All decision-making takes place within a broader context that encourages and enables some acts, but discourages and prohibits others. The fact that

adolescents' risk taking is influenced by the broader context in which it occurs makes it difficult to move seamlessly between laboratory studies and the real world (Shulman et al., 2016).

Allusions to adolescence as a time of rash behavior and poor decision making predate the articulation of the dual systems model by centuries. And yet, empirical evidence of a mid-adolescent peak in risk taking (at least in humans) is not unequivocal. As pointed out in a recent review of epidemiological data, the peak age for risk taking varies across different behaviors, and very often it is late adolescents, not middle adolescents, who exhibit the highest levels of recklessness (Willoughby et al., 2013). For example, one of the most dangerous forms of substance use-binge drinking is most common during the early 20s (Chassin et al., 2002; Willoughby et al. 2013).

Although some argue that these data pose a problem for the dual systems model, Steinberg and colleagues disagree. The model does not posit that middle adolescents necessarily demonstrate the highest levels of all forms of risk taking in the real world. Rather, it asserts that risk-taking propensity is highest in mid-adolescence, but that the expression of this propensity is expected to vary depending on the context. The position is that late adolescents are less biologically predisposed to risk taking than middle adolescents (consistent with the dual systems model), but that they exhibit higher levels of many forms of real-world risk-taking due to greater opportunity. Compared to younger individuals, people in their early 20s typically experience less supervision from adults, have more financial resources, and are afforded greater legal access to many forms of risk taking (e.g., driving, alcohol, and gambling). Thus, it is contended that maturational factors predispose middle adolescents to greater risk taking, but that social and legal factors constrain their opportunities to realize this predisposition. Simply put, it is far easier for

the average 21-year-old to take risks with alcohol, cars, and gambling than it is for the average 15-year-old. If 15-year-olds were permitted to drive, purchase alcohol, and enter casinos legally, our prediction is that they would likely crash, binge drink, and gamble more than people in their early 20s (Shulman et al., 2016).

In an effort to investigate age differences in risk-taking propensity, unconfounded by age differences in terms of opportunity, researchers have tested adolescent and adult participants using artificial tasks, typically gambling games and driving simulations, that give them the option to take risks in the safety of a laboratory setting. While such tasks are often lacking in ecological validity, they do have the advantage of controlling for contextual differences between adolescents and other age groups, as well as for age differences in behavior preferences. These studies yield inconsistent results, with some finding greater risk taking in adolescence than in adulthood (Burnett et al., 2010; Mitchell et al., 2008; Van Leijenhorst et al., 2008; and Van Leijenhorst et al., 2010a), others finding no age effects (Bjork et al., 2007; Eshel et al., 2007; and de Water et al., 2014), and still others finding that adolescents engage in less risk taking compared to children (Paulsen et al., 2011). These inconsistent findings suggest that if there is an increased risk taking propensity in adolescence it may only manifest under certain conditions (Defoe et al., 2014).

Recently, researchers have used laboratory tasks and manipulations that better approximate certain aspects of real-life risky decision-making. These studies have helped to delineate the conditions under which adolescents may be more predisposed than other age groups to take risks. For example, noting that during most real-world risk taking the actual chances of a positive or negative outcome are unknown, researchers recently tested whether age differences in



risk taking depend on whether the probabilities of a successful outcome are known or unknown (Tymula et al., 2012; Tymula et al., 2013). Tymula and colleagues (2012) had adolescents and adults complete a risk-taking task with two different conditions: a “known risk” condition and an “ambiguous risk” condition. In the “known risk” condition, participants chose between a sure bet (100% chance of receiving \$5) and a “risky” bet with known reward probabilities (e.g., a 50% chance of winning \$50 versus \$0 if they lost). In the “ambiguous risk” condition, participants again chose between a sure and risky option, but this time the likelihood of winning or losing on the risky option was unknown. Compared to adults, adolescents made fewer risky decisions when the probabilities of loss were known (i.e., adolescents were *less* risk tolerant). However, when the probabilities were unknown, adolescents made significantly more risky decisions than adults. Thus, under conditions that are more representative of real-life risk-taking (where risk probabilities are typically unknown), adolescents evince a greater risk-taking propensity than adults (Shulman et al., 2016).

Another way in which real-life risk taking differs from risk taking in the laboratory is with respect to emotional arousal. Contexts in which risk taking occurs outside the lab are often thrilling or frightening; in the lab, both the nature of the risk taking (the stakes and considerations involved) and the surrounding environment are typically less exciting. Scholars have argued that differences in arousal give rise to fundamentally different ways of processing information (Luna and Wright, 2016 ; Metcalfe and Mischel, 1999). The dual systems model holds that, to the extent that decision-making occurs under conditions that arouse the socioemotional system (that is, conditions that are relatively more thrilling), differences between adolescent and adult decision-making and, hence, risk taking, will be more pronounced. This

pattern was observed in one study that experimentally manipulated the degree to which a card game risk-taking task was affectively arousing (Figner et al., 2009). Consistent with the dual systems account, adolescents evinced greater risk taking and poorer use of risk-relevant information than adults, but only in the more arousing version of the task (Shulman et al., 2016).

A third difference between most laboratory risk-taking tasks and real-life risk taking is that, in the laboratory, adolescents are asked to make decisions when they are alone, whereas the majority of risky behaviors during adolescence occur in groups (Albert et al., 2013). To mimic this context in the lab, researchers have employed experimental manipulations in which adolescents complete risk-taking tasks in the presence of peers. Some studies have asked participants to bring same-aged peers to the lab (Chein et al., 2011; Gardner and Steinberg, 2005; Kretsch and Harden, 2014), while others have deceived participants into believing that they are being observed remotely by a peer (Smith et al., 2014a). Not only does the “presence” of peers increase the ecological validity of the risk-taking task (because adolescent risk taking often occurs in groups), but it also appears to elevate emotional arousal, which further increases the comparability to real-world risk-taking contexts (Shulman et al., 2016).

Studies that have manipulated the social context have found that adolescents are more induced by peer presence to take risks than are adults (Chein et al., 2011; Gardner and Steinberg, 2005; Smith et al., 2014a). These findings, which are largely consistent with other studies of peer effects on adolescent driving (Segalowitz et al., 2012; Lambert et al., 2014), suggest that adolescents are particularly vulnerable to the effects of peer presence on risk-taking behaviors. Moreover, neuroimaging data suggest that the effect of peer presence on risk taking is due to

increased affective arousal, as evidenced by greater activation of brain regions within the socioemotional system (Chein et al., 2011).

Overall, there is evidence for increased risk taking in adolescence compared to adulthood, though developmental differences may only be evident under certain conditions, such as emotional arousal, ambiguous risk, and the presence of others. The tendency for adolescents to engage in more risky behaviors in highly-arousing contexts together with increased engagement of their socioemotional system during peer observation point to the importance of reward processing in decision making during this period of life (Shulman et al, 2016).

Each of the three propositions are explained below under their sections respectively.

**Reward sensitivity peaks in adolescence.** The development of sensation seeking and reward sensitivity in adolescence is described here. Increased adolescent risk taking in contexts that are emotionally arousing is consistent with one of the central tenets of the dual systems model, that activation and reactivity of the socioemotional system reaches its peak during mid- to late adolescence. A growing literature interrogates this aspect of the model by examining the psychological and neurological evidence for heightened responsiveness of the socioemotional system during adolescence, including situations that do not involve risky decision-making. This is important because the dual systems model proposes that the socioemotional system is more responsive generally in adolescence than at other ages, not only in the context of risk taking (Shulman et al, 2016).

Moreover, the model hypothesizes that the developmental course of the socioemotional system is, unlike the development of the cognitive control system, closely tied to pubertal development (Smith et al., 2013). Around age 12 (for boys) or 11 (for girls), pubertal hormones

inundate the brain, triggering a series of changes in neural structure and function (Euling et al., 2008; Schulz et al., 2009), especially in dopamine-rich limbic regions associated with reward processing (Blakemore et al., 2010 ; Sinclair et al., 2014). It is thought that these hormone-related changes sensitize the adolescent brain to reward (Forbes and Dahl, 2010; Peper and Dahl, 2013), as appears to be the case in animal studies (Alexander et al., 1994; Clark et al., 1996; Miele et al., 1988). More specifically, the reward system is particularly sensitive to the sudden surge of hormones at the start of puberty, heightening sensitivity to affective stimuli. Although pubertal hormones do not decline into adulthood, we posit that a decrease in reward sensitivity ensues during later adolescence and into young adulthood as the reward system becomes desensitized to the effects of these hormones (Smith et al., 2013). While admittedly limited, recent evidence integrating measures of puberty into psychological, behavioral, and neuroscience studies supports this claim as well (Shulman et al., 2016).

***Sensation seeking.*** One psychological manifestation of socioemotional reactivity is sensation seeking. As anticipated by the dual systems model, measures of sensation seeking are often found to be predictive of self-reported risk taking (e.g., Kong et al., 2013; MacPherson et al., 2010). True sensation-seeking behavior is difficult to elicit in laboratory environments (among human subjects); consequently, the vast majority of studies examining age-related changes in sensation seeking rely on self-report. As would be expected within the dual systems account, longitudinal and cross-sectional studies generally find evidence of a peak in self-reported sensation seeking around mid-adolescence and a decrease into adulthood (Harden and Tucker-Drob, 2011; Peach and Gaultney, 2013; Quinn and Harden, 2013; Romer and Hennessy, 2007; Shulman et al., 2014a; Shulman et al., 2014b; Steinberg and Chein, 2015; and Steinberg et

al., 2008). This overall pattern is further corroborated by a number of longitudinal studies following individuals from childhood into adolescence, which find that sensation seeking increases across this time period (Collado et al., 2014; Lynne-Landsman et al., 2011; MacPherson et al., 2010). Overall, these studies suggest that, as the dual systems model would predict, sensation seeking follows an inverted-U pattern over time, consistent with the proposed pattern of change in the socioemotional system (Shulman et al., 2016).

The hypothesis that pubertal development drives developmental change in the socioemotional system in adolescence is derived in part from older studies linking higher levels of sensation seeking to more advanced pubertal status (Martin et al., 2002; Resnick et al., 1993). Newer studies have replicated this result (Castellanos-Ryan et al., 2013; Gunn and Smith, 2010; Quevedo et al., 2009; Urošević et al., 2014) and have found evidence that the correlation between self-reported pubertal development and sensation seeking may be stronger for boys than for girls (Castellanos-Ryan et al., 2013; Steinberg et al., 2008). Also, as would be expected based on the link between puberty and sensation seeking, recent studies have found that more advanced pubertal status in adolescents is associated with greater involvement in behaviors that are closely related to sensation seeking, such as substance use (Castellanos-Ryan et al., 2013; de Water et al., 2013; Gunn and Smith, 2010).

***Behavioral manifestations of reward sensitivity.*** Compared to self-report studies of sensation seeking, there are markedly fewer behavioral studies examining the development of reward sensitivity; additionally, these have heterogeneous methodologies and findings, which makes it difficult to draw firm conclusions about age differences. One large-scale study utilized the Iowa Gambling Task (IGT; Cauffman et al., 2010) to explore age-related changes in reward

sensitivity. In the standard version of the IGT, participants are presented with four decks of cards, two that will win them money over repeated play (advantageous decks) and two that will lose them money over repeated play (disadvantageous decks); participants are permitted to choose freely from the four decks (e.g., Smith et al., 2011b). However, Cauffman et al. (2010) modified the task such that the computer pseudo randomly selected a deck on each trial and the participant was asked to decide whether to play or pass. This modification allowed the researchers to disentangle affinity for the advantageous decks and a measure of reward sensitivity from avoidance of disadvantageous decks. The results indicated that mid-adolescents aged 14–17 and older adolescents aged 18–21 learned to play from advantageous decks faster than either younger adolescents (ages 10–13) or adults (ages 22–25), a finding that was recently replicated in an international sample of more than 5000 individuals (Steinberg and Chein, 2015). This outcome suggests that ages 14–21 are a period of heightened sensitivity to reward. Using the same data set, Steinberg (2010) also found that self-reported sensation seeking, but not impulsivity, was associated with overall rate of plays from rewarding decks at the end of the task.

*Neuroimaging of reward sensitivity.* Despite occasional inconsistencies in the literature, self-reported sensation seeking, behavioral measures of reward sensitivity, and neuroimaging studies of reward processing support the contention that reward sensitivity reaches its apex during adolescence (Barkley-Levenson and Galvan, 2014; Christakou et al., 2011; Collado et al., 2014; Galvan and McGlennen, 2013; MacPherson et al., 2010; Shulman et al., 2014a; Shulman et al., 2014b; Somerville et al., 2011; Van Leijenhorst et al., 2010b). The bulk of developmental research on this topic provides evidence for a mid-adolescent peak in reward sensitivity, and

although the neuroimaging literature does not allow for a precise estimation of age of peak striatal response, the weight of the evidence indicates that adolescents engage the striatum (and other components of the reward network) to a greater extent than adults, particularly during receipt of reward and when differences in reward sensitivity are reflected in decision-making behavior. Also consistent with the dual systems model, studies that have incorporated measures of puberty typically find that sensation seeking and reward sensitivity are higher among those (particularly boys) who are more pubertally advanced (Shulman et al., 2016).

**The development of self-regulation and cognitive control.** A second major claim of the dual systems model is that cognitive control increases linearly across adolescence and does not reach full maturity until several years after the peak period of reward sensitivity. In the developmental literature, impulse control (or its inverse, impulsivity) is the psychological variable most often used to assess self-regulation (or its absence). Impulsiveness, acting in an unplanned and reactive, or less thought out, fashion, is often considered a quintessential adolescent characteristic that predisposes adolescents to engage in reckless behaviors (Romer, 2010). To date, studies examining age differences in self-reported impulsivity, both cross-sectional (Leshem and Glicksohn, 2007; Steinberg et al., 2008) and longitudinal (Harden and Tucker-Drob, 2011), find that impulsivity decreases with age across the second decade of life.

Of substantial importance, the protracted maturation of impulse control is believed to continue into young adulthood, where even 18–19 year olds report higher impulsivity (that is, less impulse control) than individuals in their early twenties (Vaidya et al., 2010). Although adults sometimes engage in impulsive acts, by the early-to-mid 20s the frequency of impulsive behavior appears to stabilize at levels much lower than those exhibited by adolescents (Steinberg

et al., 2008; Quinn and Harden, 2013). For example, using a three-item impulsivity scale, Quinn and Harden (2013) found a linear decrease in self-reported impulsivity between the ages of 15 and 21, but no further age differences among individuals between 21 and 25.

*Neuroimaging of cognitive control.* In recent years, developmental neuroimaging has helped elucidate the neural mechanisms underlying age-related improvements in cognitive control. Continuing maturation of response inhibition is often examined in terms of development of the prefrontal cortex, and particularly the lateral prefrontal cortex (LPFC). In line with the dual systems framework, we postulate that developmental improvements in cognitive control are supported by the concurrent maturation of these underlying neural regions and by enhancements in top-down connectivity between frontal cognitive control regions and other cortical and subcortical areas associated with motor processing, affective processing, and the execution of selected actions (Shulman et al., 2016). Several studies have demonstrated a direct relationship between age-related increases in LPFC engagement and successful cognitive control (Adelman et al., 2002; Andrews-Hanna et al., 2011; Bunge et al., 2002; Casey et al., 1997; Durston et al., 2006; Rubia et al., 2006; Rubia et al., 2007; Rubia et al., 2013; Velanova et al., 2009).

Whereas the behavioral and neuroimaging literatures generally indicate a relationship between increases in cognitive control and engagement of the LPFC from adolescence into adulthood, the relationship between age, behavior, and neural engagement from childhood to adolescence is not as consistent (Alahyane et al., 2014, Booth et al., 2003, Braet et al., 2009, Casey et al., 1997; Durston et al., 2002). In fact, some studies find that children utilize more frontal regions than adults—in terms of overall volume and/or magnitude of activity—in order to successfully withhold a prepotent action. These findings have led researchers to posit



that increases in self-regulation from childhood to adolescence and into adulthood may be due to a developmental progression from diffuse to focal activation (Durstun et al., 2002). In this account, during childhood and early adolescence, the brain is inefficient and needs to “work harder,” recruiting neurons across a larger frontal area in order to successfully inhibit a response. As the brain undergoes continued reorganization across adolescence, necessary neural connections are strengthened and unnecessary ones are pruned, creating a more efficient brain and leading to more focal recruitment of regions within the IPFC during successful inhibition (Shulman et al., 2016).

Cognitive control encompasses the integration of several (often simultaneous) processes that support planning behavior in accord with one's intentions (Miller, 2000). The effective integration of these processes relies not only on the functional recruitment of implicated brain regions, but also on the strength of connectivity among them (Hwang et al., 2010 ;van Belle et al., 2014). Studies conducted show the potential benefit to the field of fMRI studies in moving beyond simplistic models of regional activation toward more elaborate models that consider connectivity among regions throughout development, as well as the strength and efficiency of those connections, which likely support age-related increases in the acquisition and execution of complex cognitive control skills (Satterthwaite et al., 2013). This is particularly true because, there is reason to believe that continuing changes in connectivity account for the observation that some aspects of cognitive control continue to strengthen into early adulthood, instead of plateauing in adolescence (Shulman et al., 2016).

**Why risk taking during adolescence is related to heightened reward sensitivity and immature cognitive control.** As the literature suggests evidence with the third proposition,

research largely supports the dual systems model's characterization of adolescence as a time of heightened socioemotional reactivity (relative to earlier and later periods) and still maturing cognitive control. Moreover, there is considerable evidence consistent with the proposition that the developmental trajectories of reward sensitivity and cognitive control differ, with the former following an inverted U-shaped pattern and the latter evincing protracted, linear improvement that extends into the third decade of life. The model posits that it is the confluence of the developmental patterns of the socioemotional and cognitive control systems, relatively high responsiveness to reward combined with relatively weak self-regulation, that renders adolescents particularly vulnerable to risk taking. If the two systems contribute to risk taking in an additive manner, independent correlations should be found between the functional state of each system and risk-taking propensity (Shulman et al., 2016).

In the few studies that have simultaneously assessed constructs reflective of the socioemotional and cognitive control systems (sensation seeking and impulse control) along with measures of risk taking, the anticipated correlations are found. Both higher levels of sensation seeking and lower levels of impulse control explain variation in risk taking, over and above the effects of one another (Cyders et al., 2009; Donohew et al., 2000; Quinn and Harden, 2013). For example, one study of college students found that sensation seeking uniquely predicted increases in the frequency of alcohol use, over and above several measures of impulsivity (Cyders et al., 2009). Another study found that both sensation seeking and impulsive decision making were independently associated with greater odds of ninth-graders engaging in sex, non-coital sexual behavior, alcohol use, and marijuana use (Donohew et al., 2000). Moreover, these associations were comparable in magnitude, except that impulsive decision-making was more strongly

associated with having sex and sensation seeking was more strongly associated with marijuana use (Shulman et al, 2016).

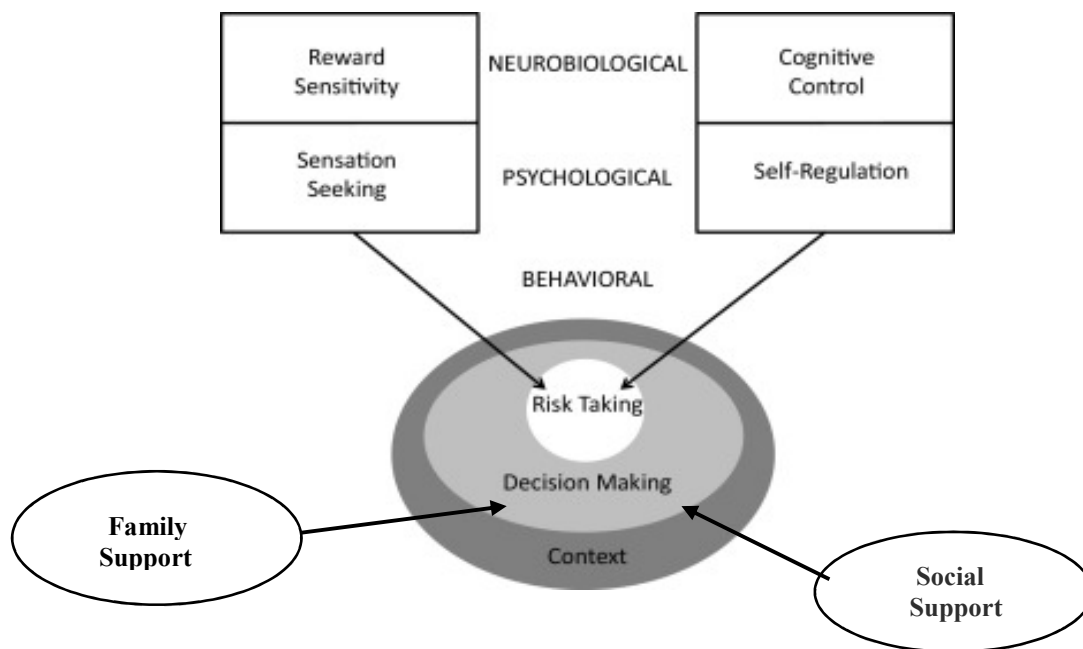
Whereas other studies have not demonstrated simultaneously heightened socioemotional activation and dampened cognitive control within the same task, a few recent ones have observed heightened striatal activation when adolescents receive a reward following a decision (Braams et al., 2014; Braams et al., 2015). In one further relevant study (Cascio et al., 2015), researchers recruited recently licensed drivers (around age 16) to complete a response inhibition task and, one week later, a driving simulation in the presence of a peer confederate. The peer either encouraged risky driving or safe driving. In the latter condition (encouragement of safe driving), greater engagement of cognitive control circuitry during the response inhibition task (indicative of better cognitive control) predicted safer driving behavior in the simulated driving task. Participants who exhibited higher cognitive control also showed no increase in risky driving in the condition in which the peer encouraged risk taking, suggesting that individuals who evince greater engagement of cognitive control circuitry may be more resistant to socioemotional arousal. These findings indicate that poor cognitive control, as expected, also plays a role in risk-taking behavior. However, because the study did not compare age groups, it cannot address whether maturation of cognitive control helps to account for developmental patterns in risk taking (Shulman et al., 2016).

In another recent study, van Duijvenvoorde and colleagues (2015b) had children, adolescents, and adults complete a risk-taking task called Columbia Card Task (CCT). This task investigates developmental changes and individual differences in healthy individuals across the life span and in populations. The CCT enables the researcher to compare affect-based versus

deliberative risky decisions and their triggering mechanisms, as well as predictors of risk taking, such as inhibitory control, need-for-arousal, and impulsivity (Figner & Weber, 2017). While overall risk-taking tendency did not differ by age, adolescents showed greater activation of control circuitry as the riskiness of the decision increased. This effect was not seen in children or adults. The authors suggest that heightened recruitment of control circuitry is necessary due to the heightened emotional response to risk during this age. Although there is good reason to believe that the functional status of both the socioemotional and cognitive control systems during adolescence contribute to heightened risk taking during this stage of development, the dual systems model still awaits a comprehensive study that confirms or disconfirms the purported joint effects of the developmental trajectories of the socioemotional and cognitive control systems on risk-taking behavior (Shulman et al, 2016).

The conceptual model based upon Steinberg's Dual Systems Model allows for the examination of multiple factors that may have an impact on decision-making in college freshmen. These factors include health-risk behaviors, family support and social support. Determining the extent to which social factors play a role in freshmen decision-making will require the use of previously devised coping mechanisms, as well as the development of new coping strategies. For college freshmen students, these social support systems may be viewed as uncertain, perhaps leading in consequence to poor decision making due to the absence of, or limited social support resources on offer. When using Steinberg's model as a framework, perception of health-risk behaviors and social support systems can be viewed as affecting decision-making. Some of these factors can be assessed for the amount of impact they may have on decision-making both individually and in combination. Through the comprehensive

examination of multiple factors that may be predictive of decision-making, further information can be gained on the factors that may contribute to a positive transition into college. This in turn may explain how and why college freshmen decide to engage in health-risk behaviors. From the research explained earlier in this chapter, the Dual Systems perspective explicitly emphasizes the context in which decision-making takes place.



**Figure 1. Study conceptualization using the Dual Systems Model of Adolescent Risk-taking (Steinberg, 2010).**

So, in this proposed study, although reward sensitivity, sensation seeking, cognitive control and self-regulation are neurobiological and psychological manifestations of the concept of risk-taking (Steinberg's model of adolescent risk-taking), the researcher is interested in studying decision-making. Therefore, the lower half of the model was used to guide this study.

### **Literature Search**

The literature was reviewed by searching electronic databases and was conducted with the assistance of a librarian at Loyola University Health Sciences Library who helped with gaining access to certain studies relevant to this study. All database searches were restricted to articles published in the English language. Electronic databases utilized in the literature review process included: Google Scholar, Scopus, PubMed, PsychINFO, ERIC and dissertations database. The search terms utilized in the search process included: college freshmen, decision making; college freshmen, decision-making and health risk behavior; college freshmen, decision making, family support and social support; and college freshmen, family support, decision making and gender. The reference lists of all articles that were obtained were reviewed to allow for further expansion of possible sources of information. Overlap in articles reviewed from each of the databases was discovered, as several articles were cited in more than one database searched for this analysis. The literature review will be organized in the following manner; decision-making in college freshmen, decision-making and health-risk behaviors, social support systems, existing gaps in the literature and contributions made to knowledge development in adolescent decision-making.

As data collection drew close to completion, a review and update of the literature was conducted. Eight research studies were added to the existing review of literature. A synthesis and critique of the relevant literature is summarized below.

### **Decision Making in College Freshmen**

College freshmen face many challenges when it comes to decision making. Whether it is about making a choice about a college course, finding out ways to pay and manage college

tuition, decisions about whether or not to engage in a social or intimate relationship, etc, college freshmen at large lack the ability to make decisions that are best for them. However, there are different psychological forms of support that college freshmen utilize in order to assist in their decision making process. Some of these supports include family support, social support, institutional support systems among others. It is therefore important to understand aspects of adolescent brain development as it relates to decision-making in young college students.

### **Adolescent Brain Development**

The adolescent's brain is different from both the child's brain and the adult's brain with respect to both morphology and function, and at the levels of brain structures, regions, circuits, and systems. The brain is made up of white matter and grey matter. The grey matter stores all the information, and the white matter forms the connections between the different parts of the brain. The grey matter matures between 11 and 12 years of age, but the white matter has not completely developed until the early twenties. This means that the brains of teenagers literally are not physically fully connected. Whereas, in an adult brain, there are a number of neural connections that allow the different parts of the brain to work together, in the teenage brain, these connections are not fully formed yet; unsurprisingly, this impacts the brain's ability to process information in a way that looks at the entire picture. It has been found that the last part of the brain to finish developing its connections is the frontal lobe, which is also the part of the brain that governs attention span, impulses, and motivation (Kelly, 2014). Other marked differences occur with respect to grey matter, white matter, structural connectivity, and neurotransmission, which will be further discussed in this study. Although studies of sleep, electrophysiology, functional imaging, pharmacological challenge, and stress reactivity illuminate these differences (Steinberg,

2010), for the purposes of this study, among these factors the researcher will discuss particulars of functional imaging only.

In addition to being a transitional time in physical, intellectual, emotional, and social development, adolescence is a time of important changes in the structure and function of the brain. Scientists are beginning to understand how the psychological changes of adolescence are linked to brain maturation. Before the development of brain imaging technology, scientists could only speculate about the workings of the adolescent brain. However, with the same scanners that are used to identify tumors and torn ligaments, researchers can see inside the adolescent's brain and watch what happens in various parts of the brain when teenagers think. One recent study (Galvan, Hare, Voss, Glover, & Casey, 2007) indicates that individuals' self-reported likelihood of engaging in risky behavior is more strongly connected to reward processing than to impulsivity, but studies of this issue are sparse. Consistent with the notion that reward-seeking and self-control are distinct phenomena that are subserved by different brain systems and follow different developmental trajectories, Cauffman et al., (2010) hypothesized that reward-seeking is curvilinearly related to chronological age, increasing during early adolescence but declining thereafter, whereas impulsivity declines gradually over this same age period. We now know that, other than the first three years of life, no period of development is characterized by more dramatic brain changes than adolescence (Steinberg, 2011).

### **What We have Learned from Functional Magnetic Resonance Imaging**

Major contributions to our understanding have come from studies using functional magnetic resonance imaging (fMRI). Formerly it was thought that improved intellectual functioning in adolescence would be reflected in larger brain size. However, the brain has



reached its adult size by age 10, meaning that changes in thinking during adolescence cannot be the result of sheer increases in the brain's size or volume. Since 2000, there has been an explosion in research on adolescent brain development, and correspondingly, understanding of brain maturation has progressed at breathtaking speed. fMRI enables researchers to take pictures of individuals' brains and compare anatomy (brain structure) and activity (brain function). Some aspects of brain development in adolescence are reflected in changes in brain structure (for instance, certain parts of the brain are relatively smaller in childhood than in adolescence, whereas other parts are relatively larger). Other aspects of brain development are reflected in changes in brain function (for instance, adolescents may use different parts of the brain than children do when performing the same task). In addition, greater inter-connectedness among various regions of the brain allows for better communication between parts associated with different functions. For example, connections between regions of the brain responsible for logical reasoning become better connected with those responsible for experiencing intense emotions; "cross-talk" between these regions enables better impulse control and self-regulation. This is one reason that older teenagers are so much better than younger teenagers at controlling their emotions (Steinberg, 2011).

Although the technology used in MRI is the same as that used by neuroscientists who study brain development, fMRI refers to the use of the test to examine how the brain functions, not just study the brain's anatomy. Researchers use fMRI to examine patterns of brain activity while individuals perform a specific task (for example, recalling a list of words, viewing photos of one's friends, or listening to music) (University of California San Diego Center for Functional MRI, 2017). Participants in an fMRI study are asked to perform tasks on a computer while lying

inside a brain scanner. With this setup, it is possible to study how patterns of brain activity differ during different tasks (for example, when we actively read as opposed to being read to) and whether people of different ages show different patterns of brain activity while performing the same task. Many of the most important brain changes that take place during adolescence do not depend specifically on the brain's structure, but on how the brain now functions. Steinberg and colleagues (2011) studied how patterns of brain activity varied when individuals performed tasks either alone or with their friends watching them, and whether the ways in which the presence of friends changed brain activity differed between teenagers and adults. They found that the mere presence of peers activated an adolescent's reward center, but not that of an adult. This may make teenagers more inclined to take risks when with their friends because they are more likely to focus on the rewards of a risky choice than on the potential costs.

**Synapse Formation.** The human brain contains approximately 100 billion neurons, cells that carry information by transmitting electrical charges within the brain by means of chemicals called neurotransmitters. Neurons do not actually touch as there is a miniscule gap between them called a synapse. When the electrical charge travels through a neuron, it stimulates the release of neurotransmitters, chemicals that carry the signal across the synapse from one neuron to the next. A key process in early brain development is the development of connections-synapses- between neurons. By age 2, a single neuron may have 10,000 connections to other neurons. The formation of some synapses is genetically programmed, but others are formed through experience. The rate of synapse formation peaks at about age 1 and slows down in early childhood, but the development of new synapses continues throughout life as we learn new skills, build memories,

acquire knowledge, and adapt to changing circumstances (Steinberg, Bornstein, Vandell, & Rook, 2011).

**Synaptic Pruning.** Initially, the brain produces many more connections among cells than it will use. The number of synapses in the brain of a 1-year-old is about twice the number in the adult brain. However, soon after birth, unused and unnecessary synapses start to be eliminated, a process called synaptic pruning. The elimination of synapses continues through adolescence and is normal and necessary to development and functioning. It makes the brain more efficient by transforming an unwieldy network of small pathways into a better organized system of superhighways. In general, the development of synapses is characterized by a period of growth (when more and more synapses are created) followed by a period of decline (when more and more synapses are pruned). Although synaptic pruning takes place throughout infancy, childhood, and adolescence, different regions of the brain are pruned at different points in development. As a rule, the brain regions in which pruning is taking place at a particular point in development are the regions associated with the greatest changes in cognitive functioning during that stage (Boyd & Bee, 2010).

**Myelination.** Initially, neurons are “nude,” but in the course of development, white fatty tissue called myelin encases the projections of neurons that interconnect them, a process called myelination. Myelin, which acts like plastic insulation around an electrical wire, increases the speed of neural impulses and so improves information transmission. Myelination occurs in waves, beginning in the prenatal period and continuing into adulthood. As with synaptic pruning, examining where myelination occurs most dramatically at a particular point in development

provides clues about the aspects of cognitive functioning that are changing most at that stage (Kemmerer, 2014).

**What This Means for the Adolescent Brain.** During adolescence, the brain is remodeled through synaptic pruning and myelination in particular brain regions. The most important part of the brain to be pruned in adolescence is the prefrontal cortex, the region of the brain directly behind the forehead, which is most important for sophisticated thinking abilities, such as planning, thinking ahead, and weighing risks and rewards. There is also continued myelination of the prefrontal cortex and its connections to other parts of the brain throughout adolescence, which leads to many cognitive advances, including improvements in our ability to regulate our emotions and coordinate our thoughts and feelings. Maturation of the prefrontal cortex is not complete until the mid-20s, a much later point in development than scientists had once thought. Imaging studies have also shown important changes in the functioning of the prefrontal cortex in adolescence. Patterns of activation within the prefrontal cortex typically become more focused. For instance, in experiments in which participants are presented with a rapid succession of images and asked to push a button when a certain image appears but refrain from pushing it when a different image appears, adolescents are less likely than children to activate prefrontal regions that are not relevant to performing the task well. In addition, individuals become more likely to use multiple parts of the brain simultaneously and coordinate activity among prefrontal regions and other areas of the brain, such as the limbic system, a region that is important for our experience of reward and punishment and for processing emotional and social information, such as reading someone's facial expression or judging what a person thinks of us (Steinberg, 2011).

At the same time that the adolescent brain is maturing in ways that enable teenagers to become more capable of reasoned thinking, it is also changing in ways that cause them to do risky things. A chemical substance in the brain called dopamine is responsible for the feeling of pleasure. When something enjoyable happens, we experience what some scientists have called a “dopamine squirt,” which leads to the sensation of pleasure. It makes us want whatever elicited the squirt because the feeling of pleasure it produces is so strong (Siegel, 2015).

We now know that there is a rapid increase in dopamine activity in early adolescence. In fact, there is more dopamine activity in the brain’s reward center in early adolescence than at any other time of life. Because things feel especially pleasurable during early adolescence, young adolescents go out of their way to seek rewarding experiences; however, the drive to do this is much more intense in early adolescence than before or after. The urge to seek out rewarding and pleasurable experiences is a mixed blessing, as sometimes this drive is so intense that adolescents can exhibit a sort of “reward tunnel vision.” They are so driven to seek pleasure that they may not pay attention to associated risks. For instance, teenagers may experience so much pleasure from driving fast, drinking alcohol, and having unprotected sex that misgivings about the possibility of receiving a speeding ticket, being grounded for coming home smelling of beer, (or worse), having an unwanted pregnancy, may not even make it onto their radar screen. This combination of advanced (but not yet totally mature) reasoning and heightened sensation-seeking explains why otherwise intelligent adolescents often do surprisingly foolish things. More important, the fact that teenagers’ ability to control their impulses is immature at the same time that their interest in sensation seeking is stronger than ever makes them vulnerable to making serious mistakes (Siegel, 2015).

Although scientists agree about the ways in which the structure and function of the brain change during adolescence, the implications of these changes for adolescent development are still the subject of a great deal of ongoing research and considerable speculation. Psychologists draw a distinction between “cold” cognition (when we think about something that lacks emotional content, like how to solve an algebra problem) and “hot” cognition (when we think about something that can make us feel exuberant or excited, angry or depressed, like whether to go joyriding with friends or throw a punch at someone who insulted a girlfriend). The systems of the brain responsible for cold cognition are mature by the time most individuals are 16. But the systems that control hot cognition are not, continuing to develop well into the 20s (Steinberg, 2011).

**The Need to Practice Autonomy.** It is important to keep in mind that the brain is very malleable, or “plastic,” and that its development is affected by experience as well as biology. Both synaptic pruning and myelination are influenced by experience, such that repeated activation of a specific collection of neurons as a result of engaging in a particular behavior will actually strengthen the connections among those neurons, which, in turn, will make them function more efficiently. This is one reason that practicing the same task over and over again makes that task easier to perform each time (Steinberg, 2011).

Although research on brain plasticity during adolescence is just in its infancy, many scientists believe that the maturation of the brain systems responsible for thinking ahead and controlling impulses is influenced by the sorts of experiences young people have, including their experiences in the classroom. Given the well-documented finding that practicing something will strengthen the brain circuits that control that behavior, it is important that, as educators, we

provide adolescents with opportunities to practice things like planning, anticipating the consequences of a decision, and regulating their own behavior (Steinberg, 2011).

Hence, it appears that brain changes characteristic of adolescence are among the most dramatic and important to occur during the human lifespan. The last decade has witnessed a redefinition of what it means to study judgment and decision making in adolescence. Moving beyond a relatively narrow focus on age differences in the rational processing of decision elements, the field has begun to grapple with the dynamic quality of adolescents' subjective decision-making experience, their beliefs and values, intentions and intuitions, emotions and self-awareness, all developing in the midst of a changing social world (Albert & Steinberg, 2011).

Decision making is a task that individuals face on a daily basis. It was found that maladaptive decision making in children and adolescents was associated with negative parenting approaches. In a systematic review that was conducted to establish the relationship between parenting approaches and decision making styles among children and adolescents, it was suggested that maladaptive decision making styles are associated with detrimental outcomes for children and adolescents' development. The review revealed that western and non-western societies play an important role in shaping these associations; however, it also established that age and gender do not play a significant role. In particular, the various approaches to parenting have been associated with a number of psychosocial as well as behavioral outcomes. The results indicate that there are distinct associations between decision making and parenting. Both adaptive and maladaptive decision making have been associated with parenting approaches,

while maladaptive decision making styles were the most prevalent (Davids, Roman & Leach, 2016).

Decision-making and risk-taking behavior undergo developmental changes during adolescence. Disadvantageous decision-making and increased risk-taking may lead to problematic behaviors such as substance use and abuse, pathological gambling and excessive internet use. Balogh, Mayes & Potenza (2013) reviewed the literature on decision-making and risk-taking and their relationships to addiction vulnerability in youth. The authors found that decision-making and risk-taking behaviors involve brain areas that undergo developmental changes during puberty and young adulthood. Individual differences and peer pressure also relate importantly to decision-making and risk-taking. They concluded that brain-based changes in emotional, motivational and cognitive processing may underlie risk-taking and decision-making propensities in adolescence, making this period a time of heightened vulnerability for engagement in addictive behaviors.

Adolescents may engage in risk behaviors that jeopardize their futures. A study examined the role of deliberative decision making (the tendency to consider options and consequences before making a decision) and social contextual variables (parenting and friend influences) in alcohol and drug use, risky sex, and delinquency. Participants were 7,748 adolescents (50% female) in grades 7–11 from the National Longitudinal Study of Adolescent Health dataset ( $M$  age = 14.87,  $SD$  = 1.54). Hierarchical regression analyses revealed that deliberative decision making and contextual variables were associated with risk behavior concurrently and 1 year later. Furthermore, deliberative decision making interacted with social contextual variables in some models, indicating that deliberative decision making may be especially important in certain



contexts. These findings suggest that both cognitive and social factors need to be considered to explain adolescents' decisions to engage in risk behavior (Wolff & Crockett, 2011).

Adolescence is characterized by increasing incidence of health risk behaviors, including experimentation with drugs and alcohol. To fill the gap in our understanding of the associations between risky decision-making and health risk behaviors, the authors investigated associations between laboratory-based risky decision-making using the Stoplight task and self-reported health risk behaviors. Given that there has been no examination of potential age differences in the associations between risky decision-making and health risk behaviors, the authors also examined whether the association of risky decision-making with health risk behaviors is consistent across adolescence and adulthood using two-group structural equation modeling (SEM). The results indicated significant differences across the two age groups: adolescents (17-20 year olds) who took more risks on the Stoplight task reported greater frequency and earlier onset of substance use, whereas Stoplight performance was not associated with substance use frequency or onset among adults (31-61 year olds). Study findings suggest that a laboratory-based measure of risky decision-making is significantly related to health risk behaviors among adolescents but not among adults (Kim-Spoon, Kahn, Deater-Deckard, Chiu, Steinberg & King-Casas, 2015).

### **Decision-Making and Health-Risk Behaviors**

As the researcher delved into the extant literature in regards to decision-making and health-risk behaviors, a number of aspects caught the researcher's attention. These aspects were appraised with reference to the researcher's variables of interest. They include adolescent brain development; risk-taking; pubertal maturation; peer presence; risk preference; heightened sensitivity to potential reward and self-control; sensation-seeking and impulsivity; maternal

presence; lab-based measures for risky decision-making; role of functional MRI; individual differences with risk-taking behavior; age differences with risk-taking; learning from consequences of negative actions; emotional and social factors; guided self-reflection and positive health behavior change; juvenile offenders, social context and justice policy; experimentation with drugs and alcohol, alcohol prevention programs; pregaming; sugar and sweetened beverage intake; substance abuse and prevention programs; sexual behaviors; depression and hopelessness and; suicidal thoughts and behaviors. In this section, the literature will be discussed within these aspects that may directly or indirectly influence decision-making and health-risk behaviors in the college population, with some studies focusing on college freshmen.

Researchers posit that the most important findings grounded in developmental neuroscience have emerged during the past ten years in the study of adolescent risk taking. According to this view, the temporal gap between puberty, which impels adolescents toward thrill seeking, and the slow maturation of the cognitive-control system, which regulates these impulses, makes adolescence a time of heightened vulnerability for risky behavior. This view of adolescent risk taking helps to explain why educational interventions designed to change adolescents' knowledge, beliefs, or attitudes have been largely ineffective, and suggests that changing the contexts in which risky behavior occurs may be more successful than changing the way adolescents think about risk (Steinberg, 2007).

Steinberg (2008) proposed a framework for theory and research on risk-taking that is informed by developmental neuroscience. Two fundamental questions motivated this review. First, why does risk-taking increase between childhood and adolescence? Second, why does risk-

taking decline between adolescence and adulthood? Risk-taking increases between childhood and adolescence as a result of changes around the time of puberty in the brain's socio-emotional system leading to increased reward-seeking, especially in the presence of peers, fueled mainly by a dramatic remodeling of the brain's dopaminergic system. Risk-taking declines between adolescence and adulthood because of alterations in the brain's cognitive control system, and changes which improve individuals' capacity for self-regulation. These events occur across adolescence and young adulthood and are seen in structural and functional modifications within the prefrontal cortex and its connections to other brain regions. The differing timetables of these variations make mid-adolescence a time of heightened vulnerability to risky and reckless behavior (Steinberg, 2008).

Much recent research on adolescent decision making has sought to characterize the neurobiological mechanisms that underlie the proclivity of adolescents to engage in risky behavior. One class of influential neurodevelopmental models focuses on the asynchronous development of neural systems, particularly those responsible for self-regulation and reward seeking. While this work has largely focused on the development of prefrontal (self-regulation) and striatal (reward processing) circuitry, Smith and colleagues (2014) explored the significance of a different region, the anterior insular cortex (AIC), in adolescent decision making. According to the researchers, although the AIC is known for its role as a cognitive-emotional hub, and is included in some models of adult self-regulation and reward seeking, the importance of the AIC and its maturation in adolescent risk taking has not been extensively explored. The authors suggest that age-related differences in AIC engagement may contribute to heightened risk taking during adolescence.

Trying to understand why adolescents and young adults take more risks than younger or older individuals do has challenged psychologists for decades. Adolescents' inclination to engage in risky behavior does not appear to be due to irrationality, delusions of invulnerability, or ignorance. Steinberg (2007) presented a perspective on adolescent risk taking grounded in developmental neuroscience. According to this view, the temporal gap between puberty, which impels adolescents toward thrill seeking, and the slow maturation of the cognitive-control system, which regulates these impulses, makes adolescence a time of heightened vulnerability for risky behavior. This view of adolescent risk taking helps to explain why educational interventions designed to change adolescents' knowledge, beliefs, or attitudes have been largely ineffective, and suggests that changing the contexts in which risky behavior occurs may be more successful than changing the way adolescents think about risk (Steinberg, 2007).

To test a proposition central to Belsky, Steinberg, and Draper's (1991) evolutionary theory of socialization, that pubertal maturation plays a role in linking early rearing experience with adolescent sexual risk taking (i.e., frequency of sexual behavior) and, perhaps, other risk taking (e.g., alcohol, drugs, delinquency), the authors subjected longitudinal data on 433 White, 62 Black, and 31 Hispanic females to path analysis. Results showed (a) that greater maternal harshness at 54 months predicted earlier age of menarche (the first occurrence of menstruation); (b) that earlier age of menarche predicted greater sexual (but not other) risk taking; and (c) that maternal harshness exerted a significant indirect effect, via earlier menarche, on sexual risk taking (i.e., greater harshness leads to earlier menarche which leads to greater sexual risk taking) but only a direct effect on other risk taking. The authors recommend prospective longitudinal

studies that follow individuals beyond adolescence and into adulthood to further study this area (Belsky, Steinberg, Houts & Halpern-Felsher, 2010).

Adolescents make more reckless decisions when with peers than when alone, which poses a challenge for organizations that place adolescents within situations in which risky and myopic decision making (the tendency in decision makers to focus on information immediately related to their judgment and to ignore other, less prominent, pieces of information) is problematic. In one study, the authors asked whether the effect of peers on adolescents' decision making is mitigated by the presence of a slightly older adult. They examined whether target subjects' risk taking was greater when they were in groups of 4 late-adolescent males (ages 18–22) than when they were in groups that mixed 3 late-adolescent males with 1 slightly older adult (age 25–30); risk taking in both of these conditions was compared with that of adolescents tested alone. It was found that adolescents took more risks and expressed stronger preference for immediate rewards when they were grouped with 3 same-age peers than when they were alone. When 1 adolescent was replaced by someone slightly older, however, adolescents' decision making and reward processing resembled that seen when adolescents were tested alone. The authors therefore suggest that adding a young adult to a work team of adolescents may improve group decision making (Silva, Chein & Steinberg, 2016).

As mentioned above, adolescents take more risks when with peers than when alone. However, it is not clear how peer presence affects adolescents' risky decision making. Silva, Chein, Shulman and Steinberg (2016) used the Iowa Gambling Task (IGT), a game used to assess decision making involving risk and reward, to examine how peers affect late adolescents' exploration of relevant environmental cues, ability to learn from the outcomes (positive and

negative) of that exploration, and ability to integrate feedback to adjust behavior toward optimal long-term outcomes. One hundred and one 18- to 22-year old males ( $M = 19.8$  years) were randomly assigned to play the IGT either alone or observed by peers. Late adolescents tested with observers engaged in more exploratory behavior, learned faster from both positive and negative outcomes, and evinced better task performance than those tested alone. The authors suggest that spending time with peers during adolescence may be a double-edged sword, increasing the odds not only that adolescents will behave recklessly, but also, more positively, that they will learn from the consequences of their actions.

Recent research suggests that the presence of peers may alter how the potential rewards and costs of a decision are valued or perceived. One study further explored this notion by investigating how peer observation affects adolescent risk taking when the information necessary to make an informed decision is explicitly provided. The researchers used a novel probabilistic gambling task in which participants decided whether to play or pass on a series of offers for which the reward and loss outcome probabilities were made explicit. Adolescent participants completed the task either alone or under the belief that they were being observed by an unknown peer in a neighboring room. Participants who believed a peer was observing them chose to gamble more often than participants who completed the task alone, and this effect was most evident for decisions with a greater probability of loss. Study results suggest that the presence of peers can increase risk taking among adolescents even when specific information regarding the likelihood of positive and negative outcomes is provided. The findings expand the understanding of how peers influence adolescent decision making and have important

implications regarding the value of educational programs aimed at reducing risky behaviors during adolescence (Smith, Chein & Steinberg, 2014).

Another study was conducted by Chein and colleagues (2011) on peer influences, concluding that the presence of peers increases risk taking among adolescents but not adults. They posited that the presence of peers may promote adolescent risk taking by sensitizing brain regions associated with the anticipation of potential rewards. Using fMRI, brain activity was measured in adolescents, young adults, and adults as they made decisions in a simulated driving task. Participants completed one task block while alone, and one block while their performance was observed by peers in an adjacent room. During peer observation blocks, adolescents selectively demonstrated greater activation in reward-related brain regions, including the ventral striatum and orbitofrontal cortex, and activity in these regions predicted subsequent risk taking. Brain areas associated with cognitive control were less strongly recruited by adolescents than adults, but activity in the cognitive control system did not vary with social context. Results suggested that the presence of peers increases adolescent risk taking by heightening sensitivity to the potential reward value of risky decisions (Chein, Albert, O'Brien, Uckert & Steinberg, 2011).

Adolescence is characterized by making risky decisions. Early lesion and neuroimaging studies in adults pointed to the ventromedial prefrontal cortex and related structures as having a key role in decision-making. More recent studies have fractionated decision-making processes into its various components, including the representation of value, response selection (including inter-temporal choice and cognitive control), associative learning, and affective and social aspects. These different aspects of decision-making have been the focus of investigation in recent

studies of the adolescent brain. Evidence points to a dissociation between the relatively slow, linear development of impulse control and response inhibition during adolescence versus the nonlinear development of the reward system, which is often hyper-responsive to rewards in adolescence. The authors suggest that decision-making in adolescence may be particularly modulated by emotion and social factors, for example, when adolescents are with peers or in other affective contexts (Blakemore & Robbins, 2012).

While much research on adolescent risk behavior has focused on the development of prefrontal self-regulatory mechanisms, prior studies have elicited mixed evidence of a relationship between individual differences in the capacity for self-regulation and individual differences in risk taking. To explain these inconsistent findings, it has been suggested that the capacity for self-regulation may be, for most adolescents, adequately mature enough to produce adaptive behavior in non-affective, “cold” circumstances, but that adolescents have more difficulty exerting control in affective, “hot” contexts. To further explore this claim, the authors of a study examined individual differences in self-control in the face of affective and non-affective response conflict, and examined whether differences in the functioning of cognitive control processes under these different conditions was related to risk taking. Participants completed a cognitive Stroop task (demonstration of interference in the reaction time of a task), an emotional Stroop task (examining the response time to name colors of negative emotional words), and a risky driving task known as the Stoplight game. Regression analyses showed that performance on the emotional Stroop task predicted laboratory risk-taking in the driving task, whereas performance on the cognitive Stroop task did not exhibit the same trend. This pattern of results, according to the authors, is consistent with theories of adolescent risk-



taking that emphasize the impacts of affective contextual influences on the ability to enact effective cognitive control (Botdorf, Rosenbaum, Patrianakos, Steinberg & Chein, 2016).

In a study, 306 individuals in 3 age groups, adolescents (13-16), youth (18-22), and adults (24 and older) completed two questionnaire measures assessing risk preference and risky decision making, and one behavioral task measuring risk taking. Participants in each age group were randomly assigned to complete the measures either alone or with 2 same-aged peers. Analyses indicated that (a) risk taking and risky decision making decreased with age; (b) participants took more risks, focused more on the benefits than the costs of risky behavior, and made riskier decisions when in peer groups than alone; and (c) peer effects on risk taking and risky decision making were stronger among adolescents and youths than adults. These findings support the idea that adolescents are more inclined toward risky behavior and risky decision making than are adults and that peer influence plays an important role in explaining risky behavior during adolescence (Gardner & Steinberg, 2005). Adolescent decision-making is highly sensitive to input from the social environment. In particular, adult and maternal presence influence adolescents to make safer decisions when encountered with risky scenarios. However, it is currently unknown whether maternal presence confers a greater advantage than mere adult presence in buffering adolescent risk taking.

It has been hypothesized that sensation seeking and impulsivity, which are often conflated, in fact develop along different timetables and have different neural underpinnings, and that the difference in their timetables helps account for heightened risk taking during adolescence. In order to test these propositions, the authors examined age differences

in sensation seeking and impulsivity in a socioeconomically and ethnically diverse sample of 935 individuals between the ages of 10 and 30, using self-report and behavioral measures of each construct. Consistent with the authors' predictions, age differences in sensation seeking, which are linked to pubertal maturation, follow a curvilinear pattern, with sensation seeking increasing between 10 and 15 and declining or remaining stable thereafter. In contrast, age differences in impulsivity, which are unrelated to puberty, follow a linear pattern, with impulsivity declining steadily from age 10 on. The authors suggest that heightened vulnerability to risk taking in middle adolescence may be due to the combination of relatively higher inclinations to seek excitement and relatively immature capacities for self-control that are typical of this period of development (Steinberg et al., 2008).

Developmental differences in mental representations of choices, reward sensitivity, and behavioral inhibition (self-control) explain greater susceptibility to risk taking. Ironically, relying on precise representations in reasoning promotes greater risk taking, but this reliance declines as adolescents mature. This phenomenon is known as a developmental reversal, so called because it violates traditional developmental expectations of greater cognitive complexity with maturation. Fuzzy-trace theory (FTT) predicts reversals by proposing two types of mental representation (gist and verbatim), and stating that risk takers rely more on verbatim processing when making decisions. In a study conducted by Reyna and colleagues (2015), they describe the main tenets of FTT (a theory of cognition originally proposed by Brainerd and Reyna that draws upon dual-trace conceptions to predict and explain cognitive phenomena, particularly in memory and reasoning domains) and explain how it can account for risky decision making. The authors also explored the neural underpinnings of development and decision making in the context of

distinctions from FTT. FTT predicts developmental differences in risky decision making that are not predicted by other views. Thus, adults would be expected to be more rational than children. Instead, as predicted by FTT, many cognitive biases increase from childhood to adulthood, exhibiting developmental reversals. Adolescents' risky decision making is closer to the economic ideal of trading off risks and rewards than adults,' but ironically, verbatim trading off is associated with unhealthy risk taking, while inducing simpler gist-based intuition is protective. FTT concurs with developmental dual-process theories in distinguishing reward sensitivity from behavioral inhibition, although imbalance between prefrontal control and reward systems is an incomplete explanation of developmental differences in risk taking. Indeed, greater reward sensitivity encourages recruitment of cognitive control areas, so many adolescents take calculated risks rather than act impulsively. FTT emphasizes the interplay among representation, reward sensitivity, and inhibition, which researchers must distinguish between going forward. In particular, the authors recommend neuroimaging studies of the development of risky decision making that should target verbatim and gist strategies (Reyna, Wilhelms, McCormick & Weldon, 2015).

Another study by Rao and associates (2011) was conducted to assess individual differences among adolescents regarding risk-taking behavior in the laboratory. Another aim of the study was to evaluate whether the laboratory-based risk-taking behavior is associated with other behavioral and psychological measures associated with risk-taking behavior. A total of 82 adolescents with no personal history of psychiatric disorders completed a computerized decision-making task called the Wheel of Fortune. Regarding the validity of the Wheel of Fortune task, the preliminary data suggest that it might be a valuable laboratory tool for studying behavioral

and neurobiological processes associated with risk-taking behavior in adolescents. On the basis of the choices made between clearly defined probabilities and real monetary outcomes, this task assesses risk preferences when participants are confronted with potential rewards and losses. The participants also completed a variety of behavioral and psychological measures associated with risk-taking behavior. Performance on the task varied on the basis of probability and anticipated outcomes. In the winning sub-task, participants selected low-probability high-magnitude reward (high-risk choice) less frequently than high-probability low-magnitude reward (low-risk choice). In the losing sub-task, participants selected low-probability high-magnitude loss more often than high-probability low-magnitude loss.

On average, the selection of probabilistic rewards was optimal and similar to performance in adults. There were, however, individual differences in performance, and one-third of the adolescents made high-risk choice more frequently than low-risk choice while selecting a reward. After controlling for sociodemographic and psychological variables, high-risk choice on the winning task predicted "real-world" risk-taking behavior and substance-related problems (Rao et al., 2011). These findings highlight individual differences in risk-taking behavior.

Functional magnetic resonance imaging (fMRI) has illuminated the development of human adolescent brain function as demonstrated in various research studies. Cross-sectional comparisons have revealed age-dependent differences between adolescents and other age groups in regional brain responsiveness to prospective or experienced rewards (usually greater in adolescents) or penalties (usually diminished in adolescents). These differences have been interpreted as reflecting an imbalance between motivational drive and behavioral control

mechanisms, especially in mid-adolescence, thus promoting greater risk-taking. The authors caution that researchers should be more circumspect in attributing clinically significant adolescent risky behavior to age-group differences in task-elicited fMRI responses from neurotypical (not displaying or characterized by autistic or other neurologically atypical patterns of thought or behavior) subjects. This is because actual mortality and morbidity from behavioral causes (e.g. substance abuse, violence) by mid-adolescence is heavily concentrated in individuals who are not neurotypical, who rather have shown a lifelong history of behavioral disinhibition that frequently meets criteria for a disruptive behavior disorder, such as conduct disorder, oppositional-defiant disorder, or attention-deficit hyperactivity disorder. These young people are at extreme risk of poor psychosocial outcomes, and should be a focus of future neurodevelopmental research. The authors propose that longitudinal studies are needed to address the functional significance of individual differences (whether developmental differences or differences between adolescents) in brain activation with respect to a causal explanation of real-world risky behaviors, comparable to the decades of rigorous longitudinal research that has characterized the influence of socio-contextual factors on adolescent behavioral outcomes (Bjork & Pardini, 2015).

In another study conducted by Guassi & Telzer, (2018), 23 adolescents completed a risk-taking task during a functional MRI scan in the presence of their mother and an unknown adult. Results reveal that maternal presence elicits greater activation in reward-related neural circuits when making safe decisions but decreased activation following risky choices. Moreover, adolescents evidenced a more immature neural phenotype when making risky choices in the presence of an adult compared to mother, as evidenced by positive functional coupling between

the ventral striatum and medial prefrontal cortex. Results underscore the importance of maternal stimuli in bolstering adolescent decision-making in risky scenarios (Guassi & Telzer, 2018).

Study findings point out that the presence of adults can positively impact risky decision-making in adolescents.

Extant studies of age differences in cognitive processes relevant to risk taking and decision making, such as risk perception and risk appraisal, indicate few significant age differences in factors that might explain why adolescents engage in more risk taking than adults. A study's analysis suggests that the greater propensity of adolescents to take risks is not due to age differences in risk perception or appraisal, but to age differences in psychosocial factors that influence self-regulation. It is argued that adolescence is a period of heightened vulnerability to risk-taking because of a disjunction between novelty and sensation seeking (both of which increase dramatically at puberty) and the development of self-regulatory competence (which does not fully mature until early adulthood). This disjunction is biologically driven, normative, and unlikely to be remedied through educational interventions designed to change adolescents' perception, appraisal, or understanding of risk. Interventions should begin from the premise that adolescents are inherently more likely than adults to take risks and should focus on reducing the harm associated with risk-taking behavior (Steinberg, 2004).

Contemporary perspectives on age differences in risk taking, informed by advances in developmental neuroscience, have emphasized the need to examine the ways in which emotional and cognitive factors interact to influence decision making. In another study, a diverse sample of 901 individuals between the ages of 10 and 30 were administered a modified version of the Iowa Gambling Task, which is designed to measure affective decision making.

Results indicate that approach behaviors (operationalized as the tendency to play increasingly from the advantageous decks over the course of the task) display an inverted U-shape relation to age, peaking in mid- to late adolescence. In contrast, avoidance behaviors (operationalized as the tendency to refrain from playing from the disadvantageous decks) increase linearly with age, with adults avoiding disadvantageous decks at higher rates than both preadolescents and adolescents. The finding that adolescents, compared to adults, are relatively more approach oriented in response to positive feedback and less avoidant in response to negative feedback is consistent with recent studies of brain development, as well as epidemiological data on various types of risky behavior, and may have important practical implications for the prevention of adolescent risk taking (Cauffman et al., 2010).

Research efforts to account for elevated risk behavior among adolescents have arrived at an exciting new stage. Moving beyond laboratory studies of age differences in risk perception and reasoning, new approaches have shifted their focus to the influence of social and emotional factors on adolescent decision making. Albert and associates (2013) reviewed recent research suggesting that adolescent risk-taking propensity derives in part from a maturational gap between early adolescent remodeling of the brain's socioemotional reward system and a gradual, prolonged strengthening of the cognitive-control system. Research has suggested that in adolescence, a time when individuals spend an increasing amount of time with their peers, peer-related stimuli may sensitize the reward system to respond to the reward value of risky behavior. As the cognitive-control system gradually matures over the course of the teenage years, adolescents grow in their capacity to coordinate affect and cognition and to exercise self-regulation, even in emotionally arousing situations. The authors suggest that these capacities are

reflected in gradual growth in the ability to resist peer influence (Albert, Chein & Steinberg, 2013).

One study conducted by Calamidas and Crowell (2018) explored the feasibility of a course activity as an opportunity for students to assess their own health behaviors, which could increase the likelihood of students adopting healthier behaviors. A content analysis of 100 students' Lifestyle Analysis assignments was conducted, and the results were analyzed. Results reveal that unhealthy eating, smoking, and lack of exercise are the most commonly reported negative behaviors and are reinforced by social support networks, stress, busy schedules, and habitual behaviors. Most common healthy behaviors to adopt are exercise and better eating habits and would be supported by help from friends and family, internal motivation, and goal-setting. As per the authors, although past research indicates that setting specific time frames for adoption of healthier behaviors is critical, over half of the students failed to do so. The authors suggest that the use of a guided assignment to identify students' perceptions of negative behaviors, the consequences of the behaviors, and positive alternative behaviors to adopt. They add that results provide valuable insight into the value of guided self-reflection in fostering positive health behavior change (Calamidas & Crowell, 2018).

A study was conducted on brain development in juvenile offenders, in relation to social context and justice policy. Justice policy reform in the past decade has been driven by research evidence indicating that brain development is ongoing through adolescence, and that neurological and psychological immaturity likely contributes in important ways to teenagers' involvement in crime. The study explained that features associated with biological and psychological immaturity alone do not lead teenagers to engage in illegal conduct. Instead the



decision to offend, like much behavior in adolescence, is the product of dynamic interaction between the still-maturing individual and the social context. The authors confirm and illuminate the Supreme Court's conclusion that juvenile offenders differ in important ways from adult counterparts; juveniles deserve less punishment because their offenses are driven by biological and psychological immaturity, and also because, as legal minors, they cannot extricate themselves from social contexts (neighborhoods, schools and families) that contribute to involvement in crime. They also confirm that correctional facilities and programs, which constitute young offenders' social settings, can support healthy development to adulthood in individual offenders, or affect their lives in harmful ways (Scott, Duell & Steinberg, 2018).

US Supreme Court rulings concerning sanctions for juvenile offenders have drawn on the science of brain development and concluded that adolescents are inherently less mature than adults in ways that render them less culpable. This conclusion departs from arguments made in cases involving the mature minor doctrine, in which teenagers have been portrayed as comparable to adults in their capacity to make medical decisions. Adolescents are indeed less mature than adults when making decisions under conditions that are characterized by emotional arousal and peer pressure, but adolescents aged 15 and older are just as mature as adults when emotional arousal is minimized and when they are not under the influence of peers, conditions that typically characterize medical decision-making. According to Steinberg (2013), the mature minor doctrine, as applied to individuals 15 and older, is thus consistent with recent research on adolescent development. First, the inclination of health care and legal practitioners to treat older adolescents differently from younger ones is consistent with research on adolescent brain and behavioral development, which suggests that adolescents 14 and younger are likely to be less

competent than those who are 15 and older. Second, the research indicates that competence of minors to make informed medical decisions depends not only on their intellectual capability but on the circumstances under which these skills are exercised and, in particular, whether the circumstances are those that attenuate or exacerbate the psychosocial characteristics of juveniles that have the potential to impair their decision-making (Silber, 2011). Steinberg (2013) emphasizes that health care practitioners can maximize adolescents' abilities to make informed and knowledgeable decisions by being involved in the decision-making process and creating conditions that protect against impulsive decision-making, decision-making that does not include deliberation about the long- as well as short-term consequences of alternative courses of action, and decision-making that is subject to coercion. Under these conditions, mature minors are likely to be just as capable as adults (Steinberg, 2013).

Although justice system policy and practice cannot, and should not, be dictated solely by studies of adolescent development, the ways in which we respond to juvenile offending should be informed by the lessons of developmental science. Steinberg (2009) reviewed the history, rationale, and workings of the American juvenile justice system. Following this, he summarized findings from studies of brain, cognitive, and psychosocial development in adolescence that have implications for the treatment of juveniles in the justice system. According to Steinberg, the utility of developmental science in this context is illustrated by the application of these research findings to three fundamental issues in contemporary justice policy: the criminal culpability of adolescents, adolescents' competence to stand trial, and the impact of punitive sanctions on adolescents' development and behavior. Collectively, the lessons of developmental science offer

strong support for the maintenance of a separate juvenile justice system in which adolescents are judged, tried, and sanctioned in developmentally appropriate ways (Steinberg, 2009).

In another study, Scott and Steinberg (2008) explored the dramatic changes in the law's conception of young offenders between the end of the nineteenth century and the beginning of the twenty-first. At the dawn of the juvenile court era, they note, most youths were tried and punished as if they were adults. Early juvenile court reformers argued strongly against such a view, believing that the justice system should offer young offenders treatment that would cure them of their antisocial ways. That rehabilitative model of juvenile justice held sway until a sharp upswing in youth violence at the end of the twentieth century led both public opinion and public policy toward a view that youths should be held to the same standard of criminal accountability as adults. Lawmakers seemed to lose sight of developmental differences between adolescents and adults. But Scott and Steinberg note that lawmakers and the public appear now to be rethinking their views once more. To many, a justice system that operates on the principle of "adult time for adult crime" now seems to improperly disregard age and immaturity in calculating criminal punishment. In 2005, the United States Supreme Court abolished the juvenile death penalty as cruel and unusual punishment, emphasizing that the immaturity of adolescents made them less culpable than adult criminals. In addition, state legislatures recently have repealed or moderated some of the punitive laws they recently enacted. Meanwhile, public anger has abated and attitudes toward young offenders have softened somewhat (Scott & Steinberg, 2008).

In response to these changes, Scott and Steinberg argue that it is appropriate to reexamine juvenile justice policy and to devise a new model for the twenty-first century. They proposed

what they call a developmental model. They observe that substantial new scientific evidence about adolescence and criminal activity by adolescents provides the building blocks for a new legal regime superior to today's policy. They put adolescent offenders into an intermediate legal category, being neither children, as they were seen in the early juvenile court era, nor adults, as they often are seen today. The authors observe that such an approach is not only more compatible than the current regime, but also more likely to promote social welfare by reducing the social cost of juvenile crime (Scott & Steinberg, 2008).

The transition from high school to college is a critical period for developing college drinking habits. Hazardous alcohol consumption increases during this period, as well as participation in drinking games, pregaming, and tailgating. All of these risky drinking practices are associated with higher levels of intoxication as well as an increased risk of alcohol-related problems. Another study on alcohol use aimed to evaluate pre-college predictors (personality, social norms, and beliefs reflecting the internalization of the college drinking culture [ICDC]) of estimated peak BAC (pBAC) reached during drinking games, pregaming, and tailgating, as well as pBAC and alcohol-related problems during the first 30 days of college. Participants (n=936) were incoming freshmen at a large university who completed a baseline assessment prior to college matriculation and a follow-up assessment after they had been on campus for 30 days. Using path analysis, ICDC was significantly associated with pBAC reached during the three risky drinking practices. ICDC had an indirect effect on both pBAC and alcohol-related problems via pBAC from drinking games, pregaming, and tailgating. Hopelessness and sensation seeking were significantly related to alcohol use outcomes. The authors conclude that precollege perceptions of the college drinking culture are a stronger predictor of subsequent alcohol use

than social norms. Interventions that target these beliefs may reduce peak intoxication and associated harms experienced during the first 30 days of college (Moser, Pearson, Hustad & Borsari, 2014).

Adolescence is also characterized by increasing incidence of health risk behaviors, including experimentation with drugs and alcohol. To fill the gap in the understanding of the associations between risky decision-making and health risk behaviors, Kim-Spoon and colleagues (2016) investigated associations between laboratory-based risky decision-making using the Stoplight task (a procedure for assessing risk-taking in humans) and self-reported health risk behaviors. Given that there has been no examination of potential age differences in the associations between risky decision-making and health risk behaviors, Kim-Spoon and colleagues also examined whether the association of risky decision-making with health risk behaviors is consistent across adolescence and adulthood using two-group structural equation modeling (SEM). The results indicated significant differences across the two age groups: adolescents (17-20 year olds) who took more risks on the Stoplight task reported greater frequency and earlier onset of substance use, whereas Stoplight performance was not associated with substance use frequency or onset among adults (31-61 year olds). The authors suggest that a laboratory-based measure of risky decision-making is significantly related to health risk behaviors among adolescents, but not among adults.

Another type of risky behavior that adolescents engage in is pregaming. Pregaming (or prepartying) can be defined as drinking before going to an event or gathering. The heavy consumption of alcohol and resulting negative consequences that are associated with pregaming have prompted scholars to investigate this risky drinking practice. Many students

pregame (ie, drink before drinking), but there are scant data evaluating changes following college entry. A study examined pregaming across the fall quarter and identified predictors of change and initiation in college. Freshmen (N = 708; 53% female, 100% drinkers) were recruited during university orientation (baseline). Self-report data were collected at baseline and end of fall quarter for 3 cohorts (the 2008-2010 academic years) and included demographics, alcohol use, problems, pregaming, personality, and expectancies. Pregaming increased from 61.7% (baseline) to 79.9% (follow-up), with students pregaming twice as often and attaining higher blood alcohol concentration at follow-up. Many (54%) baseline non-pregamers initiated by follow-up. Initiation was associated with increased overall drinking (including heavy episodic drinking), positive expectancies, and greater behavioral activation sensitivity. The authors concluded that pregaming rapidly escalates upon college entry and students who initiate in college may be at higher risk for alcohol-related problems. They suggest campus prevention and intervention efforts that should include pregaming in their prevention programming (Haas, Smith & Kagan, 2013).

Another study examined alcohol use and pregaming in the transition from high school to college. Alcohol use and beliefs (i.e., self-reported quantity/frequency, pregaming practices, drinking game participation, alcohol-related problems, and expectancies) were assessed in entering freshmen (N = 1171) with prior alcohol use for the 3 months between high school and starting college. Results revealed that 65% of drinkers pregamed in the past, and most did so on fewer than 50% of their overall drinking occasions, consuming an average of 3 drinks in 27 min and most (87%) drank afterward. Hierarchical regression analyses indicated that pregaming frequency explained an additional 7.0% of variance in problematic alcohol use above-and-

beyond overall drinking and demographic risk factors (e.g., gender, ethnicity, and Greek affiliation:  $R^2 = .43$  for overall model). Separate analyses indicated that demographics did not moderate the relationship between pregaming and problems. Regression analyses predicting pregaming frequency identified seven characteristics associated with this outcome including demographics (gender, ethnicity, Greek affiliation), heavy drinking, drinking game frequency, feeling attractive and woozy. Findings implicate pregaming as a common practice during the transition to college and highlight the need for additional studies examining pregaming changes across the freshman year (Haas, Smith, Kagan & Jacob, 2012).

Neale and colleagues (2018) examined the effect of an intervention implemented in a non-randomized sample of drinking and non-drinking college freshmen. Risk factors, such as family history of alcohol problems, predict future alcohol problems, but less is known about their potential impact on intervention effectiveness. Freshmen college students recruited for the intervention study ( $n = 153$ ) completed a web-adaptation of the Brief Alcohol Screening and Intervention for College Students (BASICS) at the start of spring semester. The researchers compared their 30-days post-intervention alcohol initiation, number of drinking days (DAYS), drinks per occasion (DRINKS), maximum drinks in 24 h (MAX24) and alcohol use disorder symptoms (AUDsx) to 151 comparison participants retrospectively matched on demographics and baseline alcohol use behaviors. Baseline DRINKS, DAYS, AUDsx, MAX24, and parental family history (PFH) of alcohol problems as moderators of the effect of the intervention were tested. At follow-up, intervention participants had lower rates of AUDsx than comparison participants, especially among baseline drinkers. Among participants drinking 3+ days/month at baseline, intervention participants showed fewer DAYS at follow-up than the comparison group

participants. BASICS was also associated with a decreased likelihood of initiation among baseline non-drinkers. PFH significantly interacted with treatment group, with positive PFH intervention participants reporting significantly fewer AUDsx at follow-up compared to positive PFH comparison participants. No evidence was found for an effect of the intervention on DRINKS or MAX24 in the analyses. The results suggest some indication that novel groups, such as non-drinkers, regular drinkers, and PFH positive students may experience benefits from BASICS. Although conclusions were limited by lack of randomization and short follow-up period, PFH positive and low to moderate drinking groups represent viable targets for future randomized studies (Neale, Salvatore, Cooke, Savage, Aliev, Donovan, Hancock & Dick, 2018).

Rulison and colleagues (2016) tested whether perceived parental approval of high-risk drinking is directly linked to alcohol-related outcomes or whether the link between perceived parental approval and these outcomes is mediated by perceived friends' approval of high-risk drinking. In fall 2009, 1,797 incoming first-year college students (49.7% female) from 142 U.S. colleges and universities completed a web-based survey before participating in an online substance use prevention program. The analytic sample included only 18- to 20-year-old freshmen students who had consumed alcohol in the past year. Students answered questions about perceived parental approval and perceived friends' approval of high-risk drinking. They also answered questions about their alcohol use (heavy episodic drinking, risky drinking behaviors), use of self-protective strategies (to prevent drinking and driving and to moderate alcohol use), and negative alcohol-related consequences (health, academic and work, social consequences, and drinking and driving). Mediation analyses controlling for the clustering of students within schools indicated that perceived parental approval was directly associated with



more easily observable outcomes (e.g., academic- and work-related consequences, drinking and driving). Perceived friends' approval significantly mediated the link between perceived parental approval and outcomes that are less easily observed (e.g., alcohol use, health consequences). During the transition to college, parents may influence students' behaviors both directly (through communication) as well as indirectly (by shaping their values and whom students select as friends). Alcohol use prevention programs for students about to start college should address both parental and friend influences on alcohol use.

One particular study was conducted on alcohol use in freshmen. Differences in drinking, consequences, and perceptions were examined between alcohol-using college students by smoking status (current, past, and lifetime nonsmoker). Entering freshmen (N = 558: 45% male, 72% Caucasian, age M = 18) completed a questionnaire assessing smoking, drinking and current health perceptions. Results indicated current smokers drank more frequently, were more likely to drink to intoxication, and had more physiological consequences (e.g., blackouts, coordination problems) than past or lifetime nonsmokers, but past smokers also reported riskier drinking than lifetime nonsmokers. Despite a higher prevalence of alcohol-related health problems in both current and past smokers, no current health differences were found. Results replicate findings that current smokers are at increased risk for problematic drinking and identify past smokers as another risk group (Haas & Smith, 2012).

An additional study examined the prevalence of risky drinking and the association between risky drinking behaviors and risk groups of substance abuse among college freshmen. A total of 376 college freshmen (126 boys and 248 girls) in a Japanese university participated in the study. The subjects were asked to complete self-administered, anonymous questionnaires during

their class. The number of participants who had used drugs was small. The following 2 items for substance abuse were included in the questionnaires: (1) those who had drug using peers who used drugs and (2) those who had been persuaded to use drugs by their peers. On the basis of the responses, the participants were classified into 3 groups: (1) high-risk group (HRG), which accounted for 1.4% of the subjects and comprised those who answered "yes" to both the above-mentioned two items; (2) risk group (RG), which accounted for 7.4% and comprised participants who answered "yes" to one of the two items; and (3) control group (CG), which accounted for 91.2% and comprised those who did not answer "yes" to either of the two items. Bivariate analyses were performed to evaluate the association between risky drinking behaviors and risk groups of substance abuse. The results of our study indicated that 87.0% of the participants reported lifetime alcohol use, and 69.4% reported the consumption of alcohol during the past 30 days. Of the former group, 21.4% had engaged in binge drinking, 8.6% had experienced alcohol-related harassment, 9.5% had experienced alcohol-induced blackouts, and 82.0% had experienced drinking alcohol with peers without adults. There were significant associations between risk groups of substance abuse and risky drinking such as binge drinking ( $p = 0.001$ ), alcohol-induced blackouts ( $p = 0.020$ ), alcohol-related harassment ( $p = 0.012$ ), alcohol consumption during the past 30 days ( $p = 0.047$ ). However, lifetime alcohol use ( $p = 0.264$ ) and experience of drinking alcohol with peers without adults ( $p = 0.103$ ) did not differ significantly. These findings indicated that risky drinking behavior such as binge drinking or alcohol-induced blackouts are associated with substance abuse among college freshmen. As per the researchers, substance abuse prevention programs for college students should address the health effects

of risky drinking behaviors and train students how to avoid submission to peer pressure (Shimane, Wada, Mishima & Fujiwara, 2009).

One research study evaluated the efficacy of a computerized, freshmen-specific personalized normative feedback (PNF) intervention on reducing alcohol consumption among high-risk drinking freshmen. Students (N = 316; 53.8% female) completed measures of perceived drinking norms and drinking behavior. After completing the baseline assessment, students were randomly assigned to receive either freshman-specific PNF that was gender-specific or gender-neutral, and was compared to an assessment control group. Findings demonstrated that students exhibited normative misperceptions for typical freshman drinking behavior and that perceptions of typical same-sex freshman drinking were positively associated with riskier drinking behavior. At follow-up, students randomly assigned to receive PNF reduced perceptions of typical freshman drinking behavior and personal drinking behavior relative to those who did not receive PNF. Findings extend previous evaluations of computer-based PNF and suggest that computer-based PNF for incoming freshmen utilizing freshman-specific norms that are gender-specific may constitute a promising prevention strategy (Lewis, Neighbors, Oster-Aaland, Kirkeby & Larimer, 2007).

A long line of theoretical and empirical evidence implicates negative reinforcement as a process underlying the etiology and maintenance of risky alcohol use behaviors from adolescence through emerging adulthood. However, the bulk of this literature has relied on self-report measures, and there is a notable absence of behavioral modes of assessments of negative reinforcement-based alcohol-related risk-taking. To address this clear gap in the literature, a study presented the reliability and validity of the Maryland Resource for the Behavioral

Utilization of the Reinforcement of Negative Stimuli (MRBURNS), which is a modified version of the positive reinforcement-based Balloon Analogue Risk Task (BART). Participants included a convenience sample of 116 college freshmen regular drinkers (aged 18 to 19) who completed both behavioral tasks; self-report measures of negative reinforcement/avoidance constructs and of positive reinforcement/appetitive constructs to examine convergent validity and discriminant validity, respectively; and self-report measures of alcohol use, problems, and motives to examine criterion validity. The MRBURNS evidenced sound experimental properties and reliability across task trials. In support of convergent validity, risk-taking on the MRBURNS correlated significantly with negative urgency, difficulties in emotion regulation, and depressive and anxiety-related symptoms. In support of discriminant validity, performance on the MRBURNS was unrelated to risk-taking on the BART, sensation seeking, and trait impulsivity. Finally, pertaining to criterion validity, risk-taking on the MRBURNS was related to alcohol-related problems but not heavy episodic alcohol use. Notably, risk-taking on the MRBURNS was associated with negative reinforcement-based but not with positive reinforcement-based drinking motives. The authors suggest the utility of the MRBURNS as a behavioral measure of negative reinforcement-based risk-taking that can provide a useful complement to existing self-report measures to improve our understanding of the relationship between avoidant reinforcement processes and risky alcohol use (Macpherson et al., 2012).

Multiple theories suggest mechanisms by which the use of alcohol and drugs during adolescence could dampen growth in psychosocial maturity. However, scant empirical evidence exists to support this proposition. A study tested whether alcohol and marijuana use predicted suppressed growth in psychosocial maturity among a sample of male serious juvenile

offenders ( $n = 1,170$ ) who were followed from ages 15 to 21 years. Alcohol and marijuana use prospectively predicted lower maturity 6 months later. Moreover, boys with the greatest increases in marijuana use showed the smallest increases in psychosocial maturity. Finally, heterogeneity in the form of age-related alcohol and marijuana trajectories was related to growth in maturity, such that only boys who decreased their alcohol and marijuana use significantly increased in psychosocial maturity. Taken together, these findings suggest that patterns of elevated alcohol and marijuana use in adolescence may suppress age-typical growth in psychosocial maturity from adolescence to young adulthood, but that effects are not necessarily permanent, because decreasing use is associated with increases in maturity (Chassin et al., 2010).

Fisher and colleagues (2007) developed and validated measures of college drinking expectations, psychosocial influences, and values. Freshmen at college entry ( $N = 320$ ) and the end of freshman year ( $N = 420$ ) participated. The College Drinking Influences Survey consists of 3 distinct scales: (1) the College Drinking Expectations Scale assesses expectations for drinking norms and consequences; (2) the Psychosocial Drinking Inventory evaluates social influences, stress, and sensation seeking; and (3) the Drinking Values Scale assesses drinking decisions based on personal choice, social responsibility, and institutional obligation. Factor analysis, inter-item reliability, and correlations with existing instruments demonstrated validity and reliability. Differences between the sexes were in predicted directions, and multiple regression using subscale scores as predictors accounted for significant variance in drinking behaviors across the freshman year. The researchers conclude that data support the usefulness of the scales for identifying student alcohol risk and protective factors (Fisher, Fried & Anushko, 2007).

Although inexperience undoubtedly plays a role in the disproportionately elevated rate of automobile crashes that involve adolescent drivers, lack of experience behind the wheel does not fully account for the age differential. Even when adolescent drivers are compared with older drivers having a similar amount of driving experience, for instance, 17-year-olds who have been driving for a year with 22-year-olds who did not begin driving until they turned 21, crash rates are still higher among the teenagers. Driving is dangerous and is especially so when the driver is a teenager. Why adolescents knowingly take risks has been the subject of a great deal of speculation and, more recently, a fair amount of empirical work. A study by Simons-Morton et al. (2011) proposed as their main conclusion that rates of crashes and near-crashes among teen drivers are substantially higher when adolescents drive alone or with risk-inclined friends than when they drive with adult passengers. This finding is an important contribution to a growing literature indicating that risky behavior during adolescence, while normative, may not be inevitable or unpreventable. In addition, this study also highlights the point concerning conditions under which adolescents' driving is more or less risky. Specifically, one cannot understand adolescent risk-taking behavior without taking into account the context in which it occurs. The study therefore suggests that one may overestimate the adolescent's capacity for safe driving. Although installing the sort of monitoring device used in the present study may be beyond the means and energy of most families, parents should, at the very least, be reminded that their teenagers do not drive as safely when they are alone as they do when their parents are passengers, and to take this into account when deciding whether their teen is ready for the road (Steinberg, 2011).

A randomized controlled study was conducted by Opoku-Acheampong and team (2018) in order to test the effectiveness of a 15-month intervention for reducing sugar-sweetened beverage (SSB) intake among college students and assess fruit and vegetable (F/V) intake and physical activity (PA) habits and their relationship to SSB intake. A total of 156 college students (aged 18–24 years) from a Kansas university, mostly female (72%), white (89%), and freshmen (51%) participated in the study. Two-staged intervention included participants receiving: (1) 3 weekly stage-tailored messages on healthful behaviors for 10 weeks; and (2) 3 monthly stage-tailored messages and 1 monthly e-mail encouraging a visit to the portal page, after the 3-month physical assessment. Main outcome measures were stages of change for PA and F/V intake, self-reported PA scores, self-reported F/V intake, and SSB intake habits. Generalized linear mixed models and linear regression models were used to test changes and associations among outcome measures. No significant decrease occurred in SSB consumption ( $p > 0.05$ ) among intervention participants. Both control and intervention groups recorded low F/V intake and moderate PA scores. The authors conclude that low F/V intake and high SSB intake evident among study participants may pose risk for unwanted weight gain and obesity-related conditions. Furthermore, they recommend that college campuses can continue to support an environment conducive for being physically active, while promoting healthy eating behaviors (Opoku-Acheampong, Kidd, Adhikari, Muturi & Kattelman, 2018).

A cross-sectional study involving college freshmen was conducted by Bruce and colleagues (2017) on racial and gender disparities with sugar sweetened beverages (SSBs) and sugary snacks (SSNs) behavioral modification efficacy among African American and White first year college students ( $n = 499$ ) at a medium-sized southern university. Key outcome variables

were self-efficacy in reducing consumption of SSBs and SSNs, respectively. Primary independent variables were BMI, concerns about weight, and attempts to lose weight, takeout food consumption frequency, and physical activity. Findings demonstrate that half of the sample was African American (50.1%) and a majority of participants were female (59.3%). Fewer African Americans than Whites were very sure they could substitute SSBs with water (48.8% vs 64.7%,  $p < 0.001$ ) or eat fewer SSNs (39.2% vs 48.2%,  $p < 0.04$ ). A smaller segment of males reported being confident in their ability to replace SSBs with water (51.2% vs 60.5%,  $p < 0.04$ ). African Americans (OR = 0.38, CI: 0.22-0.64) and males (OR = 0.49, CI: 0.27-0.88) had lower odds of being more confident in their ability to change their SSB intake. Race and gender differences were not present in models predicting confidence to reduce SSN consumption. These findings highlight the need to consider race and gender in interventions seeking to increase self-efficacy to make lifestyle modifications (Bruce, Beech, Thorpe Jr, Mincey & Griffith, 2017).

A study was conducted on substance abuse in college freshmen. Two hundred and seventy-six sexually active college freshmen were surveyed as part of an adjudication process for having violated university substance abuse guidelines. This study examined the relationship between drinking contexts and risky sex while controlling for problem drinking. Results demonstrated that drinking excessively in intimate situations was significantly associated with greater expectancies of alcohol's sex-enhancing effects and with risky sexual behaviors (RSB). In addition, risky sex expectancies (RSE) and behaviors were higher among males who drank excessively to cope with negative emotions. Implications include early intervention programs like cognitive-behavioral strategies that emphasize moderation and harm reduction (e.g., Marlatt, Baer, Kivlahan et al., 1998). The author suggests that future research needs to



expand to noncollege cohorts that include more young persons of color (O'Hare, 2005). A study examined differences in substance use, depression, and academic functioning among attention deficit hyperactivity disorder (ADHD) and non-ADHD college students. Participants included 1,748 students (ages 18–25; women 68.4%; Caucasian 71.3%) with and without history of ADHD. The researchers assessed the relationship of ADHD to substance use variables, controlling for depressive symptoms and examined relationships with GPA. Results indicated that ADHD students were more likely to have engaged in frequent alcohol use, binge drinking, regular marijuana use and to have used other drugs in the last year. They reported higher depression symptoms than non-ADHD students, although substance abuse risk remained high even when controlling for depressive symptoms. ADHD students had lower overall GPA than those without ADHD. However, this difference was no longer significant when controlling for depression and marijuana use. It was suggested by the authors that college campuses should consider programing aimed at identifying ADHD students at risk for developing substance abuse problems and emotional difficulties (Mochrie, Whited, Cellucci, Freeman, & Corson, 2018).

The transition from high school to college offers adolescents more freedom that may result in increased risky sexual behaviors. An exploratory study by Vail-Smith and colleagues (2010) examined sexual behaviors of freshmen. Half of participants completed a questionnaire during the first week of college and the other half during the last week of their freshmen year. Significant differences in sexual behaviors between the semesters and subgroups of students who may be more likely to engage in high risk behaviors are identified. The results suggest that freshmen need more effective targeted educational programming about the importance of

condom use in preventing sexually transmitted infections (STIs) and pregnancy (Vail-Smith, Maguire, Brinkley & Burke, 2010).

Another study investigated the relation between symptoms and a variety of health-related risk-taking behaviors during adolescence. A survey of 20,745 adolescents from the National Longitudinal Study of Adolescent Health provided data for analysis. Adolescents who reported more depressive symptoms were found to wear seatbelts and bike-helmets less often and more frequently drive while drunk. Depressive symptoms did not correlate with reported condom use. The found relations were all mediated by reported levels of hopelessness. Reported levels of anhedonia and suicidality also mediated some of the found relations. Therefore, adolescents experiencing depressive symptoms, especially those reporting hopelessness, should be considered at jeopardy for a variety of health-related risk-taking behaviors (Testa & Steinberg, 2010).

In another vein, according to Mortier and partners (2017) no previous studies have prospectively investigated the first onset of suicidal thoughts and behaviors (STB) during the college period. Using longitudinal data from the Leuven College Surveys, 2337 (response rate [RR]=66.6%) incoming freshmen provided baseline data on STB, parental psychopathology, childhood-adolescent traumatic experiences, 12-month risk for mental disorders, and 12-month stressful experiences. A total of 1253 baseline respondents provided data on 12-month STB in a two-year annual follow-up survey (conditional RR=53.6%; college dropout adjusted conditional RR=70.2%). One-year incidence of first-onset STB was 4.8-6.4%. Effect sizes of the included risk factors varied considerably whether viewed from individual-level (ORs=1.91-17.58) or population-level perspective (PARPs=3.4-34.3%). Dating violence prior to the age of 17,

physical abuse prior to the age of 17, and 12-month betrayal by someone else than the partner were most strong predictors for first-onset suicidal ideation (ORs=4.23-12.25; PARPs=8.7-27.1%) and plans (ORs=6.57-17.58; PARPs=15.2-34.3%). Multivariate prediction (AUC=0.84-0.91) revealed that 50.7-65.7% of first-onset STB cases were concentrated in the 10% at highest predicted risk. As stated by the authors this is a first investigation of STB onset in college, future studies should use validation samples to test the accuracy of the multivariate prediction model. They infer that the first onset of STB in college appears to be higher than in the general population. Screening at college entrance is a promising strategy to identify those students at highest prospective risk, enabling the cost-efficient clinical assessment of young adults in college (Mortier et al., 2017).

Hence, from the literature stated above, it is evident that decision making and health risk behaviors in late adolescents and college students correlate with each other. To expand our understanding on these variables, their relationship with each other, and whether or not some of these variables may predict certain phenomena, this study was subjected to further testing to determine if they produce the same results in college freshmen.

### **Social Support Systems**

Social support systems considered as an important concept for college students and college freshmen was examined in relation to factors that can influence decision-making related to health-risk behaviors. The literature reveals that some of the factors associated with decision-making related to health-risk behaviors in this age group include association between age and crime, psychosocial maturity and unfavorable changes in social control among young offenders; family structure and physical activity; value of education and family emotional support;

university campus support efforts and mental health of students; life satisfaction and well-being; parental closeness; smaller sibships, birth order, quality of relationships with parents and financial aid support; college adjustment in students with chronic illness; predictors of stress; social media usage; mindfulness training programs and; coping among ethnic minority college students. This segment reviews the evidence linking social support systems to decision-making in late adolescence, college students and in some measure, college freshmen.

Developmental theories point to a multitude of sociological, psychological, and biological changes that occur during adolescence and adulthood. Age is one of the most robust correlates of criminal behavior. Yet, explanations for this relationship are varied and conflicting. One prominent criminological perspective outlined by Gottfredson and Hirschi (1990) claims that age has a direct effect on crime, inextricable from sociological and psychological variables. Despite the attention this claim has received, few direct empirical tests of it have been conducted. The authors used data from Pathways to Desistance, a longitudinal study of over 1,300 serious youthful offenders (85.8 % male, 40.1 % African-American, 34.3 % Hispanic, 21.0 % White), to test this claim. On average, youths were 16.5 years old at the initial interview and were followed for 7 years. Multilevel longitudinal models were used to assess the extent to which the direct effects of age are reduced to statistical and substantive non-significance when constructs from a wide range of developmental and criminological theories were controlled. Unlike previous studies, the authors were able to control for changes across numerous realms emphasized within differing theoretical perspectives including social control (e. g., employment and marriage), procedural justice (e. g., perceptions of the legitimacy and fairness of the legal system), learning (e. g., gang membership and exposure to antisocial peers), strain (e. g.,

victimization and relationship breakup), psychosocial maturity (e. g., impulse control, self-regulation and moral disengagement), and rational choice (e. g., costs and rewards of crime). Assessed separately, these perspectives explain anywhere from 3 % (procedural justice) to 49 % (social learning) of the age-crime relationship. Together, changes in these constructs explain 69 % of the drop in crime from ages 15 to 25. The authors suggest that the relationship between age and crime in adolescence and early adulthood is largely explainable, though not entirely, attributable to multiple co-occurring developmental changes (Sweeten, Piquero & Steinberg, 2013). One area for future work suggested by the researcher of this study will be to detect the direction of past social learning processes used by young offenders in active crime, and the role played by their social support systems in terms of decision-making in relation to criminal behavior. As such, it can be inferred that unfavorable changes in social control and psychosocial maturity in young offenders may result in maladaptive outcomes depending on the social context.

Gordon and colleagues (2017) assessed how family structure is associated with body mass index (BMI), physical activity (PA), fruit and vegetables intake (FV), and perceived social support. They also examined how differences in family structure affect parent and peer support for healthy eating and exercise in incoming college freshmen (N= 143). Independent samples t-tests revealed parent support for healthy eating, and parent and peer support for exercise were significantly lower for students from single or step-parent households compared to two-parent households while BMI was higher for single and step-parent vs. two-parent households ( $p < 0.05$ ). There were no significant differences in FV intake, PA, or peer support for healthy eating between family structures. One-way ANCOVA was conducted to evaluate the relationship

between family structure and parent support for healthy eating and, parent and peer support for exercise controlling for BMI and sex. There was a significant effect of family structure on parent support for exercise ( $p < 0.05$ ), healthy eating ( $p < 0.05$ ), and peer support for exercise ( $p < 0.05$ ). According to the authors, although differences in family structure did not appear to affect health behaviors in incoming college freshmen, further research is needed to determine the long-term impact of the differences seen in social support on weight and health behaviors in college freshmen.

Radmacher and Azmitia (2016) examined whether discrepancies in Asian and Latino heritage, college-going, and emerging adults' perceptions of their own and their parents' value of education were associated with their individuation from family, and whether this relationship was mediated by family emotional support. Larger discrepancies in the value placed on education were associated with less family engagement. This association was mediated by emerging adults' perceptions of family emotional support. Gender and ethnic differences on emerging adults' perceptions of their own and their parents' value of education squared difference, family emotional support, and family engagement were not significant. There were also no ethnic differences for parents' value of education. A significant gender main effect was obtained for emerging adults' perceptions of the value their parents placed on education. Women reported that their parents placed a higher value on education, as opposed to men reporting on the same issue. These findings suggest that family emotional support may play an important role in the individuation process of Asian- and Latino-heritage, college-going, and emerging adults.

School personnel have many opportunities to assist students and families in preparing for a successful transition to college and careers. Initial high school efforts may include prescreening

incoming freshman student files to identify those at-risk and assuring that support services and interventions are implemented quickly. Early supports for students with mental health needs are key to assuring higher graduation rates and building resiliency as they transition to adulthood. Major transitions can be exacerbated by existing mental health problems, which can contribute to difficulty making decisions or accepting new opportunities, particularly if the transition involves leaving home. Schools also can serve students with mental health needs through assistance in identifying and accessing community, employment, and postsecondary education support resources (Joyce-Beaulieu & Graphin, 2015).

Some studies related to social support examined factors such as life satisfaction in college students. Life satisfaction, or the self-perceived well-being, of college students has become an important issue for school administrators (Diener and Larsen, 1993). Correlational studies on variables such as self-esteem, social support, family social economic status, and depression, might be helpful for school administrators in making policies to improve quality of campus life for students. Zhang and colleagues (2014) performed a study on the role of social reference in determining the degree of life satisfaction. Social reference theory postulates that an individual's perception of an external social fact or a self-evaluation is based primarily on the reference that the individual consciously or unconsciously chooses to use (Zhang, 2012; Zhang et al., 2010), and so life satisfaction, as a measure of self-perceived well-being, might also be a function of social reference. They examined a large sample of undergraduate students in China for the correlates of campus life satisfaction. It was found that freshman students tended to score higher on their life satisfaction than students in other grades and that college students' life satisfaction was positively related to female gender, self-esteem, social support, and liberal attitudes on

female gender roles, but negatively correlated with depression and suicidal ideation. Contrary to common beliefs, students from an urban area or from better-off families were not necessarily more satisfied with current life than those students coming from the countryside or low income families. Findings were accounted for by the social reference theory and in this case college students' campus life satisfaction is basically affected by their pre-college life quality as a reference (Zhang, Zhao, Lester & Zhou, 2014). Therefore, these results suggest that social support systems that helped students prior to entering college, serve as a point of reference that may affect students' life satisfaction and perceived well-being during the college years.

Smith and colleagues (2013) discussed changes in decision making during adolescence, focusing on the asynchronous development of the affective, reward-focused processing system and the deliberative, reasoned processing system. Differential maturation in the structure and function of brain systems associated with these systems leaves adolescents particularly vulnerable to socio-emotional influences and risk-taking behaviors. The authors argue that this asynchrony may be partially linked to pubertal influences on development and specifically on the maturation of the affective, reward-focused processing system. A variety of approaches have proven useful in modulating the balance between these processing pathways, including manipulations of the quality of feedback given to participants during task performance (Figner, Mackinlay, Wilkening, & Weber, 2009), of the emotional content of task stimuli (Somerville, Hare, & Casey, 2011) and of the social conditions under which tasks are performed (Gardner & Steinberg, 2005; Chein, Albert, O'Brien, Uckert, & Steinberg, 2011). Overall rates of risk-taking (and subsequent crashes) did not differ between adolescents and adults when the game was played alone (the "cold" setting). However, when tested with a peer audience (the "hot" setting),



adolescents showed a significant increase in risk-taking, whereas adults did not. The relevance of socio-emotional context in adolescents' decisions about risk is a central aspect of "dual systems" models of decision making, which characterize decision making as the byproduct of an interaction between processes that support controlled, reasoned, and deliberative behavior and those that drive reactive, emotional, and reward-sensitive responding (Smith, Chein, & Steinberg, 2013). Hence, these findings highlight the complex nature of the social context and its' significant role in adolescent decision-making.

Parental closeness with their children and communication may differ depending on the gender of each party. Females are more likely to identify better with small groups of intense relationships, such as family and friends (Kapinus & Gorman, 2004). People's attitudes are influenced by persons they are close to, according to empirical research from social psychologists (Kapinus & Gorman, 2004; Sherif, 1935; Asch, 1956). Therefore, parental closeness may have more influence on their daughter's decision to go to college or not and which type to attend (public, private, etc.) than on their son's decision (Settles, 2011). In turn, parents may serve as concrete social support elements when parental closeness is strong, thus affecting their college students' decision-making.

Shields and Hanneke (2008) performed a study on sibling configurations and parental age to investigate the effects of these factors on the academic achievement of children. The study investigated the effects of maternal age at first birth, maternal age when the respondent was born, and father's age when the respondent was born on ACT scores, grade point averages over three years, and whether or not the parents are providing financial aid to their students. They examined the effects of sib ship size, ordinal position, and gender composition of the sib ship on these

same variables. The study also investigated the extent to which the relationship between parental age and academic outcomes is linear. The relationship of sib ship size, ordinal position, and gender composition on the quality of relationships with parents is investigated.

Using a sample of freshmen at a mid-western university, Shields and Hanneke (2008) found consistent positive effects of parental age on high school and early college achievement, as well as consistent negative birth order effects on achievement at the high school level. Students with older parents and fewer older siblings consistently performed better. Sib ship size and the proportion of females in the sib ship had no effect on academic outcomes. Using self-reported data from children on a childhood measure of parental support and interaction and quality of relationships with parents during late adolescence, the impact of parental age at birth, and sibling characteristics on childhood and adolescent family environment were also examined. Ordinal position had a significant positive effect on the quality of relationships with parents during adolescence, and sib ship size had a significant negative effect. A curvilinear effect for paternal age on childhood support and parental involvement was found, but not for academic achievement or quality of relationships with parents in late adolescence. Parental education had a positive significant impact on childhood support and involvement. The authors suggest that children from larger sibships and who were later born children were less likely to receive financial aid from their parents. These results show the effect of parental support on children with smaller sibships and how, as a result of birth order, financial aid served as a source of instrumental social support.

The transition to college presents an important developmental challenge in late adolescence due to increased independence and responsibilities. Since periods of transition are inherently stressful, transition may be more challenging for those with other major life stressors,

including chronic illness (CI). Wodka and Barakat (2007) examined the role of family support and coping in the adjustment of college freshmen and sophomores with chronic illness transitioning into college. The chronic illness group reported more anxiety and a trend towards more depression than the primarily positive life events group. The primarily positive life events group was used as a “healthy” comparison group that has experienced minimal reported stress within the college transition. Coping strategy (active and passive) was positively associated with anxiety in the chronic illness group. Family support was negatively associated with depression and anxiety in the primarily negative life events group, and passive coping was positively associated with depression in positive life events group. The authors suggest the development of adaptive coping strategies to be the focus of programs aimed at supporting students with chronic illness as they transition to college. Therefore, study results demonstrate the positive effects of family support in college students with a history of chronic illness.

Using a longitudinal analysis, Garrett and associates (2017) examined changes in stress during first semester among freshmen undergraduates and attempted to identify predictors of stress (coping strategies, emotional states, and quality of sleep). One hundred ninety-seven freshmen students were recruited for a 10-week study during first quarter (October–December, 2015). Students completed weekly self-report surveys on stress, coping strategies, emotions, and quality of sleep. A generalized linear mixed model was used for analyses. Findings indicate that stress was elevated during examination periods. Women reported a greater stress level than men. Increased stress level was significantly associated with lower sleep quality and greater negative emotions (fear, anger). Exercise was an effective stress coping strategy, while other coping methods (Internet usage, meditation, and self-isolation) were associated with higher stress. Social

media usage did not influence stress level. The authors propose that future stress management programs for freshmen need to consider gender differences and may focus on sleep, exercise, and decreased general Internet usage. Although social media usage may be regarded as a type of social support for some freshmen, in this study, being on social media did not predict stress levels in freshmen students.

A pilot study evaluated the effectiveness and feasibility of mindfulness training aiming to promote first-year college students' health and wellbeing. One hundred and nine freshmen were recruited from residential halls (50% Caucasian, 66% female). Data collection was completed in November 2014. A randomized control trial was conducted utilizing the Learning to BREATHE program, a universal mindfulness program adapted to match the developmental tasks of college transition. Results show that participation in the pilot intervention was associated with significant increase in students' life satisfaction, and significant decrease in depression and anxiety. Marginally significant decrease was found for sleep issues and alcohol consequences. The researchers advocate that mindfulness-based programs may be an effective strategy to enhance a healthy transition into college (Dvořáková, Kishida, Li, Elavsky, Broderick, Agrusti & Greenberg, 2017). As a result, emphasizing the utility of support intervention programs such as mindfulness is essential and may have a positive influence on freshmen students' overall well-being.

In a study using a narrative approach, Phinney & Haas (2003) explored the process of coping among ethnic minority college students. Participants were 30 freshmen, predominantly the first members of their families to attend college, who wrote journals once a week for 3 weeks on their ways of coping with stress. Those who were more successful in coping, compared to

those who were less successful, expressed a greater sense of self-efficacy and did not feel that they lacked needed social support. However, those who were more successful in coping did not differ on demographic variables, including ethnicity, gender, country of birth, and parental education. The authors' narratives provide evidence of the complex and interactive process of coping among ethnic minority college students.

Another study was conducted on Latino students. The importance of family support and encouragement provides Latino students with the financial, emotional, and psychological support they need to deal with academic and other stressful demands of college (McDonough, 2004; Nora, 2003; Hurtado & Carter, 1997; Ceja, 2001). Consistently, researchers have found that perceived family support predicts social adjustment and institutional attachment to college more strongly for Latinos/as and other ethnic minority groups than for whites (Kenny & Stryker, 1996). In addition, social support systems can positively influence the social experiences of ethnic minority students. Hollingsworth and colleagues (2018) conducted a study on racial microaggressions in social work education involving Black students' encounters in a predominantly White institution. This is important since racial microaggressions can affect students' academic, social, and emotional experiences, as well as career preparation of counseling students. The authors examined encounters reported by ten Black Master of Social Work students. It was suggested that non-Black social work students or faculty, through a lack of cultural knowledge and awareness, can contribute to an oppressive experience for Black students. Black students, while struggling with the untoward effects of racially oppressive experiences, are often simultaneously struggling to correct them and improve outcomes in the process. If left unresolved, racial microaggressions contradict the mission and core values of the

profession; that racial microaggressions detract from, rather than support the well-being of Black students. This then allows such an environment to persist ultimately failing to properly educate students for culturally competent social work practice; and finally, that the development of cultural competence is a complex and culturally individual process (Hollingsworth, Patton, Allen, & Johnson, 2018). These studies highlight the importance of having a culturally sensitive, strong support system that may affect decision-making and social experiences in ethnic minority college students.

Although the literature on college freshmen research shows moderate level of evidence on the role of social support systems (like family support and social support) on decision making, some studies support the current study findings more than other studies (Gordon et al., 2017; Smith, Chein, & Steinberg, 2013; Sweeten, Piquero & Steinberg, 2013; Zhang, Zhao, Lester & Zhou, 2014). The researcher was interested in further testing the joint impact of these social systems on college freshmen decision making.

### **Summary**

In brief, this literature review provides evidence that supports the relationship between decision-making and health-risk behaviors, and that social support systems influence decision-making in adolescents and college students in differing ways.

However, what has not been investigated is the association of decision-making and health-risk behaviors in college freshmen alone. Furthermore, in the literature review, the researcher found a lack of a consistent number of studies that examined social support systems as predictors of decision-making in college freshmen. Some studies reported specific risky

behaviors in college students as a whole. Overall, there were insufficient studies that inspected the link between these concepts in college freshmen.

On that account, this study will make a distinctive contribution by analyzing the connections between decision-making, health-risk behaviors and social support systems in college freshmen. Specifically, family support and social support will be scrutinized as contributing factors to this connection. The results of this study have the potential to benefit nursing knowledge and practice by recognizing factors that influence decision-making. This will equip advance practice nurses to focus on these factors for successful behavioral and educational outcomes in college freshmen.

### **Existing Gaps in Knowledge**

Since 2008, although there has been a steady increase in developments in the field of adolescent research, the available literature has some considerable gaps related to adolescent decision-making and risk behaviors. Shulman and colleagues (2016) suggest that more studies considering the socioemotional system as a coordinated network are needed to inform our understanding of how the development of this system relates to age-differences in reward processing. Despite occasional inconsistencies in the literature, self-reported sensation seeking, behavioral measures of reward sensitivity, and neuroimaging studies of reward processing support the contention that reward sensitivity reaches its apex during adolescence (e.g., Barkley-Levenson and Galvan, 2014, Christakou et al., 2011, Collado et al., 2014, Galvan and McGlennen, 2013, MacPherson et al., 2010, Shulman et al., 2014a, Shulman et al., 2014b, Somerville et al., 2011 and Van Leijenhorst et al., 2010b). The bulk of developmental research on the Dual Systems Model provides evidence for a mid-adolescent peak in reward sensitivity,

and although the neuroimaging literature does not allow for a precise estimation of age of peak striatal response, the weight of the evidence indicates that adolescents engage the striatum (and other components of the reward network) to a greater extent than adults, particularly during receipt of reward and when differences in reward sensitivity are reflected in decision-making behavior (Shulman et al., 2016).

Although a large number of studies have examined risky behavior in relation to measures of either sensation seeking or impulse control, very few have examined the concurrent contributions to risk taking of psychological manifestations of socioemotional activation (for example: sensation seeking and impulsivity) and cognitive control. Even fewer have examined this question in a sample spanning childhood, adolescence, and adulthood, which would be necessary to fully test whether variation in the functional status of these two systems explains age-related patterns in risk taking. Another shortcoming of some studies is that it is not yet clear how well self-report measures reflect the functional status of the socioemotional and cognitive control systems (Shulman et al., 2016). One drawback of self-report measures is that study participants may be subject to underreporting which may lead to incorrect study results.

Another obstacle is that when studies do not make comparisons between groups and among age groups, one cannot verify whether or not maturation of cognitive control helps to account for developmental patterns in risk taking. For example, in one study, researchers recruited recently licensed drivers (~age 16) to complete a response inhibition task and, one week later, a driving simulation in the presence of a peer (Cascio et al., 2015). Sixteen year old adolescents could be compared to eighteen or nineteen year old adolescents for a better understanding of patterns of behavior.



Even though recent findings (from 2008) generally support the Dual Systems Model, researchers still await a comprehensive study that confirms (or disconfirms) the purported joint effects of the developmental trajectories of the socioemotional and cognitive control systems on risk-taking behavior (Shulman et al., 2016).

### **Contribution to Knowledge Development**

Albert and Steinberg (2011) suggested four routes of research that are needed to bolster integrative progress and ultimately to inform better interventions and policies charged with supporting adolescents' well-being. First, although research examining the cognitive predictors of adolescent health-risk behavior have made important strides in the last decade, it is time to move beyond a narrow focus on perceptions of risk and vulnerability. Toward a broader view of the concerns that adolescents themselves find salient, further longitudinal research is crucial for disentangling the reciprocal influence of perception and experience. Given the implications for the effectiveness of health-risk messages, the importance of understanding this perception-experience relation cannot be overstated. If, based on the efforts of well-meaning health educators, adolescents develop inflated perceptions of risk which are inherently unstable and subject to radical discounting in response to unpunished experience, then adolescents are disserved by not honestly discussing the realistic costs and benefits of risk behavior. In addition to longitudinal studies better capable of modeling perception-experience interactions, experimental studies are needed that can examine the degree to which adolescents adjust their “instructed” risk perceptions in response to direct or vicarious experience with unpunished risk behavior. Therefore, the disconnect between adolescent’s perception and experience needs to be unfolded.

Second, much of the credit for the field's increasingly integrative focus is due to the theoretical expansion provided by the dual-process model. Recognizing that adolescent judgment and decision making is notably inconsistent with their capacities and reported intentions, theories propose that something else must be at work. Taken together, this something else looks “hot,” reactive, intuitive, experiential, not necessarily conscious, and often based on social stereotypes or prototypes. By opening the door to these domains of thinking and feeling, the field has greatly enhanced its explanatory power. Dual-process explanations are themselves likely to represent heuristics of a sort; multiple separable processes contribute to adolescent judgment and decision making while remaining conceptually useful; dual-process theories must remain flexible enough to avoid false dualities and rather attempt to model this complexity. Several of these theories converge in identifying particularly influential “hot” contributions to decision making. Research on social heuristics and social prototypes highlight the increasing importance of “social meanings” for guiding behavior in adolescence (Sunstein, 2008). Attention should continue to be given to the pathways by which these social meanings influence adolescent judgment and decision making and, in particular, the environmental factors (e.g., media, peers, parents, school) that shape the social meaning of risk behavior. Moreover, evidence that adolescents are slow to develop “gist-based” avoidance of risk, despite exposure to countless risk-avoidant messages, again raises interesting questions regarding the most effective way to present health-promoting information. If adolescents are differentially sensitive to the reward potential of their decisions, as suggested by developmental trends in sensation seeking and reward learning, as well as the influence of perceived benefits in predicting risk behavior, prevention research might gain more traction by working to strengthen adolescents' intuitive appreciation of the benefits of health-

promoting behaviors and challenge their intuitions about the benefits of risk taking (Albert & Steinberg, 2011). As a result, adolescents can learn from the impact from their risk taking behaviors and health promoting behaviors after being put in selected situations.

Third, the field's enthusiasm for the emerging work on the social neuroscience of adolescent judgment and decision making must be tempered by two observations. First, during the past decade research on the neural underpinnings of judgment and decision making in adolescence has far outpaced research on the very behaviors that the neuroscience is intended to inform. Some of the best behavioral research on adolescents' reward seeking and self-regulation conducted in the past ten years comes from functional imaging research on these phenomena. Neuroimaging studies of judgment and decision making need to be complemented by experimental and nonexperimental research on adolescent judgment and decision making in the real world (Albert & Steinberg, 2011). Consequently, our understanding of adolescent risky behavior can be expanded and be informative.

Finally, the social context in which adolescent judgment and decision making is assessed may have a profound influence on the conclusions one draws regarding age differences in decision making. Studies of individuals making decisions on their own likely minimize differences between adolescents and adults. More research that takes the social context of judgment and decision making into account would be informative. It is likely that age differences in judgment and decision making are accentuated under conditions of emotional arousal, just as they are when individuals are socially aroused. The social psychology literature is replete with examples of research on ways in which affective and social factors moderate judgment and decision making, but this work has, by and large, been developmental, involving samples of

college undergraduates. Developmentally informed work in this vein is sorely needed (Albert & Steinberg, 2011). That being the case, deepening our appreciation of the role played by social contexts in which college freshmen live is imperative.

## CHAPTER THREE

### METHODOLOGY

The overall purposes of this study were to 1) investigate the relationships between decision-making and health-risk behaviors among college freshmen, 2) determine whether or not family support and social support jointly predict decision-making among college freshmen and 3) to ascertain whether or not the effect of family support on decision-making is different for male and female college freshmen. The design, setting, sample, instruments, ethical considerations, data collection and analyses, limitations and nursing implications of this study are described.

#### **Design**

The research design chosen for this investigation was a cross-sectional, descriptive, correlational design. The design will answer the “What is happening? How is something happening? Why is something happening?” parts of the scientific enquiry. Descriptive designs help to observe phenomena as they naturally occur without any intervention (Hulley, Cummings, Browner, Grady & Newman, 2013). The correlation phase of the study analyzed the association/relationship between the variables.

In a cross-sectional, descriptive design, the researcher collects data in one moment in time and does not intend to manipulate the independent variables. Additionally, this design also describes the statistical association between two or more variables. Another feature is that it assesses the tendency for variation in one variable to be related to variation in another variable

(Hulley, Cummings, Browner, Grady & Newman, 2013). A correlational design is appropriate when there is enough existing literature on the topics of interest to presume the nature of the relationships between the variables (Wood & Brink, 1998; Prot & Anderson, 2013; Beeson & Field, 2017). Findings from correlational research can be used to determine prevalence and relationships among variables and to forecast events from current data and knowledge (Curtis, Comiskey & Dempsey, 2016).

Previous research has demonstrated the relationship between the variables in this investigation while examining only one or two factors at a time. This study evaluated the relationships between multiple factors that have not previously been investigated.

Decision-making, health risk behaviors, family and social supports are continuous variables. A continuous variable is a variable that has an infinite number of possible values (Horse, 2017). Through the implementation of on-line recruitment techniques for college freshmen who will be participants, it was hoped that the sample will be representative of the population as a whole. This study was performed in the participant's natural environment. The data instruments were questionnaires that were available in an online format for college freshmen in this study. The questionnaires were completed by the participants based upon their current life experiences, measuring the variables as they exist in the real world. Data collection occurred over a five month time period.

Therefore, as explained above, the aims of the proposed study were best addressed by a cross-sectional, descriptive, correlational design.

**Setting**

The population of interest for this investigation were college freshmen students who attend a private religiously affiliated four-year university in the Midwestern United States. Freshmen students were requested to participate in this study via online invitation to questionnaires through Opinio. Opinio is a web-based survey tool which provides a framework for authorizing and distributing surveys. Surveys were delivered by open-access. In Opinio, the link provided under Survey links for Distribution can be used or distributed in any number of ways (email, text message, website, etc) to provide access to the survey (University College London, 2017). For this study, the questionnaires were distributed via emails and Facebook invitation (for the freshmen class of 2020) through Opinio. Emails were sent through the office of the assistant director of admissions and the office of university marketing. The selected social media website contained a link to Opinio that invited participants to the study. Therefore, there was no physical setting for this study.

**Sample**

A convenience sample was utilized for this investigation. Second semester college freshmen students were recruited online, as mentioned above. This is in part, because second semester college freshmen may have had the opportunity to experience situations where they are required to make decisions on their own in relation to health risk behaviors.

There was no quota established to require a specific number of individuals from specific ethnic groups; however, it was hoped that the sample obtained would be representative of the entire population of freshmen students at the university.

**Inclusion Criteria**

The inclusion criteria for participants included: first semester sophomores, full-time, reflective of first year, on/off campus, fluent and literate in English, and between the ages of 18 and 19.

**Exclusion Criteria**

The exclusion criteria for participants in this investigation included students enrolled in graduate or doctoral programs of study, freshmen who have a diagnosis of any chronic medical condition, diagnosis of a psychiatric disorder and/or learning disabilities or inability to complete the questionnaires for other reasons.

**Sample Size**

The literature related to sample size when studying late adolescents vary based on the number of variables and study designs. Some research studies use sample sizes that are already present in survey databases. For these type of studies, sample sizes are usually large in number when compared to cross sectional designs. Accordingly, sample size determinations can be made through different techniques that are available in the literature.

As per the literature, one way of determining sample size in college freshmen is having 10-15 participants per predictor variable in regression analysis. Therefore, based on two predictors (family support and social support) in this study, the estimated number of participants will be between 20 (two predictors x 10) and 30 (two predictors x 15). One other method by the Department of Biostatistics, Vanderbilt University (2011) is using sample size for this type of analysis with the 20:1 rule which states that the ratio of the sample size to the number of parameters in a regression model should be at least 20 to 1. This rule is appropriate for any



regression - dichotomous logistic regression (use the lowest number of events or nonevents as the effective sample size), survival analysis (number of events), or linear regression (using continuous outcome variable). With this method, the calculated number of participants will be 40 (20 x two predictors). Another consideration with sample size is the number needed for the data analysis. If descriptive statistics are to be used, e.g., mean, frequencies, then nearly any sample size will suffice. On the other hand, a good size sample, e.g., 200-500, is needed for multiple regression or analysis of covariance. The sample size should be appropriate for the analysis that is planned (Israel, 1992).

Another way is by using Yamane's (1967) simplified formula to calculate sample sizes. A 95% confidence level and  $p = 0.05$  are assumed. According to Yamane's formula (Israel, 1992), the sample size is calculated by taking into consideration the population size and the level of precision. Hence, with a current population size of 20 million college freshmen (National Center for Education Statistics, 2016) and 5% level of precision, the calculated sample size is approximately 399. Subsequently, in terms of determining sample sizes, a few research studies are mentioned below.

Based on the current studies in the literature, and since this is a cross sectional design, it was determined that to complete the appropriate statistical analysis of data, a sample size of approximately 200 students will be required for this study. This sample size was estimated by using the correlation coefficient method to test the correlation hypothesis for this cross-sectional study. For this calculation, the level of significance, or  $\alpha$ , was set at 0.05. An alpha of 0.05 will allow for a 5% risk for a Type I error (Polit & Beck, 2004). The beta ( $\beta$ ) for this calculation was set at 0.20, which allows for a power of 80%. Since from the existing literature the relationships

between the variables can be predicted in one direction, a one-sided hypothesis model was chosen (Hulley, Cummings, Browner, Grady & Newman, 2007).

The effect size, also an important determinant in calculation of sample size, represents the strength of the relationships between the variables (Polit & Beck, 2013). Previous research has shown that the examination of the relationships between the variables has generated correlations ranging from 0.108 – 0.281. The average of the range of the effect size was calculated to be 0.20. When using the correlation coefficient method for this cross-sectional study, with a chosen  $\alpha$  of 0.05,  $\beta$  of 0.20 and power of 80%, and an effect size of 0.20, an estimated total sample size of 153 freshmen will be required for this study (Hulley et al., 2013, p. 79). An additional 25% will be added to account for any missing data.

G\* power analysis was also used to estimate the sample size in order to test the hypothesis for multiple regression. When using G\*power, the sample size was estimated to be 160 when values of multiple correlation  $R^2 = 0.058$ , effect size  $F^2 = 0.0615711$ ,  $\alpha = 0.05$ ,  $P = 0.80$  and number of predictors = 2 were selected. An additional 25% will be added to account for any missing data. Thus, the minimum total sample size needed for the study will be 200.

**Feasibility of obtaining the sample.** It was hoped that the researcher will be able to obtain the required number of subjects by her recruitment strategy. The data collection tools were available online for the participants' convenience. A \$10 Amazon gift card as incentive was provided to all participants. At the end of the online questionnaires, participants were asked to complete a sign-up process for their incentive. No fees were required to sign up and participants were paid for their time.

### **Recruitment of Study Participants**

The recruitment strategy was through online website invitation via Opinion survey. A brief presentation about the study was available on-line to all freshmen students at a private religiously affiliated university. Students were also invited via the SONA system which is a psychology research participation system at the university. The students were then asked to voluntarily participate in the study. If students choose to participate, they were asked to complete online questionnaires that would take approximately 30 to 45 minutes. An online informed consent letter was not needed for this study.

On completion of the online questionnaires, each participant was rewarded \$10 as compensation. Also, participants were instructed online to contact their university student health center/wellness center to assist in any medical and/or mental health services and were given information on local resources that they may have needed at that time.

### **Conceptual and Operational Definitions of Variables**

The variables examined in this research include are decision-making, health risk-behavior, family support and social support.

#### **Decision-making**

Normative models of judgment and decision-making have historically emphasized five broad stages supporting competent decision making, including: (a) identifying options; (b) assessing the possible consequences of each option; (c) evaluating the desirability of each consequence; (d) estimating the probability of occurrence for each consequence; and (e) applying a decision algorithm to the above information to identify the option with the greatest subjective utility (Beyth-Marom, Austin, Fischhoff, Palmgren, & Jacobs-Quadrel, 1993; Halpern-Felsher &

Cauffman, 2001). Decision-making is also defined as “Process of choosing between different alternatives while in the midst of pursuing a goal” (Cenkseven-Onder, 2012; Miller & Byrnesm 2001). Another definition of decision-making is “The thought process of selecting a logical choice from the available options. When trying to make a good decision, a person must weigh the positives and negatives of each option, and consider all the alternatives. For effective decision-making, a person must be able to forecast the outcome of each option as well, and based on all these items, determine which option is the best for that particular situation” (Business Dictionary, Web Finance Inc, 2018). In this proposed study, decision making will be operationalized using the Flinders Adolescent Decision-Making Questionnaire.

### **Health-risk behavior**

Health-risk behavior can be defined as any activity undertaken by people with a frequency or intensity that increases risk of disease or injury (Steptoe & Wardle, 2004). Health-risk behaviors, which are behaviors that contribute to the leading causes of morbidity and mortality among youth and adults, often are established during childhood and adolescence, extend into adulthood, and are interrelated and preventable (Division of Adolescent and School Health, 2012). This study will focus on health risk behaviors, namely behaviors that contribute to unintentional injuries and violence related deaths; sexual behaviors; alcohol and drug use; tobacco use; unhealthy dietary behaviors and; physical inactivity as operationalized by the adapted NYRBS (National Youth Risk Behavior Survey).

### **Family support**

Family support has taken on a variety of definitions since the term first emerged in the late 1970’s to describe friendly local programs designed to support parents with young children

with “whatever it takes” (S. L. Kagan 1994) (Kagan, Powell, et al. 1987) (Goetz and Peck 1994). Family Support is defined as an integrated network of community-based resources and services that strengthens parenting practices and the healthy development of children (BC Association of Family Resource Programs, 1993). Some versions of family support focus on providing for basic needs such as food or clothing or crisis services. Others may refer to services mandated for families who have been reported for child maltreatment. The definition used in state and federal legislation and in most local programs throughout the nation refers to services and programs that are focused on helping parents in their parenting role. At a minimum, family support programs provide services and opportunities that help parents, services and activities for children, and opportunities for parents and children to interact and play together (Langford, 2009). In this study, family support refers to the perceived support received from immediate family members (parents and siblings) as measured by the Multidimensional Scale of Perceived Social Support Scale (MSPSS).

### **Social support**

Social support refers to the various types of support (i.e., assistance/help) that people receive from others and is generally classified into two (sometimes three) major categories: emotional, instrumental (and sometimes informational) support. Emotional support refers to the actions people perform that make others feel loved and cared for, that bolster a sense of self-worth (e.g., discussing a problem, providing encouragement/positive feedback). Instrumental support refers to the various types of tangible help that others may provide (e.g., help with childcare/housekeeping, provision of transportation or money). Informational support represents a third type of social support which refers to the help that others may offer through the provision

of information (Seeman, 2008). Social support refers to an individual's perception or experience that others love or care for him or her (Taylor, 2011). A variety of sources can provide social support; however, social support typically refers to support provided by lay people including friends and family members (Kamp, 2018). For the purposes of this study, social support relates to support received from friends and peers as measured by the Multidimensional Scale of Perceived Social Support Scale (MSPSS).

### **Measurements**

There were three instruments that were used to collect data. The three instruments are: Adolescent Decision Making Questionnaire; National Youth Risk Behavior Survey and; the Multi-Dimensional Scale of Perceived Social Support Scale. The substruction of the proposed concepts are presented in Figure 2. In addition, a table including all of the study variables and measurements is presented in Appendix F.

#### **Adolescent Decision Making Questionnaire**

Decision making in college freshmen will be measured by the ADMQ (Adolescent Decision Making Questionnaire). The Questionnaire has been widely used to measure adolescent decision-making behaviors throughout the world (Lane, 2010). Adolescent decision-making is a behavioral concept which "tend[s] to be relatively abstract;" however, measurement is effective through observation or self-reporting (Waltz, Strickland & Lenz, 2005, pg 23). Decision-making behaviors and associated concepts are often not directly observed, and therefore self-report measurement provides "the most direct approach to the determination of affect" (Waltz, Strickland & Lenz, 2005, pg 10).

The ADMQ was derived from the Flinders Decision-Making Questionnaires I and II (DMQ) and adapted for adolescents (Brown & Mann, 1990; Mann et al., 1998). The questionnaire is based on Janis and Mann's (1977) conflict theory of decision-making (Commendador, 2006). The ADMQ assesses the concept of decision-making, self-esteem, and also measures four concepts related to coping: a) vigilance, b) complacency, c) panic, and d) cop out (Mann, Harmoni, Power, Beswick, & Ormond, 1988). The self-report instrument uses a 30-item, 4-point Likert scale with ranges for each question from 0 to 3 with highest possible total score accumulating to 90 points for the total scale. It includes 6 self-confidence items and 24 decision-making items. In this summated rating scale, response choices include: a) not at all true for me, b) sometimes true, c) often true, and d) almost always true. There are five subscales each with six items. The scales consist of the following: 1) The decision self-esteem scale measures the respondent's confidence in making decisions (items 1-6). Decision self-esteem considers decisions of any consequence that have the potential for threatening a decision maker's self-image, self-satisfaction or self-confidence specific to one's decision (Chambers & Rew, 2003). 2) The vigilance scale assesses the reported use of considering goals, generating options, gathering facts, evaluating the consequences, reviewing the decision process and implementing the decision and is considered adaptive decision making (items 8,13,16, 20, 23, 27). 3) For the purposes of this study, adaptive decision-making will be known as positive decision-making. Positive decision-making leads to behaviors that cause positive outcomes. The panic scale measures self-reported tendencies to hasty and impulsive choice and is considered maladaptive (items 11, 15, 18, 19, 22, 25). 4) The cop out scale is a combination of three behaviors: (a) defensive avoidance which measures tendencies toward decision avoidance, (b) pass off which

measures of tendencies of leaving decisions to others and, (c) putting off which measures tendencies of delaying decision making. These are all considered maladaptive (items 7, 9, 14, 17, 21, 28). 5) The complacency scale measures tendencies to apathy and non-involvement in decisions. These are considered maladaptive (items 10, 12, 24, 26, 29, 30). Items were scored from 0-3 and summed to give a subscale score. Three subscales were used for data analysis. In the first subscale (6 items), a high score on the self-esteem scale reflects high decisional self-esteem (scoring for 2, 4, & 6 are reversed). The second subscale for the vigilant decision-making scale has 6 items with a high score representing competent decision-making. Third, non-vigilant or maladaptive decision making is created by adding together panic, complacency and cop out items (18 items). Higher scores related to self-esteem indicate high decisional self-esteem, high scores related to vigilance indicate confidence and competent decision-making behaviors; while scores related to complacency, panic, and cop out reflect poor decision-making behaviors and are termed maladaptive coping behaviors (Mann et al., 1988, Commendador, 2006). Maladaptive decision-making will be known as negative decision-making, in this study. Negative decision-making leads to behaviors that cause negative outcomes. Using the subscales, the ADMQ can be used to measure both positive and negative decision-making behaviors, and has a strong theoretical basis to support the measurements of the instrument (Lane, 2010). There are no normal or usual scores reported for this instrument (Commendador, 2006).

The theoretical background, reliability and validity of the instrument, and design of the tool have led to wide use of the ADMQ. In a review of the literature, 11 studies identified psychometric properties of the ADMQ (Brown & Mann, 1990; Mann et al., 1998; Friedman & Mann, 1993; Mann et al., 1988; Commendador, 2007; Tuinstra et al., 2000; Radford, Mann, Ohta



& Nakane, 1993; Brown & Mann, 1991; Bosma & Jackson, 1996; Ormond, Luszcz, Mann & Beswick, 1991; Franken & Muris, 2005). The ADMQ originates from the decision-making course titled GOFER (Goals clarification, Options generation, Fact-finding, consideration of Effects, Review and implementation), which is targeted to high school students, and the conflict theory of decision-making (Lane, 2010).

Information on several aspects of reliability of the ADMQ are available in the literature. Temporal stability, or test-retest reliability is not discussed for the English version of the ADMQ, but has been offered for the Hebrew version at a level of 0.64 (Friedman & Mann, 1993). Though parallel forms measurement for reliability are not mentioned, a second version of the ADMQ has been established (Tuinstra et al., 2000). The alternate version of the ADMQ offers fewer items (from 30 to 22) but does not offer complete congruence with concepts. The original ADMQ measures five concepts, but the alternate version measures only four concepts, with different factor loadings from the original instrument. Regarding internal consistency (Gliner & Morgan, 2000), the Cronbach's alpha reported for various concepts of the ADMQ are as follows: a) decision-making self-esteem (0.76), b) vigilance (0.70), panic (0.70), complacency (0.67) and cop out (0.80), (Mann et al., 1988). Most studies using the ADMQ report Cronbach's alpha values ranging from 0.52 to 0.81 (Friedman & Mann, 1993; Commendador, 2007; Radford et al., 1993; Brown & Mann, 1991; Bosma & Jackson, 1996; Ormond et al, 1991). The number of test items, item interrelatedness and dimensionality affect the value of alpha. There are different reports about the acceptable values of alpha, ranging from 0.70 to 0.95 (Tavakol & Dennick, 2011). For those studies that had a Cronbach's alpha of 0.5, increasing the number of questions and assessing the interrelatedness between items could have resulted in greater Cronbach's alpha

values. Also, another possible cause of a low Cronbach's alpha is that the ADMQ could have been translated in languages other than English.

Reliability has also been established in Mann et al.'s (1988) study of the effectiveness of the GOFER (Goals clarification, Options generation, Fact-finding, consideration of Effects, Review and Implementation) course on decision making with high school students. The reliability coefficients (Cronbach's alpha) were: Decision Self Esteem: 0.76; Vigilance 0.70; Panic 0.70; Cop Out 0.80; and Complacency 0.67 (Mann et al., 1988). Ormond's et al. (1991) study of a metacognitive analysis of decision making in adolescence reported good reliability with the three subscales. The reliabilities coefficients (Cronbach's alpha) were for self-esteem 0.72; Vigilance 0.74 and Maladaptive 0.84. Correlation coefficients between ADMQ scales and course and career scales in Burnett, Mann & Beswick's (1989) study of decision-making and course and career behaviors supported the hypothesis that vigilance correlated positively with decision behaviors such as course planning and career planning. Similarly, decisional self-esteem, like vigilance, correlated positively with the decision behaviors of course planning, career planning and course satisfaction. Two non-vigilant behaviors, defensive avoidance and hypervigilance were negatively correlated with the decision behaviors of course satisfaction, course planning and career planning. Those who used vigilant decision-making searched a wider range of alternatives and evaluated the costs and benefits of each alternative before reaching a final and more competent decision. When students used vigilance to select a course, they were able to consider the future consequences of their decision. Those who scored highly on the maladaptive scales tended to make poor decisions regarding course selection and career

planning. They were less able to generate future career alternatives. These findings support the validity of the ADMQ scales as predictors of course and career planning (Commendador, 2006).

However, research by Tunistra et al. (2000) resulted in a revised instrument with 22 items. By removing eight questions the internal consistency of the ADMQ reported by Tunistra was: .73 vigilance, .70 panic, .66 evasiveness, and .73 complacency. The revised ADMQ has four subscales. The subscales described an adolescent's decision-making style and confidence. From his research, Tuinstra revised the names assigned to three of the four subscales. The first subscale vigilance became "docile," and was calculated using nine questions on the instrument. The second subscale, "panic," was calculated using four questions. "Impulsiveness," which was originally evasiveness, was determined by five questions. "Self-confidence," which was originally complacency, was calculated by four questions. Once the answer for each question was entered, totals for each subscale were computed (Tunistra et al., 2000). However, for the purposes of this study, the researcher will be using the 30-item questionnaire.

According to Lane (2010), the tool appears to be at an acceptable reading level (level not mentioned) and it seems that the terms are appropriate for adolescent language, speech, and grammar. Readability statistics of the ADMQ was verified in Word Document 2016 with Flesch reading ease at the level of 67.3 (60 and above means it is relatively easy to read) and the Flesch-Kincaid grade level of 6.9. This means that the ADMQ is appropriate for sixth graders.

Content validity is also present in the tool. Developed directly from the conflict theory of decision-making by Janis and Mann, the ADMQ accommodates each component of the tool, what actions or thoughts might occur for decision-making, self-esteem and coping styles for decision-making (Janis & Mann, 1977). Criterion related validity for the ADMQ has been

measured and established through concurrent evidence with contraceptive behavior use, gambling, comparison to other decision-making behavior tools, and in comparison, with some demographic variables (Franken & Muris, 2005). Convergent validity of the ADMQ is not discussed in the literature since “When applying construct validity to an instrument, there is a requirement that the construct that the instrument is measuring is guided by an underlying theory” (Gliner & Morgan, 2000, pg 323).

The ADMQ is widely utilized in current research. Commendador (2007) used the ADMQ with measurements of self-esteem and contraceptive behavior among 98 female adolescents in Hawaii, showing a significant negative correlation between maladaptive decision-making behaviors and contraceptive usage. Concepts of the ADMQ were tested for reliability, although maladaptive decision-making concepts were combined into one category. Cronbach’s alpha and means, respectively, were reported by Commendador (2007) as follows: a) decision-making self-esteem (0.70, 12.19), b) vigilance (0.70, 10.29), c) complacency, panic, and cop out (0.827, 14.71). Statistical measures used included Pearson correlations and logistic regression (Lane, 2010).

The ADMQ has also been used to examine relationships among decision-making behaviors, self-reported personality traits related to consequences and rewards through a gambling simulation, impulsivity, and decision-making styles in a sample of 44 college students in psychology courses (Franken & Muris, 2005). Although, Franken and Muris (2005) reported use of the ADMQ, they used a revised 22-item version based on other research by Tuinstra et al., (2000) and offered different descriptions of the concepts including self-confidence, avoidance, impulsiveness, and panic. Reliability and validity were reported for previous studies, but there

was no discussion of reliability and validity findings specific to their study. Though they expanded use of the tool with another population, generalizability based on this study is limited due to the absence of reliability and validity statistics, as well as the vague description of concept deviations from the original work on the tool (Lane, 2010).

Other research utilizing the ADMQ has been examined by Mann and colleagues (1991). For example, relationships between parents' and adolescents' confidence and competence in decision-making behaviors were compared. Data were obtained from a sample of 352 parents of the adolescents by means of a mail survey. Among 584 Australian high school students, younger adolescents' self-esteem was related to parents' decision-making self-esteem. Also, decision-making competence was associated for mothers and younger daughters. Results were determined through measures such as ANOVA, Pearson correlations, and descriptive statistics. Decision-making self-esteem of the ADMQ yielded alphas ranging from 0.60 to 0.78, while the concept of vigilance yielded alphas of 0.71 to 0.77 (Brown & Mann, 1991). Reliability and validity statistics for other concepts included in the ADMQ were not reported (Lane, 2010).

Other researchers examined the relationship between culture and decision-making self-esteem, decisional stress, and self-reported decision coping styles using a modified form of the ADMQ among 950 university students from Australia and Japan. Although the ADMQ was modified, this modification was not discussed. Though a pilot study was mentioned, no details were given concerning it. Data analysis included descriptive statistics and correlations. Cronbach's alpha results were reported by Radford and colleagues (1993) for the total sample (0.77), Australian students separately (0.79), and Japanese students separately (0.73). Cronbach's alphas were also reported for each subscale of the ADMQ for the total sample, Australian

students, and Japanese students, respectively: a) complacency (0.68, 0.67, 0.57) and b) avoidance (0.79, 0.79, 0.77). Results of the study demonstrated that cultural differences are present in decision-making behaviors; Japanese students had higher scores on decisional stress, complacency, avoidance, and hyper-vigilance, also described as panic, while scoring lower on decisional self-esteem (Bosma & Jackson, 1996).

In a similar study, researchers compared decision coping patterns between Israeli and Australian adolescents. In the study, 1028 ninth graders from Israel and 428 Australian students with unidentified grades were randomly selected. The ADMQ was translated into Hebrew and demonstrated a test-retest reliability of 0.64 using 42 students and retesting after 11 days. According to the researchers, "Reliability measured using Cronbach's alpha procedure was 0.78 for the whole scale, and 0.59-0.65 for subscales" (Friedman & Mann, 1993, pg 191). But overall the ADMQ had a Cronbach's alpha of greater than 0.7. The subscales will either need more items or be revised to increase internal consistency. This indicates that there could be a need for additional research into the reliability and construct validity of this questionnaire among Israeli adolescents. Pearson correlations, smallest space analysis (a multivariate technique for analyzing matrix data), and MANOVA (multivariate analysis of variance) were used to analyze data. Significant differences between Israeli and Australian adolescents were noted, with Israeli adolescents scoring higher on self-confidence, vigilance, and lower on cop out (Friedman & Mann, 1993).

Other research has measured and compared meta-cognitive knowledge of decision-making and self-reported decision-making for younger and middle age adolescents. In a sample of 84 students, middle adolescents scored significantly better on decision-making self-esteem

and vigilance than younger adolescents on the ADMQ. Younger adolescents scored higher on maladaptive behaviors associated with poorer decision-making. Males scored significantly higher on decision-making self-esteem than females. Reliability coefficients were reported by Ormond et al., (1991) for decision-making self-esteem (0.81), vigilance (0.52), and maladaptive factors including complacency, panic, and cop out (0.81). Data analyses included ANOVA (analysis of variance), t-test, correlations, and descriptive statistics. In addition to scholarly pursuits, the ADMQ has been used in evaluation of experiential learning curriculum materials (Dimmitt, 2007).

Throughout the research using the ADMQ, two hypotheses have been evident on decision-making: 1) younger adolescents would score higher on maladaptive coping and lower on vigilance and decision-making self-esteem, and 2) vigilance and decision-making self-esteem would be associated with higher levels of decision-making and decision-making behaviors, implying convergent evidence, which has been consistently confirmed (Brown & Mann, 1990; Mann et al., 1998; Friedman & Mann, 1993; Mann et al., 1988; Commendador, 2007; Tuinstra et al., 2000; Radford, Mann, Ohta & Nakane, 1993; Brown & Mann, 1991; Bosma & Jackson, 1996; Ormond, Luszcz, Mann & Beswick, 1991; Franken & Muris, 2005). Discriminant evidence for construct validity is neither discussed, nor are specific factor analyses for the original ADMQ. But these analyses were found in the alternate version (Tuinstra et al., 2000).

Strengths of the ADMQ include its wide usage and strong theoretical design by scholars in decision-making. Validity and congruence are established between the instrument and theoretical model, and enhanced by original concurrent development of both the model and the

instrument. Cronbach's alpha statistics are prevalent among studies using the tool, and are moderate to high in most cases (Lane, 2010).

Weaknesses of the instrument include limited availability of psychometric properties as well as few studies using random sampling when testing the instrument. Likewise, the majority of the research samples took place among countries outside of the United States, decreasing generalizability and creating possible cultural and linguistic concerns. Generalizability is also limited based on the large number of students who completed the ADMQ in nested education settings, with few among populations such as those who might have chosen to drop out of school or take another life course. Other limitations include the actual literature available related to the ADMQ. Several unpublished manuscripts involving the ADMQ were cited in many articles (Lane, 2010). Although there are limitations, the strengths of the instrument support its use in helping delineate adolescent decision-making behaviors and coping styles and offering opportunities to enhance decision-making for this population (Lane, 2010).

### **National Youth Risk Behavior Survey**

Health risk behavior will be operationalized by the National Youth Risk Behavior Survey. According to the survey, youth who are between 12 to 18 years or older can be participants. In 1991, the U.S. Centers of Disease and Control and Prevention (CDC, 2013) developed the National Youth Risk Behavior Survey (NYRBS) to address the need for data on the health risk behaviors that contribute substantially to the leading causes of morbidity and mortality among U.S. youth. The NYRBSS contains a total of 98 items and is a self-administered survey. The sections include: 7 items on demographics, 5 items on safety, 11 items on violence-related behaviors, 2 items on physical fight, 4 items on intercourse and dating, 2



items on bullying, 5 items on sad feelings and attempted suicide, when giving an introduction to the questionnaires there will be information on how to access mental health services , 4 items on cigarette smoking, 3 items on electronic vapor products, 3 items on tobacco, 6 items on alcohol, 3 items on marijuana use, 11 items on drugs, 9 items on sexual behavior, 2 items on body weight, 12 items on eating/drinking habits, 6 items on physical activity, 1 item on concussion and 9 items on other health-related topics. But for the purposes of this study, an adapted version of the NYRBS will be utilized. Only 20 items will be used. The sections include 3 items on dietary behaviors, 2 items on physical activity, 2 items on tobacco use, 5 items on alcohol and drug use, 4 items on sexual behaviors, and 4 items on unintentional injuries and violence related deaths. The survey is available on the CDC website.

The tool was designed to enable public health professionals, educators, policy makers and researchers to describe the prevalence of health risk behaviors among youths, assess trends in health risk behaviors over time, and evaluate and improve health related policies and programs. The CDC has conducted two test-retest reliability coefficients for stability of the tool, one in 1992 and the other in 2000. The 1991 version of the tool was administered to a convenience sample of 1,679 students in grades 7-12. The tool was then administered fourteen days later. Almost three-fourths of the items were rated as having a substantial or higher reliability and showed a kappa statistic of 61% -100%. No statistically significant differences were observed between the prevalence estimates for the first and second times the tool was administered. In the 2000 version of the tool, administered again on two separate occasions two weeks apart, significantly different prevalence estimates were seen with both kappas <61%. This indicated

that the reliability of the items was questionable. The problematic items were revised or deleted from later versions of the tool (Brener et al., 2013).

No study has been conducted to assess the validity of all self-reported behaviors that are included on the NYRBS questionnaire. However, in 2003, the CDC reviewed existing literature to assess cognitive and situational factors that might affect the validity of adolescent self-reporting of behaviors. It was found that, although self-reports of these types of behaviors are affected by both cognitive and situational factors, these factors do not equally threaten the validity of self-reports of each type of behavior. Also, each type of behavior differs in the extent to which its self-report can be validated by an objective measure. In 2000, the CDC conducted a study to assess the validity of two NYRBS items on self-reported height and weight. Self-reported height and weight that were calculated were substantially reliable, but students over-reported their height by 2.7 inches and underreported their weight by 3.5 pounds, indicating that the NYRBS probably underestimates the prevalence of overweight and obesity in adolescent populations (Brener et al., 2013).

A number of studies have used the NYRBS and its adapted version as well. The questionnaire has also been translated into other languages including Persian. The reliability and validity of the psychometric properties of the self-administered Persian version of the 2009 Youth Risk Behavior Surveillance System (YRBSS) questionnaire was examined. In order to evaluate the questionnaire's reliability, the Intraclass Correlation Coefficient (ICC) and Cronbach's  $\alpha$  were calculated for domains and 89 items. The value of Cronbach's  $\alpha$  was 0.73 for intentional and unintentional injuries, 0.77 for tobacco use, 0.86 for alcohol and other drug use, and 0.79 for unsafe sexual behaviors. No domain had a mean ICC of below 0.6. Furthermore,

97.75% of the items had moderate to excellent reliability. Thus, the Persian YRBSS questionnaire had an acceptable reliability (Baheiraei & colleagues, 2012).

Another study conducted by Miller and colleagues (2008), looked at underage drinking. The authors analyzed data on current drinking, binge drinking, and other health risk behaviors from the 2003 National Youth Risk Behavior Survey. Logistic regression was used to examine the associations between different patterns of alcohol consumption and health risk behaviors (Miller, Naimi, Brewer, & Jones, 2008). Another study aimed to estimate the prevalence of e-cigarette use and identify correlates of use among a large, multi-institution, random sample of college students. 4444 students from 8 colleges in North Carolina completed a web-based survey. Using standard items from the Youth Risk Behavior Surveillance System (CDC, 2006) to assess cigarette smoking, age of smoking initiation (used to gauge if students had ever smoked a whole cigarette) and the number of days smoked in the past month were assessed. Responses to age of initiation were: *I have never smoked a whole cigarette*, *age 8 or younger*, *each individual age between 9 and 21*, and *22 or older*. Responses to the number of days smoked were: *0 days*, *1–2 days*, *3–5 days*, *6–9 days*, *10–19 days*, *20–29 days*, and *all 30 days*. Using these two items, four categories were created to represent cigarette smoking behavior: never smoker (never smoked a whole cigarette), former smoker or experimenter (smoked a whole cigarette in lifetime, but not in the past 30 days), current nondaily (smoked on between 1 and 29 of the past 30 days), and current daily smoker (smoked on all of the past 30 days). Students were also asked about lifetime hookah tobacco smoking (yes/no); past month marijuana use (yes/no); past month binge drinking, defined as four or more drinks in a row for females and five or more drinks in a row for males (yes/no); and lifetime illegal drug use, including any form of cocaine, methamphetamines,

hallucinogens, flunitrazepam (Rohypnol), 3–4-methylenedioxymethamphetamine (Ecstasy), or prescription drugs without a prescription (yes/no) (Sutfin, McCoy, Morrell, Hoepfner, & Wolfson, 2013).

Further, a secondary data analysis was conducted with a cross-sectional survey of 9900 students who dated, from a nationally representative sample of US high school students, using the 2013 National Youth Risk Behavior Survey. The Centers for Disease Control and Prevention's NYRBS has provided often-cited estimates of physical teen dating violence (TDV) since 1999. The study described the content of new physical and sexual TDV victimization questions first administered in the 2013 National Youth Risk Behavior Survey, to share data on the prevalence and frequency of TDV, and to assess associations of teen dating experience with health-risk behaviors. The 2013 TDV questions allowed for new prevalence estimates of TDV to be established that represent a more complete measure of TDV and are useful in determining associations with health-risk behaviors among youth exposed to these different forms of TDV (Vagi, Olsen, Basile, & Vivolo-Kantor, 2015).

Another research study examined behavioral patterning in weight behaviors (diet and physical activity), substance use, sexual behavior, stress, and sleep among undergraduate students. Health survey data using the NYRBS were collected among 2026 undergraduates attending a large, public US university. Latent class analysis was used to identify homogeneous, mutually exclusive "classes" (patterns) of ten leading risk behaviors. According to the authors, this is among the first research to examine complex lifestyle patterning among college youth, particularly with emphasis on the role of weight-related behaviors. These findings have

important implications for targeting much needed health promotion strategies among emerging adults and college youth (Laska, Pasch, Lust, Story, & Ehlinger, 2009).

One study described alternative methods used for gathering data on late adolescent health behavior that was conducted through a countywide youth behavior survey outside of the school system. When school districts choose not to participate in adolescent health behavior surveys, tracking adolescent health indicators can be challenging. Two parallel surveys were conducted with youth ages 14–19 residing in a mid-sized county with urban, suburban, and rural neighborhoods. The phone-based sample recruited 1813 participants; the marginalized sample included 262 youth. An anonymous phone-based survey used computer-assisted telephone interviewing with a live interviewer in conjunction with an interactive voice response system to survey youth via random digit dialing of landlines and cell phones. A concurrent in-person anonymous survey was conducted with marginalized youth (from juvenile detention centers, shelters, and residential facilities), using audio computer-assisted self-interviewing technology. The survey measures included the Centers for Disease Control Youth Risk Behavior Surveillance System and additional questions about social supports, neighborhood, and adverse childhood experiences. These techniques can provide a basis to collect data that may help direct resources and policies relevant to needs of local youth (Brooks, et al., 2017).

Furthermore, another study examined the reliability and validity of the psychometric properties of the self-administered Persian version of the 2009 Youth Risk Behavior Surveillance System (YRBSS) questionnaire. One hundred Iranian adolescents aged 15-18 years were recruited through convenience sampling. The face and content validity were used for the questionnaire validity. In order to evaluate the questionnaire's reliability, the Intraclass

Correlation Coefficient (ICC) and Cronbach's alpha were calculated for domains and 89 items. Among 89 items, the ICC values were below 0.4 (weak reliability) for 2 items (2.25%), 0.4-0.6 (moderate reliability) for 10 items (11.24%), 0.6-0.8 (good reliability) for 32 items (35.96%) and 0.8-1 (excellent reliability) for 45 items (50.56%). The value of Cronbach's  $\alpha$  was 0.73 for intentional and unintentional injuries, 0.77 for tobacco use, 0.86 for alcohol and other drug use, and 0.79 for unsafe sexual behaviors. No domain had a mean ICC of below 0.6. Furthermore, 97.75% of the items had moderate to excellent reliability. Thus, the Persian YRBSS questionnaire had an acceptable reliability. Over a two week period, sexual behaviors were reported with less consistency compared to other behaviors. In any case, researchers must be aware of the limitation of the data collected through this questionnaire, particularly in comparison to the domain of sexual behaviors. Overall, 97.75% of the items had moderate to excellent reliability. Thus, the Persian YRBSS questionnaire had an acceptable reliability (Baheiraei, Hamzehgardeshi, Mohammadi, Nedjat, & Mohammadi, 2012).

Another study conducted by Klonsky and colleagues (2013) examined the associations of nonsuicidal self-injury (NSSI) and established suicide risk factors to attempted suicide in four samples: adolescent psychiatric patients ( $n = 139$ ), adolescent high school students ( $n = 426$ ), university undergraduates ( $n = 1,364$ ), and a random-digit dialing sample of United States adults ( $n = 438$ ). The Youth Risk Behavior Survey was utilized to measure suicidal ideation and attempts. The YRBS also included items assessing 12-month ideation and attempts, as well as medical severity of attempts. Results suggest that NSSI is an especially important risk factor for suicide. Findings suggest that NSSI may be a uniquely important risk factor for suicide because its presence is associated with both increased desire and capability for suicide. The authors found

that the YRBS suicide questions have good reliability and validity (Brener et al., 2002; May & Klonsky, 2011).

This study will use an adapted version of the NYRBS to assess health risk behaviors in college freshmen. Self-reports of these types of behaviors are affected by both cognitive and situational factors, these factors do not equally threaten the validity of self-reports of each type of behavior (Brener et al., 2013). Because each item on the NYRBS has been designed to stand alone, it has been deemed appropriate to utilize just the terms of interest (Kann, 2010). This signifies that all items will be included except the items on physical fight, bullying, and concussion, as these are not health-risk behaviors that the researcher is currently interested in.

There are a number of limitations for the NYRBS. The extent of underreporting and over reporting cannot be determined. The tool will not be representative of all persons in the age group because a portion of the sample may not attend school. Since the determinants of health risk behaviors are not included in the NYRBS, this omission is something that schools and communities need to focus on (Brener et al., 2013).

### **Multi-Dimensional Scale of Perceived Social Support**

Family support and social support in college freshmen will be measured by the Multidimensional Scale of Perceived Social Support (MSPSS). This scale is primarily intended for use in adolescents and late adolescents (Canty-Mitchell & Zimet, 2000). The Multidimensional Scale of Perceived Social Support (MSPSS) was developed to address an individual's subjective perceptions of the adequacy of social support (see Appendix G) (Zimet, Dahlem, Zimet, & Farley, 1988). Prior to the development of the MSPSS, the available instruments mainly focused upon the objective measurement of social support. The need for an

instrument to focus upon the subjective assessment of social support was first noted following an investigation of social support in 227 introductory psychology students at the University of Washington (Sarason, Levine, Basham, & Sarason, 1983). The results of this investigation indicated that an individual's perceived number of social supports and reported satisfaction with these supports constituted two different aspects of the concept of social support. The investigators felt these two factors should be evaluated separately in future research studies (Sarason, Levine, Basham, & Sarason, 1983). The MSPSS was the first instrument developed that could measure the individual's perception of satisfaction with their social support, not simply measure the objective measure of the number of social supports available (Zimet, Dahlem, Zimet, & Farley, 1988).

The initial investigation utilizing the MSPSS was completed using 275 students from an introductory psychology course at Duke University. The instruments utilized in this investigation were completed in a group setting as a requirement for the introductory psychology course. The subjects in this investigation included 136 women and 139 men whose ages ranged from 17 years to 22 years of age, with the mean age being 18.6 years. One hundred and eighty-five of these individuals were freshmen, 67 were sophomores, 20 were juniors and 3 were seniors at the time of the investigation. Each of the 275 subjects completed the initial version of the MSPSS, which consisted of 24 items focused upon their perceptions of social support from their families, friends, and significant others. This initial version asked subjects to rate their agreement or disagreement with each statement on a 5-point Likert scale (Zimet, Dahlem, Zimet, & Farley, 1988).



After evaluation of data from this initial investigation, two changes were implemented, resulting in the currently available version of the MSPSS. First, repeated factor analysis of the data from this initial investigation indicated that 12 of the items did not directly address social support. Therefore, these 12 items were removed from the instrument. The current MSPSS consists of a total of 12 items with each of the 3 subscales consisting of 4 items. These 3 subscales include perceived social support from family, perceived social support from friends, and perceived social support from significant others (Zimet, Dahlem, Zimet, & Farley, 1988).

The MSPSS utilizes a 7-point Likert-type scale to allow subjects to express their amount of agreement or disagreement with the statements presented on the questionnaire. Total scores can then be calculated for each of the subscales of the MSPSS as well as the total scale. There is no specific cut-off score for this instrument. However, the data can be interpreted as the higher the score is of an individual on each of the subscales and the total scale, the greater will be their perception of positive social support (Zimet, Dahlem, Zimet, & Farley, 1988). This information can assist researchers to estimate the amount of perceived social support among subjects in their investigations (Brandy, 2011).

The reliability of the scores obtained through use of the MSPSS in the initial investigation was addressed by the individuals who developed the instrument. Cronbach's coefficient alpha, a measure of internal consistency, was calculated for each of the three subscales as well as the overall scale scores. The Cronbach's coefficient alpha coefficients for perceived social support from a significant other subscale was 0.91, perceived social support from family subscale was 0.87, perceived social support from friends was 0.85, and the overall

scale was 0.88. Zimet and colleagues felt this data indicated good internal consistency for the overall scale as well as for the three subscales (Zimet, Dahlem, Zimet, & Farley, 1988).

Approximately two to three months after the initial investigation, 69 of the 275 subjects were asked to complete the MSPSS in an evaluation of test-retest reliability. The data from this second investigation were then evaluated to determine their test-retest reliability. The Cronbach's coefficient alpha coefficients for the perceived social support from a significant other subscale was 0.72, the perceived social support from family subscale was 0.85, the perceived social support from friends was 0.75, and the overall scale was 0.85. The authors felt this data indicated good internal reliability and adequate stability over time for the overall scale as well as the three subscales (Zimet, Dahlem, Zimet, & Farley, 1988).

### **Individual Characteristics**

Demographics on individual characteristics were collected through the Demographics questionnaire (Appendix A). Demographic information was obtained for each participant in the study. This data provided information on different variables and their associations, if any, with each other. Characteristics in the demographic questionnaire include gender, age, height, weight, work status, race, religious affiliation if any, resident status, type of school, number of enrolled credit hours in the semester, financial aid status, health care problems like medical and emotional, prescription medication status, stress, feelings of depression and, number of hours of sleep during the school week. The questionnaire allowed participants to indicate more than one ethnicity. The ethnicities range from a single ethnic background to as many as a combination of seven ethnicities.

### **Environmental Characteristics**

Family support and social support was measured using the Multidimensional Scale of Perceived Social Support (MSPSS), as mentioned earlier. Also, living situations are included under this category, which refers to whom the participant currently resides with. These situations comprise living with family, in university housing, or in an off-campus apartment.

### **Human Subjects' Concerns and Ethical Considerations**

Freshmen were informed that participation would not affect their school grades. Self-report online questionnaires were used as data collection tools. Sensitive issues may arise when answering the questionnaire, so assistance can be given through appropriate guidance. On the bottom of each page of the online survey, there was information on mental health services, during business hours, emergency information and local crisis line resources so participants can contact counselors if they become upset or experience psychosocial stress. The researcher had included a variety of local resources, so the participants can choose to contact the one(s) they think would be most helpful to them. The study assumed that the participants were assured that anonymity of information is maintained. When participants completed the survey, the link with their email and IP address were broken so that no one will be able to connect these with their survey answers. The results were presented in summary form so no individual can be identified. All study participants received financial compensation upon completion of all three questionnaires. At the end of the online questionnaires, participants were asked to complete a sign-up process for their incentive. No fees were required to sign up for respondents' participation. The incentive was a \$10 Amazon gift card as compensation. This amount of compensation was chosen in return for the time and effort required to complete the data

collection online questionnaires. Gift cards were given to eligible participants via email but remained unknown to the researcher.

**Risk/benefit ratio.** Risk/benefit ratio is the comparison of the risk of a situation to its related benefits (Treleven & Schweikhart, 1988). Though it is inevitable that some study participants will experience emotional hardships, the anticipated benefits from this proposed study will outweigh the potential risks. Upon completion of the questionnaires, no participants encountered emotional issues to the extent that they needed to contact their university counseling centers on campus. An unambiguous understanding of the risk-taking process and the support systems that may be predictive of decision making will pave the way for development of appropriate nursing assessment and interventions. Identification of support systems that influence decision-making in college freshmen to engage in risk-taking behavior is necessary for health professionals endeavoring to provide anticipatory guidance and counseling to students and their families. Understanding risk, as it is perceived by high-risk youth, is essential in designing health and related services to meet their needs.

Since a convenience sampling technique was used, gender is not only restricted to males and females, but was extended to freshmen students who may be of gender non-conforming identities. Consequently, these gender identities will also be included in the study. As data collection was collected on-line, and with an adequate sampling size, it was hoped that the sample may be representative of a population of freshmen students who attend a local university in the Midwestern US. The extent of representativeness depends on the sample characteristics of participants in this study.

### **Study Procedures/Protocol, Data Collection and Management**

The researcher assured participants that the collected data would be anonymous. To ensure anonymity, each online questionnaire package was assigned an identification number, and this number was utilized for further data identification. The names of subjects were not gathered and therefore there was no mechanism to connect specific data to individual participants. As mentioned earlier, when participants completed the survey, the link with their email, and IP address was broken so that no one will be able to connect these with their survey answers. The results will be presented in summary form so no individual can be identified. All data was handled by the researcher and all completed online questionnaires was stored and kept locked in a computer at a secure location. The results of the data collection were then reported as aggregate data to protect the anonymity of study subjects. The data collected was destroyed and therefore will not be available for future reference.

The researcher's IT expert entered all data into the latest version of SPSS software for each instrument. The researcher checked all data for errors and rectified any errors found. For analysis of data, a professional statistician was consulted for guidance and she determined whether the collected data met the appropriate assumptions to allow for parametric and multivariate analysis. The assumptions included: parameter following a normal distribution, homogeneity of variance, and an interval level of measurement.

Any missing data in the key variables will be replaced with the overall group mean for the missing item (Brandy, 2011). If any questionnaire missed data, that questionnaire was deleted from further data analysis. So, in this study, only completed questionnaires were used for analyses.

Data analysis was completed in relation to the specific aims and testable hypotheses and model of the study. The validity and reliability of the three instruments were already established (see above section on instruments or Table of Instruments).

### **Data Analysis**

In this study, data was analyzed using Pearson's correlation, Cronbach's alpha coefficients and multiple regression. Details about the specific analysis is explained with each aim below.

**Aim 1:** to explore the relationship between decision-making and health-risk behaviors among college freshmen;

**Hypothesis 1:** There is a significant correlation between decision-making and health-risk behaviors in college freshmen.

Pearson's ( $r$ ) correlation coefficient computation was used to analyze decision-making and health risk behaviors. Correlational analysis refers to the statistical association or relationship between two variables (Moore, 1991). Performed frequently, correlation is a very basic analysis that is a very useful statistic. It forms the basis of a large number of other sophisticated statistics like multiple regression and factor analysis. When attempting to perform a Pearson's correlation, typically the analysis should be performed where one variable is associated with another variable. This could be a positive correlation or a negative correlation. The Pearson correlation is one method of estimating the association between two variables that are scored on an interval or ratio level (how2stats.com, 2011).

To say that two variables are correlated is to say that knowledge of the value of one provides information about the likely value of the other. In correlational analysis, distinctions

are not made between predictor and outcome variables (Diekhoff, 1992; Volicer, 1984).

Therefore, Pearson's correlation coefficient calculation will predict the strength of the relationships between the variables.

The researcher analyzed the range for the scores on each instrument in this study that she will utilize to measure the variables and the impact of the demographic variables on the instrument scores. Details of the three instruments are explained in the section under "Measurements."

**Aim 2:** to determine whether or not family support and social support jointly predict decision-making among college freshmen;

**Hypothesis 2:** Family support and social support will jointly predict decision-making in college freshmen.

**Aim 3:** to ascertain whether or not the effect of family support on decision-making is different for male and female college freshmen;

**Hypothesis 3:** The effect of family support on decision-making will be different for male and female college freshmen.

Regression analysis was used to determine whether certain selected social factors may be predictive of decision-making among college freshmen. Regression analysis is a more sophisticated form of correlation analysis because the outcome variable (decision-making) is specified as well as one or more predictor variables (family support and social support). The standardized regression coefficient  $\beta$  (beta) was used to determine the relative importance of individual predictors in specific analysis (Musil, Jones & Warner, 1998).

Cronbach's alpha coefficients were used to test internal consistency reliability of all instruments. Coefficient alpha computation allows the researcher to find the reliability of the instrument that used Likert scales (Hulley, Cummings, Browner, Grady & Newman, 2007). The following chapter will discuss the analytical tests used in the study and their respective findings.



## CHAPTER FOUR

### RESULTS

This chapter will discuss the analysis and results of the study, providing descriptive statistics on the sample along with the key variables in the study, followed by the results from the analysis of the study aims. Overall purposes of this study were to examine the relationship between decision-making and health-risk behaviors in college freshmen and to determine whether or not support systems (such as family and social) predict decision-making in college freshmen. The first aim of the study was to identify the relationship between decision-making and health-risk behaviors in college freshmen. The second aim of the study was to determine whether or not family support and social support jointly predict decision-making among college freshmen. The third aim of the study was to ascertain whether or not the effect of family support on decision-making is different for male and female college freshmen.

#### **Enrollment**

As explained in detail in chapter three, power analysis was performed and recruitment continued until the required sample size was achieved. G\* power analysis was used to estimate the sample size. When using G\*power, the sample size was estimated to be 160 when values of multiple correlation  $R^2 = 0.058$ , effect size  $F^2 = 0.0615711$ ,  $\alpha = 0.05$ ,  $P = 0.80$  and number of predictors = 2 were selected. An additional 25% was added to account for any missing data. Thus, the minimum total sample size needed for the study was estimated to be 200. Therefore, college sophomores (N= 200) were recruited from a local private, religiously affiliated university

in the Midwestern United States via a web-based online survey software application known as Opinio.

Sophomores were recruited so that their freshman experience could be studied. It was not expected that the sample would closely resemble the racial and ethnic composition of the surrounding community because sophomore students who volunteered to participate in the study may come from local, out-of-state and out of country regions. The majority of college sophomores who participated were females (n=146, 73%). The racial composition of sophomores consisted of 61.5% White, 21% Asian, 9.5% more than one race, 5% Black or African American, 2% Native Hawaiian or Pacific Islander and 1% American Indian or Alaska Native.

### **Data Security**

Data were extracted from completed on-line questionnaires. All questionnaires in Opinio had respondent identification numbers which were de-identified and data were transferred into statistical software (SPSS Statistics Data Editor, Version 24, Chicago, IL). All data were checked manually for errors by the investigator and the IT expert. The Opinio database can only be accessed by a licensed user and the investigator was given a username and password for access. SPSS data was transmitted to the investigator's email by the IT expert and was stored in a password-protected file and a protected backup system. Participants were not asked for consent but the researcher informed them of the nature of the study. Since the data collected were from electronic sources, there were no paper data in the investigator's office.

## **Missing Data**

Mechanisms were put in place in Opinio wherein sophomores were neither allowed to skip a questionnaire nor skip a single item within a questionnaire in order to receive their study incentive. Therefore, only completed data were included for study purposes. Frequencies were calculated prior to data analysis to verify completeness of data.

## **Data Analysis**

Each of the study variables were analyzed for normality, outliers, extreme scores and multicollinearity that may influence study findings. Histograms were used to evaluate normality. Variables that appeared skewed were also analyzed for significant skewness. SPSS reports a statistic called the standard error for skewness (Rose, Spinks & Canhoto, 2015). Based on this statistic, skewness was computed. The computation is explained later in this chapter. Although data normality is not an assumption for Pearson's correlation analysis or for the predictors used in multiple linear regression (Field, 2009), skewness was also calculated.

The next sections provide an analysis of the variables based on Steinberg's Dual Systems model of adolescent risk-taking: decision-making, health risk behavior, characteristics of the individual (demographics), and characteristics of the environment.

### **Characteristics of the Individual**

Since individual characteristics may impact decision making and health risk behaviors, demographics on college sophomores were collected.

## **Description of the Sample**

Two hundred college sophomores actually accessed the questionnaires and completed the study. Non-Loyola students were not allowed to participate in this study. The study sample

can be described as 18 to 19-year-old students who have completed their second semester

freshmen year of college. The socio-demographics of the study sample are summarized in Table

1. The summary of all variables are shown in Table 2.

Table 1. Demographics of Study Sample

Variable	N(Percent)
Gender	
Male	53 (26.5%)
Female	146 (73%)
Gender non-conforming	1 (0.5%)
Age	
18	37 (18.5%)
19	163 (81.5%)
Race	
White	123 (61.5%)
Black or African-American	10 (5%)
Asian	42 (21%)
Native Hawaiian or Pacific Islander	4 (2%)
American Indian or Alaska Native	2 (1%)
More than one race	19 (9.5%)
Hispanic	
Yes	36 (18%)
No	164 (82%)
Religious affiliation	
Yes	132 (66%)
No	68 (34%)
International student status	
No	192 (96%)
Yes	8 (4%)
Work status	
Yes, Part-Time	81 (40.5%)
Yes, Full-Time	11 (5.5%)
Not working	108 (54%)
Residence location	
Residence Hall (non-co-ed)	15 (7.5%)
Residence Hall (co-ed)	108 (54%)
Campus Apartment (with cooking facilities)	17 (8.5)
Off Campus Apartment	30 (15)
Living with parents or other adult relative	29 (14.5)
Other	1 (0.5%)
Financial Aid	
Yes	158 (79%)
No	42 (21%)
Under Care of Health Care Professional For Specific Physical Problem	32 (16%)
Under Care of Health Care Professional Specific Emotional Problem	168 (84%)
Taking Medications	
Yes	71 (35.5%)
No	129 (64.5%)
Felt Sad or Depressed	
None of the time	49 (24.5%)

Several times	106 (53%)
Often	33 (16.5%)
All the time	12 (6%)
<b>Felt Stressed</b>	
None of the time	5 (2.5%)
Several times	66 (33%)
Often	84 (42%)
All the time	45 (22.5%)

Table 2. Summary of the Variables

	# of items	Theoretical Range	Mean Score (SD)	Median (Range)	Normative Data Score
<b>Decision-Making Total score</b>	30	0 – 90	40.56 (8.25)	-	-
<i>Subscales</i>					
<b>Positive Decision-Making Total</b>	12	0-36	22.03 (4.61)	9-33(24)	-
Decisional self-esteem	6	0 – 18	11.50 (3.02)	3-18 (15)	9.5 (±2.76)
Vigilance	6	0 – 18	10.53 (2.55)	4-18 (14)	9.97 (±3.01)
<b>Negative Decision-Making Total</b>	18	0—54	18.52 (9.42)	2-54 (52)	12.78 (±4.97)
Panic	6	0 – 18	7.56 (3.59)	0-18 (18)	4.01
Cop out	6	0 – 18	5.61 (3.49)	0-18 (18)	3.26
Complacency	6	0 – 18	5.35 (3.43)	0-18 (18)	2.96
<b>Health-Risk Behaviors</b>	20	1-100	36.29 (9.18)	21-71(50)	Report on Table 4
<b>Multidimensional Perceived Social Support</b>	12	1 – 84	67.16 (14.18)	14-84 (70)	66.18 (13.78)
Family Support	4	1 – 28	21.66 (5.88)	4-28 (24)	16.17 (7.99), 24.90 (3.10)
Support from Friends	4	1 – 28	22.71 (5.10)	4-28 (24)	19.09 (7.05), 22.08 (5.37)
Support from Significant Others	4	1 – 28	22.78 (5.22)	5-28(23)	19.83 (8.49), 24.53 (3.35)

*Note.* Theoretical Range of scores is possible lowest and highest score.

Normative data score is a score from a reference population that establishes a baseline distribution for a score or measurement, and against which the score or measurement can be compared.

### Decision-making

Decision-making was measured using the Adolescent Decision-Making Questionnaire.

The self-report instrument uses a 30-item, 4-point Likert scale with ranges for each question from 0 to 3 with highest possible total score accumulating to 90 points for the total scale. It

includes 6 self-confidence items and 24 decision-making items. In this summated rating scale, response choices include: a) not at all true for me, b) sometimes true, c) often true, and d) almost always true. There are five subscales each with six items, consisting of the following: 1) The decision self-esteem scale measures the respondent's confidence in making decisions (items 1-6). Decision self-esteem considers decisions of any consequence that have the specific potential to threaten a decision maker's self-image, self-satisfaction or self-confidence (Chambers & Rew, 2003). 2) The vigilance scale assesses the reported use of considering goals, generating options, gathering facts, evaluating the consequences, reviewing the decision process and implementing the decision, and is considered adaptive decision making (items 8,13,16, 20, 23, 27). 3) The panic scale measures self-reported tendencies for hasty and impulsive choice-making and is considered maladaptive (items 11, 15, 18, 19, 22, 25). 4) The cop out scale is a combination of three behaviors: (a) defensive avoidance, which measures tendencies toward decision avoidance, (b) pass off, which measures tendencies of leaving decisions to others and, (c) putting off, which measures tendencies of delaying decision making. These behaviors are all considered maladaptive (items 7, 9,14,17, 21, 28). 5) The complacency scale measures tendencies to apathy and non-involvement in decisions; these are considered maladaptive (items 10, 12, 24, 26, 29, 30). Items were scored from 0-3 and summed to give a subscale score.

Three subscales were used for data analysis. In the first subscale (6 items), a high score on the self-esteem scale reflects high decisional self-esteem (scoring for 2, 4, & 6 are reversed). The second subscale for the vigilant decision-making scale has 6 items, with a high score representing competent decision-making. Third, non-vigilant or maladaptive decision making is created by adding together panic, complacency, and cop out items (18 items). While higher

scores related to self-esteem indicate high decisional self-esteem, high scores related to vigilance indicate confidence and competent decision-making behaviors; additionally, scores related to complacency, panic, and cop out reflect poor decision-making behaviors and are termed maladaptive coping behaviors (Mann et al., 1988, Commendador, 2006). Using the subscales, the ADMQ can be used to measure both positive and negative decision-making behaviors and contains a strong theoretical basis to support the measurements of the instrument (Lane, 2010). There are no normal or usual scores reported for this instrument (Commendador, 2006).

Appendix A lists all instruments that were used for this study.

The overall mean score for decision-making was 40.56, although this score is not meaningful in this study sample. The standard deviation was 8.25. The questionnaire had an alpha coefficient (Cronbach's alpha) of 0.743 indicating good reliability with the study sample. The aggregate alpha coefficient for the positive decision-making subscale was 0.742 indicating good reliability. Whereas alpha coefficients for the subscale decisional self-esteem was 0.760 (good reliability) and vigilance subscale with 0.564 (low reliability) respectively. These values indicate fair to. The aggregate alpha coefficient for the negative decision-making subscale was 0.911 indicating good reliability. A high value of alpha ( $>0.90$ ) may suggest redundancies and show that the test length should be shortened (Tavakol & Dennick, 2011). Nevertheless, in this study the questionnaire was not shortened due to the questionnaire's use being supported in the literature. Alpha coefficients for the panic subscale was 0.790, cop out subscale was 0.802 and complacency subscale with 0.800 respectively. These alpha values reflect a good index of test reliability (Tavakol & Dennick, 2011). The frequencies of all items of the decision-making

questionnaire are shown in Appendix A. Table 3 shows the interpretation of the subscales of the Adolescent Decision- Making Questionnaire.

Table 3. Interpretation of the subscales of the Adolescent Decision- Making Questionnaire

<b>Subscale Interpretation Subscale</b>	<b>High Response Meaning</b>
Decisional self-esteem Items 1-6	High decisional self-esteem: positive decision-making
Vigilance Items 8,13,16, 20, 23, 27	Competent decision making and confidence: positive decision-making
Panic scale: Items 11, 15, 18, 19, 22, 25 Cop out scale: Items 7, 9,14,17,21, 28 Complacency scale: Items 10, 12, 24, 26, 29, 30	Poor decision-making: negative decision-making

In the decisional self-esteem subscale, 52% reported *often true for me* for “I feel confident about my ability to make decisions.” 49.5% reported *sometimes true for me* for “I am not as good as most people in making decisions.” 52.5% reported *often true for me* for “I think that I am a good decision maker.” 48.0% reported *not at all true for me* for “I feel so discouraged that I give up trying to make decisions.” 62.0% reported *often true for me* for “The decisions I make turn out well.” 47.0% reported *sometimes true for me* for “It is easy for other people to convince me that their decision rather than mine is a correct one.” Overall, these findings indicate that majority of freshmen had faith in themselves when making decisions and were self-assured with their decision-making.

Within the vigilance subscale, 48.0% reported *often true for me* for “I take a lot of care before I make my choice.” 50.5% reported *sometimes true for me* for “Once I have made a



decision then I don't change my mind." 45.0% reported *almost always true for me* for "I like to think about a decision before I make it." 45.5% reported *often true for me* for "When I make a decision, I feel that I've made the best one possible." 41.5% reported *often true for me* for "I like to make decisions myself." 48.5% reported *sometimes true for me* for "When I decide to do something, I immediately go about it." Overall, half of the freshmen sample reviewed their decisions prior to implementing it, evaluated the consequences of their decisions and felt ultimately competent in their decision-making.

In the panic subscale, 38.5% reported *sometimes true for me* for "I panic if I have to make decisions quickly." 39.0% reported *sometimes true for me* for "Whenever I get upset by having to make a decision, I choose on the spur of the moment." 48.0% reported *sometimes true for me* for "I feel as if I'm under tremendous pressure when making decisions." 41.5% reported *sometimes true for me* for "I can't think straight if I have to make a decision in a hurry." 50.5% reported *sometimes true for me* for "The possibility that some small thing might go wrong causes me to immediately change my mind about what I'm going to do." 57.5% reported *sometimes true for me* for "I choose on the basis of some small thing." These results suggest that over half of the freshmen sample were afraid to make wrong decisions. Being in a panic situation may cause one to not engage in positive or adaptive decision-making.

Within the cop out subscale, 48.0% reported *sometimes true for me* for "I avoid making decisions." 46.0% reported *sometimes true for me* for "I put off making decisions." 46.5% reported *sometimes true for me* for "I prefer to leave decisions to others." 47.5% reported *sometimes true for me* for "When I have to make a decision, I wait a long time before starting to think about it." 61.0% reported not at all true for me for "I put little effort into making

decisions.” 41.0% reported *sometimes true for me* for “I don’t like to take responsibility for making decisions.” Overall, majority of freshmen, to a lesser extent engaged in tendencies that led to decision avoidance, tendencies of having others making decisions for themselves and tendencies of delaying decision-making.

And, finally with the complacency subscale, 54.0% reported *sometimes true for me* for “When faced with a decision I go along with what others suggest.” 43.5% reported *sometimes true for me* for “I’d rather let someone else make a decision for me so that it won’t be my problem.” 60.5% reported not at all true for me for “When I’m forced to make a decision, I couldn’t care less which way I choose.” 47.0% reported not at all true for me for “I tend to drift into decisions without thinking about them.” 49.0% reported *sometimes true for me* for “When making decisions I tend to choose the first alternative that comes to mind.” 41.0% reported *sometimes true for me* for “I prefer to do what others choose because I don’t like to be different.” In general, most freshmen were involved in decision-making and expressed interest when choosing to make a decision.

### **Health Risk Behavior**

Health risk behavior was operationalized by the National Youth Risk Behavior Survey. The NYRBS contains a total of 98 items and is a self-administered survey. The sections include: 7 items on demographics, 5 items on safety, 11 items on violence-related behaviors, 2 items on physical fight, 4 items on intercourse and dating, 2 items on bullying, 5 items on sad feelings and attempted suicide (when giving an introduction to the questionnaires there will be information on how to access mental health services), 4 items on cigarette smoking, 3 items on electronic vapor products, 3 items on tobacco, 6 items on alcohol, 3 items on marijuana use, 11 items on drugs, 9

items on sexual behavior, 2 items on body weight, 12 items on eating/drinking habits, 6 items on physical activity, 1 item on concussion, and 9 items on other health-related topics. As mentioned earlier, self-reports of these types of behaviors are affected by both cognitive and situational factors and therefore, these factors do not equally threaten the validity of self-reports of each type of behavior (Brener et al., 2013). Because each item on the NYRBS has been designed to stand alone, it has been deemed appropriate to utilize just the terms of interest (Kann, 2010). Hence, for the purposes of this study, an adapted version of the NYRBS was utilized with only 20 items. The sections include 3 items on dietary behaviors, 2 items on physical activity, 2 items on tobacco use, 5 items on alcohol and drug use, 4 items on sexual behaviors, and 4 items on unintentional injuries and violence related deaths. The higher the score, the higher the frequency of the health-risk behavior. The first five items in the survey are reverse coded and the scoring pattern is shown in Appendix A. Table 4 shows the frequency of health risk-behavior.

Table 4. Frequency of Health-Risk Behavior

Behavior	% in Current Study	Normative Data in % (CI) NYRBSS (2017)	Normative Data in % ACHA NCHA (2018)
Did not eat fruit	15%	5.5% (4.4- 6.9)	Together 9%
Did not eat green salad	4.5%	6.6% (5.3- 8.2)	
Drank bottle water/glass of plain water	71.5%	4% (2.9- 5.5)	—
Were not physically active for a total of at least 60 minutes per day	42.5% (0 days)	18.7% (15.2- 22.7)	40.9%
Did not do exercises to strengthen or tone muscles on 3 or more days	19.5% (2 days)	54% (49.2-58.8)	11.7%
Currently smoked cigarettes	8% (1 or 2 days)	13.4% (1.9-3.2)	3.2%
Smoked more than 10 cigarettes per day	0.5%	11.6% (8.1-16.2)	—
Days of 4 or more drinks of alcohol in a row	19.5% (3-4 days)	20.9% (18.1-24.1)	3.3%
Largest number of alcoholic drinks in a row	26.5% (5 drinks or >)	7.3 % (5.7-9.4)	—

Were ever physically forced to have sexual intercourse	3.5% (4-5 times or >)	9.4% (7.7-11.3)	2.7%
Experienced physical dating violence	1% (4-5 times or >)	9.2 % (7.8-10.8)	2%
Ever had sexual intercourse	22% (4 or more people)	18% (15.5-20.8)	---
Were currently sexually active	3.5% (3 or more people)	44.3% (40.6-48.0)	5.4%
Currently used marijuana	8% (20 or > times)	25.7% (22.9-28.7)	3.3%
Ever took steroids without a doctor's prescription	0.5% (20 or > times)	3 % (2.3-3.8)	—
Ever took prescription pain medicine without a doctor's prescription or differently than how a doctor told them to use it	1.5% (20 or > times)	17% (14.3-20.0)	—
Carried a gun	0.5% (6 or more days)	5.5% (4.2-7.2)	
Did not go to school because they felt unsafe at school or on their way to or from school	1% (6 or more days)	5.2 % (4.2-6.4)	12.3%
Were threatened or injured with a weapon on school property	0.5% (6 or more times)	4.6% (3.7-5.8)	—
Attempted suicide	0.5% (6 or more times)	5.8% (4.5-7.6)	1.4%

Note. %: Percentage. CI: Confidence Interval.

ACHA: American College Health Association

NCHA: National College Health Assessment

In the current study, item “*Were not physically active for a total of at least 60 minutes per day*” had the highest percentage of students with 42.5% compared with 18.7% of the youth nationally were not physically active for a total of at least 60 minutes per day in the past three months. Also, 26.5% of freshmen reported five drinks or more in a row in the past three months and was almost fourfold the percentage reported nationally (7.3%). Less than quarter of the sample engaged in binge alcohol drinking. Over half the sample of freshmen adequately consumed plain water in their normal diet. When comparing freshmen’s water drinking behavior (71.5%) in the past three months with the NYRBS frequency (National Youth Risk Behavior Survey (2017), only 4% of the adolescents nationally did not drink bottled water or a glass of plain water.

The mean score of the survey was 36.29 with a standard deviation of 9.18. As mentioned above, the median range of scores for this sample was from 21 to 71. The survey had an alpha coefficient of 0.777 indicating good reliability with the study sample. The mean and standard deviation of all items of the health-risk behavior questionnaire are shown in Appendix A.

Almost 15% of freshmen reported that they did not eat fruit at all during the past three months; 4.5 % reported not eating green salad at all during the past three months; compared to 9% [ACHA NCHA, 2018]. 71.5% reported that they drank plain water or bottled water. 42.5% reported not being physically active at all during the past three months, [40.9% ACHA NCHA, 2018]. Only 19.5% reported that they exercised two days per week to strengthen or tone muscles during the past three months, [11.7% ACHA NCHA, 2018]and 8% reported currently smoking cigarettes on one to two days per week during the past three months[3.2% ACHA NCHA, (2018)]. This report is much higher than the ACHA NCHA data (2018)]. Nearly 19.5 % reported four or more drinks of alcohol in a row for 3-4 days during the past three months, whereas ACHA NCHA (2018) data reported 3.3% used alcohol four or more drinks of alcohol three times in the past three months. Nearly 26.5% reported 5 drinks or greater in a row during the past three months; 3.5% reported being physically forced to have sexual intercourse during the past three months [(2.7%, ACHA NCHA (2018)]; and 1% reported having experienced physical dating violence during the past three months [(2%, ACHA NCHA (2018)].

Almost 22 % reported having had sexual intercourse with four or more people in their life; 3.5 % reported were currently sexually active with three or more people during the past three months (5.4% ACHA NCHA, 2018); 8% reported currently having used marijuana 20 or more times during the past three months, 3.3% used marijuana daily (ACHA NCHA, 2018).

0.5% reported having taken steroids without a doctor's prescription; 1.5% reported taking prescription pain medicine during their life 20 or more times without a doctor's prescription or differently than how a doctor told them to use it; 0.5% reported carrying a gun on six or more days during the past three months; only 1% reported not feeling unsafe at school or on their way to or from school on six or more days during the past three months; this finding is consistent with an ACHA NCHA (2017) finding in which 87.7% reported feeling safe on campus. Only 0.5% reported they were threatened or injured with a weapon on school property six or more times during the past three months and not more than 0.5% reported attempting suicide six or more times during the past three months (1.4% ACHA NCHA, 2018).

In this study, from the mean scores, the highest mean was 4.58 (SD .773) for the number of times freshmen drank a bottle or plain glass of water. This finding has also been supported in the current literature (Levêque & Burns, 2018; Sharma et al., 2017). The lowest mean was 1.12 (SD .536), which indicated the number of times freshmen actually attempted suicide; this means that freshmen attempted suicide rarely. Interestingly, the current study finding on lower numbers of attempted suicide in this group of freshmen is not supported by the present day literature. Overall, the findings from this study indicated that college freshmen mostly engaged in alcohol consumption, which is not an alarming finding.

### **Characteristics of the Environment**

Perceived social support was examined in this study because it is an environmental influence that may affect decision-making when it comes to health risk behaviors in college freshmen. In addition, living situations were included under this category, which refers to the

person(s) with which the participant currently resides. These student living situations encompass living with family, in university housing, or in an off-campus apartment.

### **Multi-Dimensional Scale of Perceived Social Support**

Social support systems in college freshmen was measured by the Multidimensional Scale of Perceived Social Support (MSPSS). This scale is primarily intended for use in adolescents and late adolescents (Canty-Mitchell & Zimet, 2000). The scale consists of a total of 12 items with each of the 3 subscales consisting of 4 items. These 3 subscales include perceived social support from family, perceived social support from friends, and perceived social support from significant others (Zimet, Dahlem, Zimet, & Farley, 1988). The MSPSS utilizes a 7-point Likert-type scale to allow subjects to express their amount of agreement or disagreement with the statements presented on the questionnaire. Total scores were calculated for each of the subscales of the MSPSS as well as for the total scale. There is no specific cut-off score for this instrument. However, the data can be interpreted in the following manner: generally, the higher the score is of an individual on each of the subscales and the total scale, the greater will be their perception of positive social support (Buckle, 2018; Zimet, Dahlem, Zimet, & Farley, 1988). Table 6 below shows the descriptives and reliability estimates of social support.

The mean score of the survey was 67.15 with a standard deviation of 14.18 and median score range from 14 to 84. The scale had an alpha coefficient of 0.944 indicating high reliability with the study sample. The alpha coefficients for family support subscale was 0.911, support from friends subscale was 0.933 and support from significant others was 0.930. There were no major differences between the subscale reliability estimates. Again, these numbers are acceptable

values of alpha indicating a good measure of reliability (Tavakol & Dennick, 2011). See Appendix A for Table on item statistics with sample number, mean and standard deviation.

### **Data Analysis of Study Aims**

Aim 1: To explore the relationship between decision-making and health-risk behaviors among college freshmen.

Hypothesis 1: There is a significant correlation between decision-making and health-risk behaviors in college freshmen.

The primary aim of the study was to examine whether there was a relationship between decision-making and health risk behaviors. Pearson's correlation was performed to assess the correlation between the variables. Table 7 shows the correlation between decision-making, health risk behaviors and multidimensional perceived social support. Correlational analyses revealed statistically significant correlation between negative decision-making and health risk behavior ( $r = .348, p < .01$ ). There were statistically significant relationships between panic and health-risk behavior ( $r = .236, p < .01$ ); cop out and health-risk behavior ( $r = .364, p < .01$ ) and; complacency and health-risk behavior ( $r = .349, p < .01$ ). There was a statistically significant negative correlation between positive decision-making and health risk behavior ( $r = -.228, p < .01$ ), which is a reasonable finding as positive decision-making leads to potentially decreased health risk behaviors.

As expected, there was a statistically significant weak negative correlation between decisional self-esteem and health risk-behavior ( $r = -.262, p < .01$ ) with a low effect size. This means that as freshmens' decisional self-esteem increased their tendency to engage in health risk-behaviors decreased. This particular finding necessitates further analysis in future studies in



light of understanding the elements of decisional self-esteem that may perhaps affect engaging or non-engaging in health-risk behaviors. The discussion of this finding is described in detail in Chapter 5. However, there was a nonsignificant negative relationship between vigilance and health risk-behavior ( $r = -.101, p > .05$ ). This indicates that as freshmen demonstrated more competence in their decision-making, health-risk behaviors decreased.

With further analyses, there was a statistically significant weak positive correlation between positive decision-making and social support ( $r = .249, p < .01$ ). There was a statistically significant weak negative correlation between negative decision-making and social support, which is not an alarming finding ( $r = -.225, p < .01$ ). There were statistically significant negative relationships between panic and social support ( $r = -.193, p < .01$ ); cop out and social support ( $r = -.201, p < .01$ ) and; complacency and social support ( $r = -.218, p < .01$ ). There was a significant weak positive correlation between decisional self-esteem and social support ( $r = .260, p < .01$ ). Also, there was a statistically significant weak positive correlation between vigilance and social support ( $r = .142, p < .05$ ). This finding suggests that as social support increased for freshmen, they were more competent in their decision-making capacity. Correlation between health-risk behavior and multidimensional perceived social support revealed a significant weak, negative relationship which is reasonable ( $r = -.211, p < .01$ ).

Table 5. Correlations to Decision-Making, Health-Risk Behaviors and Multidimensional Perceived Social Support

	HRB	MDPSS	FrS	SgS	FaS
Negative Decision-making Total	.348**	-.225**	-.222**	-.177*	-.193**
Panic	.236**	-.193**	-.212**	-.102	-.189**
Cop Out	.358**	-.194**	-.173*	-.150*	-.183**
Complacency	.343**	-.219**	-.209**	-.226**	-.146*
Positive Decision-making Total	-.228**	.249**	.253**	.156*	.242**
Decisional Self-Esteem	-.262**	.260**	.282**	.184**	.219**

Vigilance	-.101	.142*	.123	.064.	.178*
HRB		-.211**	-.203**	-.159*	.191**

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*Note.* \*\* statistically significant at  $p < .01$ , \* statistically significant at  $p < .05$

*HRB- Health Risk Behavior, MDPSS-Multidimensional Perceived Social Support, FrS- Friends Support, SgS- Support from Significant Others, FaS- Family Support*

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Based on this study, there were more statistically significant relationships between negative decision-making and health risk-behavior and; negative decision-making and social support when comparing these variables (health risk-behavior and social support) with positive decision-making. As multidimensional perceived social support increased, health-risk behaviors decreased and was a statistically significant finding ( $r = -.211, p < .01$ ) in this study. Also, based on the above table, in terms of positive decision-making, students were more confident than competent in their decision-making.

Family support, support from friends and support from significant others were all positively correlated with positive decision-making. The correlation between family support and positive decision-making was weak but statistically significant ( $r = .242, p < .01$ ). Decisional self-esteem was positively correlated with friends support and was statistically significant ( $r = .282, p < .01$ ). There was a statistically significant positive correlation between decisional self-esteem and significant others ( $r = .184, p < .01$ ) and; decisional self-esteem and family support ( $r = .219, p < .01$ ). However, there was a statistically significant but weak correlation between vigilance and family support ( $r = .178, p < .05$ ). This means that family support was an important factor in freshmen's competence when making decisions. Vigilance poorly correlated with friends support ( $r = .123, p > .05$ ) and significant others support ( $r = .064, p > .05$ ) and were not statistically significant.

In the negative decision-making subscale, family support, support from friends and support from significant others were all negatively correlated with negative decision-making.

Panic was negatively correlated with all three perceived support subscales; friends support ( $r = -.212, p < .01$ ), significant others support ( $r = -.102, p > .05$ ) and family support ( $r = -.189, p < .01$ ). Similarly, coping out was negatively correlated with friends support ( $r = -.181, p < .05$ ), significant others support ( $r = -.179, p < .05$ ) and family support ( $r = -.170, p < .05$ ). Additionally, complacency was negatively correlated with friends support ( $r = -.207, p < .01$ ), significant others support ( $r = -.202, p < .01$ ) and family support ( $r = -.165, p < .05$ ). These findings indicate that as friends support, significant others support and family support increase, there is a decrease in panic, coping out and complacency in freshmen.

In summary, these results indicate that freshmen who engaged in negative decision making were associated with increased health risk behaviors that could result in negative health consequences. These findings reveal that negative decision making has an adverse effect on health risk behaviors. Therefore, this suggests that preventing or reducing negative decision-making may result in decreased health risk behaviors and may promote healthy lifestyle behaviors. Hence, social support systems played a significant role in decreasing negative decision-making in college freshmen with friends support having the most powerful impact.

Aim 2. To determine whether or not family support and social support jointly predict decision-making among college freshmen.

Hypothesis 2: Family support and social support will jointly predict decision-making in college freshmen.

Assumptions were met for linearity, independence, and normality. Scatterplots and histograms were examined for assumption testing. Testing was also performed to determine the presence of outliers using calculation of Cook's distance. Cook's distance was less than 1 for all

points, meaning that there are no influential outliers. Cook's distance has the flexibility to look at the impact of influential points on parameters (including their interactions) and predictions (Wright, Thyer, Westra, Renard, & McInerney, 2018). A general rule of thumb is that observations with a Cook's distances (D) of more than 3 times the mean,  $\mu$ , is a possible outlier (Neter, Kutner, Nachtsheim, & Wasserman, 1996; statisticshowto.datasciencecentral.com, 2018). There was linearity as assessed by partial regression plots and a plot of standardized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 1.848, indicating that there were no correlations between the residuals. There was homoscedasticity, as assessed by a visual inspection of a plot of standardized predicted values versus standardized residuals.

Pearson's correlation was initially performed to assess the correlation between the variables. Next, linear regression was performed to determine whether or not family support and social support jointly predict positive decision-making. Family support and social support was measured using a single scale labeled Multidimensional Perceived Social Support Scale. Therefore, linear regression analysis was used that had family support and social support as a single predictor. Regression coefficients and standard errors can be found in Table 8, 9 and 10. Family support and social support explained 5.7% of the variance in positive decision-making,  $F(1, 198) = 13.075$ , 95% CI [.037, .125],  $p < .01$ ). This means that family support and social support, as measured by the Multidimensional Perceived Social Support Scale, accounted for 5.7% of the variance in positive decision-making.  $R^2$  for the overall model was 6.2% with an adjusted  $R^2$  of 5.7%, a small size effect according to Cohen (1988). Hence, family support and social support ( $b = .081$  (SE= .022,  $t = 3.616$ ,  $p < .05$ )) was a significant predictor of positive

decision-making. This means that with every one unit increase in family support and social support, there was .081 unit increase in positive decision-making and was statistically significant.

In addition to multidimensional perceived social support (family support, support from friends and support from significant others), other covariates that were participant characteristics were also used in the linear regression (unadjusted model) to find any significant predictors of positive decision-making. These include female gender, Caucasian race, feeling sad and feeling stressed. *Feeling sad* predicted positive decision-making in the unadjusted model ( $b=-2.339$ ,  $[-3.850, -.828]$ ,  $p < .05$ ). However, after controlling for all participant characteristics (adjusted model), multidimensional perceived social support ( $b=.083$ ,  $[.038, .127]$ ,  $p < .05$ ), female gender ( $b=-1.433$ ,  $[-2.865, .000]$ ,  $p=.05$ ) and *feeling sad* ( $b=-1.912$ ,  $[-3.365, -.359]$ ,  $p < .05$ ) were strong predictors of positive decision-making and were statistically significant. Table 8 shows the unadjusted and adjusted model with MDPSS and participant characteristics for positive decision-making.

The linear regression with family support and social support as a single predictor was also used as a predictor with negative decision-making as the outcome. Results indicated that there was a statistically significant predictive relationship between family support and social support as a single predictor with negative decision-making. Family support and social support explained 5.1% of the variance in negative decision-making [ $F(1, 198) = 10.588$ ,  $p < .01$ ].  $R^2$  for the overall model was 5.1% with an adjusted  $R^2$  of 4.6%, a small size effect according to Cohen (1988). Hence, family support and social support ( $b = -.150$  (SE= .046,  $t = -3.254$ ,  $p < .01$ ) was a significant predictor of negative decision-making. With every one unit increase in

family support and social support, there was .150 unit decrease in negative decision-making and was statistically significant ( $b = -.150, [-.240, -.059], p < .05$ ). *Feeling sad* was also a significant predictor (unadjusted model) of negative decision-making and was statistically significant ( $b = 6.233, [3.204, 9.262], p < .05$ ).

After controlling for participant characteristics, multidimensional perceived social support ( $b = -.133, [-.223, -.042], p < .05$ ) and *feeling sad* ( $b = 5.863, [2.700, 9.025], p < .05$ ) strongly predicted negative decision-making with statistical significance. Table 9 shows the unadjusted and adjusted model with MDPSS and participant characteristics for negative decision-making.

Although a significant predictor of both positive decision-making and negative decision-making in this study, some extent of the variability in positive decision-making and negative decision-making was unexplained by family support and social support. This further implies that, there are other factors that may influence both positive and negative decision-making. But, given the results of the current model, as family support and social support increases, there will be an increase in positive decision-making and when family support and social support decreases, there will be an increase in negative decision-making.

Table 6. Linear regression with Positive Decision-Making as the outcome

Variable	B	SE <sub>B</sub>	$\beta$	<i>t</i>	<i>P</i>
Intercept	16.594	1.538		10.791	.000
MDPSS	.081	.022	.249	3.616	.000*

Note. MDPSS= Multidimensional Perceived Social Support ;  $R^2 = .062$ ; adjusted  $R^2 = .057$ ;  $F(1, 198) = 13.075, p < .05$   
 B = unstandardized regression coefficient; SE<sub>B</sub> = Standard error of the coefficient;  $\beta$  = standardized coefficient

Table 7. Linear regression with Negative Decision-making as the outcome

Variable	B	SE <sub>B</sub>	$\beta$	<i>t</i>	<i>P</i>
Intercept	28.569	3.154		9.057	.000
MDPSS	-.150	.046	-.225	-3.254	.001*

Note. MDPSS=Multidimensional Perceived Social Support ;  $R^2 = .051$ ; adjusted  $R^2 = .046$ ;  $F(1, 198) = 10.588, p < .01$   
 B = unstandardized regression coefficient; SE<sub>B</sub> = Standard error of the coefficient;  $\beta$ = standardized coefficient. \*  $p < .05$

Table 8: Linear regression analyses of Multidimensional Perceived Social Support and participant characteristics associated with positive decision making

	Unadjusted		Adjusted	
	$\hat{\beta}$ (95% CI)	p-value	$\hat{\beta}$ (95% CI)	p-value
MPSS score	.081 (.037, .125)	.000	.083 (.038, .127)	.000
Gender -Female	-1.063(-2.522, .395)	.152	-1.433 (-2.865, .000)	.050
Race- Caucasian	-.091 (-1.417,1.236)	.893	-.081 (-1.366, 1.204)	.901
Feeling sad	-2.339 (-3.850, -.828)	.003	-1.912 (-3.365, -.359)	.016
Feeling stressed	-.732 (-2.077, .613)	.285	-.227 (-1.594, 1.139)	.743

Note. MPSS-Multidimensional Perceived Social Support [(Family support, social support(significant others, friends support)]; CI-confidence interval

Table 9: Linear regression analyses of Multidimensional Perceived Social Support and participant characteristics associated with negative decision making

	Unadjusted		Adjusted	
	$\hat{\beta}$ (95% CI)	p-value	$\hat{\beta}$ (95% CI)	p-value
MPSS score	-.150 (-.240,-.059)	.001	-.133(-.223, -.042)	.004
Gender- Female	-.292 (-3.283, 2.699)	.847	.343 (-2.575, 3.260)	.817
Race- Caucasian	1.192 (-1.508,3.892)	.385	1.017 (-1.599, 3.634)	.444
Feeling sad	6.233 (3.204, 9.262)	.000	5.863 (2.700, 9.025)	.000
Feeling stressed	.421 (-2.329, 3.171)	.763	-.721 (-3.504, 2.061)	.610

Note. MPSS-Multidimensional Perceived Social Support; CI-confidence interval

In a nutshell, family support and social support from friends and significant others were factors that impacted both positive and negative decision-making in freshmen. Consequently, when these support systems are present, positive decision-making is carried out, leading to positive risk-taking behaviors resulting in fewer negative health outcomes. Likewise, with

support systems in place, fewer situations take place with negative decision-making leading in a decrease in negative health consequences for freshmen.

Aim 3: To ascertain whether or not the effect of family support on decision-making is different for male and female college freshmen;

Hypothesis 3: The effect of family support on decision-making will be different for male and female college freshmen.

In male freshmen, family support correlated positively with positive decision-making ( $r = .338, p < .05$ ). In female freshmen, family support also correlated positively with positive decision-making ( $r = .228, p < .05$ ). In addition, there was no significant correlation between family support and negative decision-making in male freshmen. Whereas in female freshmen, family support was negatively correlated with negative decision-making ( $r = -.277, p < .05$ ).

Multiple regression was performed to determine whether the effect of family support on positive decision-making was different for male and female college freshmen. Likewise, multiple regression was performed to determine whether the effect of family support on negative decision-making was different for male and female college freshmen. Regression coefficients can be found in Table 10 and 11. Assumptions were met for linearity, independence, and normality. Scatterplots and histograms were examined for assumption testing. Testing was also performed to determine the presence of outliers using calculation of Cook's distance. Cook's distance was less than 1 for all points, meaning that there are no influential outliers. There was linearity as assessed by partial regression plots and a plot of standardized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 1.881, indicating that there were no correlations between the residuals. There was



homoscedasticity, as assessed by a visual inspection of a plot of unstandardized predicted values versus studentized residuals. There was no evidence of multicollinearity, as determined by tolerance values greater than 0.1 and Variance Inflation Factor values around 1.

The effect of family support on positive decision-making were both statistically significant in males ( $b = .297, [.066, .527], p < .05$ ) and females ( $b = .130, [.009, .251], p < .05$ ). This means that family support had a positive effect on positive decision-making in male and female freshmen. In addition, *feeling sad* was also a significant predictor of positive decision-making in female freshmen. This means that as sadness increased in females, there was a significant decrease in positive decision-making ( $b = -3.006, [-4.806, -1.207], p < .01$ ). Other participant characteristics did not predict positive decision-making in males.

Whereas, the effect of family support on negative decision-making was significantly different in females. With every one unit increase in family support in females, there was .333 unit decrease in negative decision-making. *Feeling sad* was also a significant predictor of negative decision-making among the participant characteristics in females ( $b = 6.932, [3.410, 10.454], p < .01$ ). As sadness increased in females, there was a significant increase in negative decision-making. There were no significant predictors of negative decision-making among the participant characteristics in male freshmen.

Table 10. Multivariable linear regression analyses of family support and participant characteristics associated with positive decision making stratified by gender

	Males		Females	
	$\hat{\beta}$ (95% CI)	p-value	$\hat{\beta}$ (95% CI)	p-value
Family Support	.297 (.066, .527)	.013	.130 (.009, .251)	.035
Race- Caucasian	-.143 (-2.623, 2.337)	.908	.126 (-1.380, 1.632)	.869
Feeling sad	1.197 (-1.953, 4.347)	.449	-3.006 (-4.806, -1.207)	.001
Feeling stressed	.713 (-1.857, 3.284)	.579	-.472 (-2.090, 1.146)	.565

Note. CI-confidence interval

Table 11. Multivariable linear regression analyses of family support and participant characteristics associated with negative decision making stratified by gender

	Males		Females	
	$\hat{\beta}$ (95% CI)	p-value	$\hat{\beta}$ (95% CI)	p-value
Family Support	.107 (-.424, .639)	.687	-.333 (-.569, -.096)	.006
Race-Caucasian	1.455 (-4.256, 7.165)	.611	.710 (-2.238, 3.658)	.635
Feeling sad	2.517 (-4.735, 9.769)	.489	6.932 (3.410, 10.454)	.000
Feeling stressed	-2.812 (-8.731, 3.107)	.344	-.140 (-3.306, 3.027)	.931

Note. CI-confidence interval

In previous studies, decision-making and health-risk behavior were found to be associated in adolescents and late adolescents. According to Steinberg (2008), the neurobiological model was used to explain why adolescents are particularly at increased risk of making poor decisions to engage in risk behavior. In addition, Wolff (2012) explained risk behavior is thought to occur in early to mid-adolescence because the socio-emotional system is highly developed and potent, whereas the cognitive control system is not yet sufficiently developed to control impulses of the socio-emotional system. Studies have found that the top three leading causes of death for adolescents and young adults ages 15–24 are due to behaviors – unintentional injury (such as falls or car accidents), suicide, and homicide (Centers for Disease Control, 2015). Also, as Harden et al. (2017) put it, the dual systems model of decision-making has constituted an enormously influential theoretical account of why, in general, adolescence is a time of heightened risk-taking. Therefore, this study replicates the same findings in the literature about adolescent behavioral health.

Some studies have found that social support systems such as family support and support from friends, peers and significant others play a major role in adolescent decision-making. Social support is a widely studied construct due to its associations with physical and emotional well-being outcomes (Reblin & Uchino, 2008). Research findings often show a robust relationship in

which social and emotional support from others can be protective for health (Reblin & Uchino, 2008; Franco & Durdello, 2018; Rankin, Paisley, Mulla, & Tomeny, 2018).

In conclusion, the present study concluded that family support and social support had a predictive effect on both positive decision-making and negative decision-making in college freshmen. The next generation of studies must further unfold this relationship and attempt to determine the specificity of such links to decision-making. Although family support in itself predicted positive decision-making in male and female college freshmen in this study, further studies should be conducted on positive decision-making and negative decision-making with a larger sample of college freshmen in order to advance the present understanding of this association. Overall, these findings support the importance of social support systems that impact the decision-making process in college freshmen. Though the current research is in its infancy, further studies will be crucial in order to better tailor support interventions with the capability to impact both student health and educational outcomes.

## CHAPTER FIVE

### DISCUSSION

#### **Overview**

This chapter provides a discussion of the study findings, implications for nursing, and recommendations for future research. Due to its imperative focus on improving health outcomes and educational outcomes for college freshmen, this study allowed crucial collection of additional information on decision-making, health risk behavior and social support systems in this demographic group. Epidemiological data indicate that risk behaviors are among the leading causes of adolescent morbidity and mortality worldwide (Duell et al., 2018). Overall, there is an underrepresentation of college freshmen in studies that examined decision-making, health risk behavior and social support systems, particularly those studies that inspected whether the association between these variables are different in late adolescents and college aged populations.

Research efforts to account for elevated risk behavior among adolescents have arrived at an exciting new stage. Moving beyond laboratory studies of age differences in risk perception and reasoning, new approaches have shifted their focus to the influence of social and emotional factors on adolescent decision-making. Recent research suggests that adolescent risk-taking propensity derives in part from a maturational gap between early adolescent remodeling of the brain's socioemotional reward system and a gradual, prolonged strengthening of the cognitive-control system. As the cognitive-control system gradually matures over the course of the teenage

years, adolescents grow in their capacity to coordinate affect and cognition and to exercise self-regulation, even in emotionally arousing situations (Albert, Chein, & Steinberg, 2013). There is a rich literature on how social influences and rewards differentially impact adolescent behavior relative to that of adults. Adolescents make riskier decisions when with peers (Chein et al., 2011), have more automobile accidents when driving with same-aged passengers (Williams, 2003), drink more alcohol in social contexts (Cooper, 1994), and commit more crimes in groups than do adults (Zimring, 1998). Laboratory studies have shown that social cues and the opportunity for immediate reward can increase risky choices and impulsive actions (Cauffman et al., 2010; Cohen, Breiner, et al., 2016; Dreyfuss et al., 2014; Figner, Mackinlay, Wilkening, & Weber, 2009; Jones et al., 2014; Somerville et al., 2011; Steinberg et al., 2009). Each of these contextual factors can independently overwhelm cognitive control (Briener et al., 2018). But there is limited knowledge regarding the role played by social factors on late adolescent and college freshmen decision-making. Previous research has demonstrated that no studies have focused specifically on either the role of family support or social support on the decision-making process of college freshmen in relation to health-risk behavior.

This study was important to conduct because it contributed data that provided a better appreciation of the association between positive decision-making and health risk behavior; negative decision-making and health risk behavior and the effect of social support systems on both positive decision-making and negative decision-making in college freshmen. Furthermore, this study yielded significant data that identified a distinct difference in the predictive relationship of these variables between male and female freshmen.

This cross-sectional study explored the dynamic between positive decision-making, negative decision-making, health risk behavior, and social support systems in college freshmen. Steinberg's Dual Systems model of adolescent risk-taking guided the investigation of the study variables. Accordingly, the characteristics of the individual were measured by age, gender, race/ethnicity, religious affiliation, international student status, work status, residence location, financial aid status, whether or not under the care of a healthcare professional for physical or emotional problems, medication history, and feelings of sadness/depression and stress. Decision-making was measured by the Adolescent Decision-Making Questionnaire. An adapted version of the National Youth Risk Behavior Survey measured health-risk behavior. Family support and social support was measured using the Multidimensional Scale of Perceived Social Support.

Overall findings identified that in a group of college freshmen, positive decision-making was associated with a decrease in health risk behaviors, whereas negative decision making was associated with an increase in health risk behaviors. Social support systems predicted both positive and negative decision-making in college freshmen. Family support was found to have a positive effect on positive decision-making in both male and female college freshmen. But distinctively, family support was associated with a decrease in negative decision-making in females. In general, these findings have implications for targeting college freshmen and their families for interventions that may improve their decision-making skills, leading them to have better early college experiences. To this degree, college freshmen may achieve positive health outcomes and attain successful educational outcomes that may result in improved undergraduate retention rates.

### Characteristics of the Individual

The sample consisted of 200 undergraduate college sophomores who were 18 to 19-years-old. Over three quarters (81.5%) were 19-year-old sophomores. Considering gender, females were predominant [146 (73%)] and the remaining sample were composed of males [53 (26.5%)] with 1(0.5%) gender non-conforming participants. The percentage of female gender in the sample corresponded to the university's percentage of female gender (CIRP Freshman Survey 2008, 2009). The average hours of sleep per day during the school week was 13.75 ( $\pm 14.613$ ) with the most being 7 hours per day (26.5%). Sophomores were predominantly White (61.5%), Asian (21%), more than one race (9.5%), Black or African-American (5%), Native Hawaiian or Pacific Islander (2%) and American Indian or Alaska Native (1%). The composition of the sample showed uneven representation from all racial groups. The percentage of white race in the sample also corresponded to the university's white racial composition (CIRP Freshman Survey 2008, 2009). Only 18% were Hispanics and 4% were international students. The majority (66%) had a religious affiliation, which is a not a similar finding with the American College Health Association's 2017 Health Assessment. One hundred twenty-four postsecondary institutions self-selected to participate in the 2017 ACHA National College Health Assessment and 81,529 surveys were completed by students on these campuses yielding a final data set consisting of 63,497 students at 92 schools. Out of 92 schools, 71 schools reported no religious affiliation. While this study focused upon college freshmen, the American College Health Association's Health Assessment focused upon college students at all levels in their undergraduate years (American College Health Association, 2017). In regard to work status, only 5.5% were full-time, 40.5% worked part-time, and 54% were not working. In terms of residence

location, 54% live in the residence halls (co-ed), 15% live in an off-campus apartment, 14.5% live with parents or other adult relative, 8.5% live in a campus apartment (with cooking facilities), 7.5% live in the residence hall (non-co-ed), and 0.5% live in other types of residence. Financial aid was received by the majority of freshmen (79%).

More than three quarters of the students (84%) had an emotional problem and were under the care of a healthcare professional. On the contrary, less than a quarter (16%) had a physical problem and were under the care of a healthcare professional. More than half (64.5%) did not take medications. Of the sample, in the past month, over half (53%) felt sad or depressed several times, 16.5% were often sad or depressed, 6% were sad or depressed all the time, and less than a quarter (24.5%) never felt sad or depressed. In terms of stress levels, 42% reported feeling stressed often, 33% felt stressed several times, 22.5% felt stressed all the time and only 2.5% did not feel stressed at all. Inclusion criteria for the study were first semester sophomores, full-time, reflective of first year, on/off campus, fluency and literacy in English, and to be between the ages of 18 and 19.

In brief, White female sophomores who were 19-year-old and who lived in residence halls (co-ed) were noted to be a significant proportion, or majority, of the sample. The racial diversity in this study sample is somewhat similar to what has been noted in other studies involving college students. But during the fall of 1976 to fall 2015, the percentage of White students fell from 84% to 58% according to the National Center for Educational Statistics (United States Department of Education, 2018). This is also consistent with the sample collected in the American College Health Association study involving a total of 95,712 students from 106



college campuses across the United States in 2010 that included a majority of participants who were white (71.2%) (American College Health Association, 2010).

### **Decision-Making**

The Adolescent Decision-Making Questionnaire (ADMQ) was utilized to measure positive decision-making and negative decision-making. The questionnaire is scored by totaling the scores for each of the items. A higher score related to decisional self-esteem and vigilance indicates better decision-making behaviors (positive decision-making), whereas a higher score related to complacency, panic, and cop out (negative decision-making) indicates poor decision-making behaviors.

Results of a study demonstrated that cultural differences are present in decision-making behaviors; Japanese students had higher scores on decisional stress, complacency, avoidance, and hyper-vigilance, also described as panic, while scoring lower on decisional self-esteem (Bosma & Jackson, 1996). Significant differences between Israeli and Australian adolescents were noted, with Israeli adolescents scoring higher on self-confidence, vigilance, and lower on cop out (Friedman & Mann, 1993). In a sample of 84 students, middle adolescents scored significantly better on decision-making self-esteem and vigilance than younger adolescents on the ADMQ. Younger adolescents scored higher on maladaptive behaviors associated with poorer decision-making. Males scored significantly higher on decision-making self-esteem than females (Ormond et al., 1991). As observed by the researcher, total score and individual subscale scores for the ADMQ has not been identified frequently in literature. One study by Tunistra and colleagues (2000) used the 22 item revised version of the ADMQ, revealed lower scores for all subscales- avoidance ( $1.71 \pm 0.41$ ), self-confidence ( $2.64 \pm 0.44$ ), panic  $1.74 \pm 0.44$ ) and, impulsive

( $1.89 \pm 0.46$ ), when compared to the current study that used the 30 item version of the ADMQ. The revised 22 item version of the ADMQ does not offer complete congruence with concepts (Mann et al., 1988). However, few studies used the revised 22 item version of the ADMQ for improved structure, reliability and validity (Franken & Muris, 2005; Tunistra et al., 2000).

In addition, due to the use of revised tool, the scores could not be directly compared for analysis. Next, aggregate scores for positive decision-making and negative decision-making were not seen in the literature. Most studies reported Cronbach's alpha for each of the subscales. Overall, when comparing Cronbach's alpha of other studies to the current study, there was a similar Cronbach's alpha in the decisional self-esteem (.76) subscale. Vigilance subscale had a low level of reliability (.56) in the current study and was lower than values present in the literature (.71- .77). Reliability of the instruments are shown in Table 12. All other Cronbach's alpha coefficients for the other subscales were more or less the same values.

Further development of the ADMQ in measuring decision making in adolescents should consider factor analysis to uncover underlying traits. The reliability, validity and structure was investigated in a few studies in the literature and has proved that a revised version of the ADMQ (22-item) enhanced the tool psychometric properties while other studies used the original 30-item questionnaire (Ciftci, 2015; Franken & Muris, 2005; Gardner & Steinberg, 2005; Karsli, 2015; Tunistra et al., 1998). The tool has also been used in Dutch and Turkish populations among others revealing acceptable reliability, validity and translations of the tool (Karsli, 2015; Tunistra et al., 1998).

There are no normal or usual scores reported for the ADMQ (Commendador, 2006). As mentioned in the previous chapter, using the subscales, the ADMQ can be used to measure both

positive and negative decision-making behaviors and has a strong theoretical basis to support the measurements of the instrument (Lane, 2010). Accordingly, the calculations showed the mean score for positive decision-making was 22.03 (SD 4.61) and the mean score for negative decision-making was 18.52 (SD 9.42). Based on these mean scores, it was found that freshmen engaged slightly more in positive decision-making than negative decision-making, which is a quality finding.

Analysis was completed on each of the subscales of the ADMQ (see Appendix A). In decision-making, self-esteem is an individual's self-evaluation of his/her own decision-making perception in a situation necessitating decision-making (Colakkadioglu & Gucray, 2012). Vigilance is defined as the attitude an individual bears within a decision-making situation while analyzing elaborately positive and negative aspects of a set of alternatives. Also, a person acting vigilantly in a decision-making situation is the one who possesses knowledge regarding which direction to follow that might also positively effect level of self-esteem (Josephs, Larrick, Steele & Nisbett, 1992). Decision self-esteem and vigilance subscales measured positive decision-making. Decision self-esteem scale had six items with a range of scores from 3 to 18 (mean 11.5, SD 3.02). Overall, findings indicate that majority of freshmens had faith in themselves when making decisions and were self-assured with their decision-making.

Vigilance scale had six items also with a range of scores from 4 to 18. When decisional self-esteem subscale was compared to the vigilance subscale, the higher mean score was from the decisional self-esteem subscale. Overall, these findings indicate that, compared to the number of freshmen who engaged in competent decision-making , more freshmen in this sample had decisional self-esteem. This indicates that freshmen in this sample considered themselves

confident in their decision-making. On the other hand, findings demonstrate that freshmen also reported use of considering goals, generating options, gathering facts, evaluating the consequences, reviewing the decision process, and implementing their decisions. Also, half of the freshmen sample did not change their minds once they have made a decision. While it is known that, in general, late adolescents are not very vigilant regarding their decision-making process, this is a pertinent finding. Hence this study finding was different from that found in the literature (Bavol'ar & Orosova, 2015; Bhardwaj & Kumar, 2017) in that freshmen were more vigilant in their decision-making process.

Colakkadioglu & Gucray (2012) studied the effect of conflict, theory-based decision-making and skill-training group applications on decision-making styles of adolescents. A total of 36 students who were ninth graders (average age 15), including 18 students in experimental group and 18 students in control group, participated in the research. When assigning students to experimental group or control group, Decision Making Scale for Adolescents, Socio-Economic Status Scale, Problem Solving Inventory, Self-Esteem Scale, Locus of Control Scale, and Parental Style Inventory were used. While the experimental group participated in a psycho-educational based group application that was based upon Conflict Theory, the control group did not participate in any kind of application. The findings of the research indicated that decision-making skill-training group applications increased the self-esteem level of adolescents and the application of adaptive coping style, whereas an apparently long-term decline appeared in the application of maladaptive coping style (Colakkadioglu & Gucray, 2012). These research findings support the current study findings in that support training interventions (a form of instrumental social support) positively influence decision-making skills in adolescents.

Another study examined subjective well-being with respect to problem-solving, self-esteem in decision-making, and decision-making styles in adolescents. For this purpose, Positive and Negative Affect Scale, Satisfaction with Life Scale, Adolescent Decision-Making Scale and Problem-Solving Inventory were administered to 377 adolescents (52.8% females;  $M=15.72$ ;  $SD=1.21$ ). The data were analyzed through stepwise regression analysis, results of which showed that “problem solving” and “self-esteem in decision making” significantly predict subjective well-being and its dimensions. The results also revealed that “vigilance style” is a significant predictor of subjective wellbeing and positive affect while “panic style” is a significant predictor of negative affect. In contrast, “cop-out style” in decision-making is found be a non-significant predictor of subjective well-being and its dimensions. The most important predictors of life satisfaction have been respectively found to be “problem solving” and “self-esteem in decision making.” Results also showed that "problem solving," “panic style,” and “self-esteem in decision making” are predictors of negative affect (Cenkseven-Ouml, 2013). However, there were no studies in the literature that had demonstrated these findings in college freshmen. In comparison to the current study findings, both studies reported more use of considering goals and generating options which reflected high levels of vigilance in decision-making in adolescents.

In the current research study, panic scale, cop out scale, and complacency scale measured negative decision-making. The three subscales had six items each with a range of scores from 0 to 18. The mean score for panic scale was 7.56 ( $SD 3.59$ ), cop out scale 5.61 ( $SD 3.49$ ), and complacency scale 5.35( $SD 3.43$ ). As determined by the three mean scores, findings suggest that freshmen reported the most on the panic scale, which refers to tendencies to hasty and impulsive choices. This finding was higher than those found for other tendencies like

engaging in defensive avoidance (which measures tendencies toward decision avoidance), passing off, which measures tendencies towards leaving decisions to others, putting off, which measures tendencies of delaying decision-making, and, tendencies to apathy and non-involvement in decisions. With further inspection, results also suggest that over half of the freshmen sample were afraid to make wrong decisions. Overall, majority of freshmen put considerable effort into making decisions. But, in general, most freshmen cared enough as to which way they chose to make a decision. These study results were comparable to study findings in the current literature that explored panic behavior/impulsivity as one among other constructs in adolescent risk-taking behavior (Clinkenbeard, 2016; Cullen, 2016; Fitch, 2018).

Acknowledging the social and developmental context of adolescence, one study explored social influences faced by youth through an emerging dual processing cognitive model of choice that helps to explain the vulnerability of youth to alcohol and drug use (Stacy et al. 2009; Wiers and Stacy 2006a; Wiers et al. 2007b). The authors emphasized three dispositional factors: impulsivity, sensation seeking, and hopelessness that all lead to an increased risk of adolescent substance use (Krank, 2010). Thus, this finding on panic behavior and impulsivity was demonstrated in other studies involving adolescents, but no studies were found to show these findings specifically in college freshmen. However, the current study replicates findings of panic in the youth and hence supports previous studies in the literature.

### **Health-Risk Behavior**

The National Youth Risk Behavior Survey was used to assess health-risk behavior. The survey is scored by totaling the scores for each of the items to give a quantity/frequency analysis. Reported high risk behaviors measured in this study included disordered eating, inadequate

physical activity, cigarette smoking, alcohol usage, sexual behavior, marijuana use, improper medication use, gun usage, and suicidal attempts. Table on each health-risk behavior with sample, mean and standard deviation is presented in Appendix A. Reliability of the instruments are shown in Table 12. In the literature, the Cronbach's alpha for the total scale and the subscales were more or less the same when compared to the Cronbach's alpha for the total scale and the subscales of the current study.

On the other hand, if the researcher were to sample a group of college freshmen who routinely engage in healthy behaviors, for example, regular consumption of fruits and vegetables, adequate water intake, abstinence from illicit sex/drugs, regular physical exercise among other healthy behaviors, this group would result in significant positive psychological, physical, educational and academic outcomes. The researcher's views are also supported in the literature (Bruening M et al., 2016; Dvořáková K et al., 2017; Melnyk B et al., 2014; Monroe et al., 2017; Vilaro et al., 2018). These literature findings offer a foundation to build upon when it comes to future studies focused on behavioral interventions leading to positive health outcomes among college freshmen.

## **Characteristics of the Environment**

### **Perceived Social Support**

The positive influence of perceived social support, both overall, and perceived support from family, friends, and significant others, was measured with the MSPSS. The MSPSS utilizes a 7-point Likert-type scale to allow subjects to express their amount of agreement or disagreement with the statements related to perception of social support presented on the

questionnaire (Brandy, 2011). There is no specific cut-off score for this instrument (see Table 7). The family sub-scale is scored by totaling the scores for each of the items. Higher scores meant greater perception of social support from family. Social support sub-scale is scored by totaling the scores for each of the items. Higher scores meant greater perception of social support from friends and significant others. As stated before, the data can be interpreted; however, the higher the score of an individual on each of the subscales and the total scale, the greater their perception of positive social support (Zimet, Dahlem, Zimet, & Farley, 1988). As previously mentioned, this scale is primarily intended for use in adolescents and late adolescents (Akhtar et al., 2010; Canty-Mitchell & Zimet, 2000).

Several investigations have examined the relationship between social support and depressive symptoms in college students. It has been reported that in a study of African-American female college students ( $N = 78$ ), those with greater levels of social support from their family reported lower levels of depressive symptoms ( $r = .56, p < .001$ ) (Reed et al., 1996). Similar results were found, with the following negative correlation; the greater a college freshman's perception of family support, friendship support, and a supportive school environment, the lower incidence of depressive symptoms ( $N = 176$ ) ( $r = -.45, p < .001$ ) (Dyson & Renk, 2006; Eisenberg, Gollust, Golberstein & Hefner, 2007; Pritchard, Wilson & Yamnitz, 2007; Way & Robinson, 2003). These research findings reinforce the current study findings in that, family support as a source of social support, may influence positive decision-making which may therefore decrease negative psychological outcomes in college students.

For the current study, results indicated that freshmen perceived more than average social support from family, friends, and significant others, with a mean score of 67.16 (SD 14.18),



which is consistent with previous research. Reliability of the instruments are shown in Table 12. The highest item mean score across all items in the total scale was 5.81 for the statement “*I can talk about my problems with my friends.*” Although there was not much difference in the mean scores of all three subscales, the highest mean score was 22.78 (SD 5.22) for social support from the significant others scale when all three subscales were compared (see Table 9). This means that freshmen felt supported and cared for by family, friends, and significant others. Strong perception of social support may reduce negative decision-making and health-risk behavior in college freshmen. Therefore, the strong social support reported by freshmen in this study may have contributed to positive decision-making and increased healthy behaviors. This will be discussed in more detail in the study Aim 2 discussion section.

One study examined whether stress and other factors (social support and spirituality) predicted depressive symptoms and high-risk behaviors in college freshmen students. The findings suggested that significant relationships existed between perceived social support, as measured by the MSPSS, and stress ( $r = -.380, p < .01$ ) and depressive symptoms ( $r = -.398, p < .01$ ) (Brandy, 2011). Overall it is important to note that, in this study social support from significant others was higher than family support and support from friends. Significant others could be other freshmen, older freshmen, upper class college students, intimate partners, cousins among others. This finding reinforces the importance of having significant others in one’s life as a freshman in college. Although a few studies examined social support in college students, no studies specifically explored social support from significant others in college freshmen in the US.

Table 12. Reliability of the Instruments

Instrument	Variable/Concept	Reliability in Literature Studies/Other Population	Reliability in Current Study (Cronbach's alpha)
Adolescent Decision-Making Questionnaire	Decision-making Total	0.52 - 0.81	.743
	Positive Decision-Making:	-	.742
	Decisional Self-Esteem	0.60 -0.78	.760
	Vigilance	0.71- 0.77	.564
	Negative Decision-Making:	-	.911
	Panic	.70	.790
	Cop out	.80	.802
	Complacency	.67	.800
Adapted National Youth Risk Behavior Survey	Health-Risk Behavior	Kappa statistic 61% -100% ICC > 0.6 Persian: 0.78 (Cronbach's alpha)	.777
Multidimensional Perceived Support Scale	Multidimensional Perceived		
	Support	0.85- 0.93	.944
	Family Support	.87-.90	.911
	Support from Friends	.85-.92	.933
	Support from Significant Others	.91-.92	.930

### Discussion of Study Aims

There were three study aims and three study hypotheses for this research study.

Aim 1: To explore the relationship between decision-making and health-risk behaviors among college freshmen.

Hypothesis: There is a significant correlation between decision-making and health-risk behaviors in college freshmen.

The first study aim was to explore the relationship between positive decision-making and health-risk behaviors among college freshmen. The hypothesis was that positive decision-making would be associated with health-risk behaviors. Positive decision-making and health risk behavior were negatively associated with each other. Further analysis revealed that decisional self-esteem was negatively associated with health-risk behavior. This result has been identified in the literature in a number of studies (Ford & Jaccard, 2018; Scott-Parker & Weston, 2017; van Hoorn et al., 2016). Taking a closer look at further correlational analyses, findings indicated that negative decision-making and health risk behavior were associated with each other. This relationship between negative decision-making and health risk behavior is supported by previous research as well (Bromberg et al., 2015; Harden et al., 2017; Kim-Spoon et al., 2016) with some studies on college students and the others on college freshmen.

In addition, there were statistically significant relationships between panic and health-risk behavior ( $r = .184, p < .01$ ); cop out and health-risk behavior ( $r = .253, p < .01$ ) and; complacency and health-risk behavior ( $r = .251, p < .01$ ). Other studies found a relationship between panic and health-risk behavior (Baiden et al., 2019; Otto et al., 2016; Pedrelli et al., 2015), cop out and health-risk behavior (Arigo & Cavanaugh, 2016; Edwards et al., 2017; Frankel et al., 2018) and, complacency and health-risk behavior (Corcoran, 2017; Drake & Gahagan, 2015; Vogel, 2017) in college students as a whole while some studies produced the same results specifically in college freshmen.

A consistent finding in the literature is the relationship between decision-making and the development of health-risk behavior in adolescents and college students. Studies have found that the last part of the brain to finish developing its connections is the frontal lobe, which is also the part of the brain that governs attention span, impulses, and motivation (Kelly, 2014). This phenomenon explains that, due to the physical and neural immaturity of the brain, adolescents do not make appropriate decisions, thus putting them at risk for unhealthy behaviors. As stated by Siegel (2015), teenagers' ability to control their impulses is immature at the same time that their interest in sensation-seeking is stronger than ever, making them prone to commit serious mistakes. Hence, this highly intense sensation-seeking conduct in adolescents also makes them vulnerable to health-risk behaviors. Findings are also consistent with the dual systems theory of adolescent risk-taking (Shulman et al., 2016), which posits that in adolescence, frontal control regions are insufficient to inhibit responses to affective, and often risky stimuli. Given these results, it is not surprising to the author of this study that a positive correlation was found between negative decision-making and health-risk behavior in college freshmen. However, it is important to note that, in general, freshmen may engage in negative decision-making due to their developmental stage, but some of them may not take part in health-risk behaviors on a frequent basis.

Although this study focused specifically on college freshmen, it is possible that non-college-going 18 to 19-year-old adolescents might show a similar effect, in line with work suggesting overlapping mechanisms between decision-making, peer, and family influences in relation to health-risk behavior. Therefore, the current study findings support that decision-

making is an important area for further investigation among college freshmen to improve decision-making skills that promote the college freshman experience.

Aim 2: To determine whether or not family support and social support jointly predict decision-making among college freshmen.

Hypothesis 2: Family support and social support will jointly predict decision-making in college freshmen.

The second study aim was to determine whether or not family support and social support jointly predict positive decision-making among college freshmen. The hypothesis was that family support and social support will jointly predict positive decision-making in college freshmen. In addition, family support and social support were used as predictors to jointly predict negative decision-making among college freshmen as well. Results indicated that family support and social support from friends and significant others were predictive factors that contributed to freshmen adaptive decision-making or positive decision-making. These results were supported in a few studies in the literature (Hirsch & Barton, 2011, Stringer & Kerpelman, 2010).

Lack of family support and social support were also found to be statistically significant predictors of negative decision-making and was shown in previous research studies relating to college students but not specifically in college freshmen (Denning et al., 2018; Garcia et al., 2015; Tovar, 2015). Interestingly, only 5.7% of the variability in positive decision-making was explained by family support and social support. Also, only 4.6 % of the variability in negative decision-making was explained by family support and social support. This further implies that there are other elements that may influence both positive and negative decision-making in college freshmen, that need to be further investigated in this respect. Also, female gender was

associated with positive decision-making in freshmen. No studies are present in the literature to support this finding. Family support and social support also caused a decrease in negative decision-making in college freshmen. This finding is shown in previous research studies relating to college students but not specifically in college freshmen (Denning et al., 2018; Garcia et al., 2015; Tovar, 2015). But, as the results of the current model suggests, as family support and social support increase, there will be an increase in positive decision-making and, as family support and social support decrease, there will be an increase in negative decision-making.

In light of the results stated above, it is important to note that although the freshmen who participated in this study lived locally, information was not gathered on family place of residence. The freshman year entails a transition period from home to college when family support could be low. This may be influenced by factors such as new place, level of peer support and ability to make new relationships. The researcher in this study invited sophomores, who were fairly new to the college experience and who may have not yet established a social support system. Moreover, it is imperative that one looks at this group of college students from a developmental perspective. As such, there could be other elements that affect the transition to college. As mentioned earlier, in this study data was not collected on students' family place of residence. Further studies could address students' family place of residence both as a descriptive statistic as well as a variable. As college students move into the university environment, they try to obtain autonomy and independence in various ways, one way being through social support systems. Therefore, support systems will need to be examined in more depth in further studies involving college freshmen.

Sadness/depression demonstrated a decrease in positive decision-making in freshmen in the current study. One study reported that African-American female college students ( $N = 78$ ) with greater levels of social support from their family reported lower levels of depressive symptoms ( $r = .56, p \leq .001$ ) (Reed et al., 1996). Studies have also demonstrated the importance of family support for college students (Brandy, 2011; Fredrick, Demaray, Malecki & Dorio, 2018; Goebert et al., 2009). In addition, sadness/depression demonstrated an increase in negative decision-making in this study. Mixed findings are shown in literature on the predictive role of family support and social support on freshmen decision-making (Morrison-Beedy et al., 2017). The next paragraph discusses a few studies that have been conducted on family encouragement and support with college adjustment in first generation Latina/o college students.

A positive association has been established in the research between parental encouragement and postsecondary educational plans (Conklin & Dailey, 1981; Hossler & Stage, 1992). A strong relationship has also been established between a family's socioeconomic status and the amount of parental encouragement that children receive. The literature on the role of family support in the education of Latina/o college student has been mixed. One study found that family support was not related to college adjustment for Hispanic males or females (Toews & Yazedjian, 2007). In another study, family support was found to be related to college adjustment in some Latina/o college students (Phinney, Dennis, & Gutierrez, 2005). Ong, Phinney, and Dennis (2006) found that academic achievement was linked to both individual and family level influences and contributed to the academic success of Latinas/os with low socioeconomic status. Additionally, it was found that the "persistent levels of parental support on education were

accompanied by elevations in GPA and performance” of students supporting the positive relationship between parental support and college adjustment (Ong et al., 2006).

In a study that looked at who played a greater supportive role for Latina/o college students, it was found that perceived support from family and friends both contributed to feelings of well-being among the college students (Rodriguez, Mira, Myers, Morris, & Cardoza, 2003). Support from friends was slightly greater in contributing to well-being than was perceived support from family (Rodriguez, et al., 2003). Support from friends was also found to be protective against psychological distress (Rodriguez et al., 2003). According to Rodriguez et al. (2003), it may be that college students rely on their college friends for support in coping with college-related stress and that family may be a source of support for non-college stresses (Cerdal-Lizarraga, 2015). Similar results were found in a study reporting that, as focus on positive coping mechanisms and perceived family support increased, the incidence of depressive symptoms decreased (Brandy, 2011).

A few studies focused on family support that contributed to student retention in college. Research conducted by Nora and Cabrera (1996) indicates that encouragement and support by parents was one of the three factors that contributed to Latina/os decisions to remain in college even when there was a negative perception of discrimination and prejudice on campus. Furthermore, parental encouragement and words of support were found to have a positive effect on integration into college and academic performance, as well as on the desire to remain in college (Nora & Cabrera, 1996). In a study by Schneider and Ward (2003), family support was the only support measure to “uniquely predict Latinos’ overall emotional and academic adjustment” (Schneider & Ward, 2003). When comparing all the studies mentioned in the above



sections to the current study findings, there was only partial support by previous research.

Hispanics comprised of 18% of the total sample in the current study. Although this was a small representative group of the Hispanic population, family support was a significant predictor of positive decision-making in male and female freshmen.

Another study examined how two different forms of family support—emotional and financial—are related to academic outcomes (grades, credit accumulation, and persistence) among low-income college students. Low-income students are substantially less likely to earn bachelor's degrees than their more economically advantaged peers. The analyses, based on a sample of 728 first-year low-income students attending eight four-year institutions, indicate that family emotional support plays an important role in fostering positive academic outcomes. Family emotional support is beneficial for academic outcomes, as it promotes psychological well-being and facilitates greater student engagement. Financial support was not related to the outcomes examined in the sample as a whole. However, interaction models point to variation by first-generation status wherein continuing-generation students benefit more from family financial support than their first-generation peers. Findings offered valuable insights into the role of families in supporting low-income students in college and can inform institutional policies and practices aimed at facilitating their success (Roksa & Kinsley, 2018). Most likely, this explains the positive role of family support on decision-making when it comes to student retention and course completion. Again, these findings demonstrate the importance of family support in relation to student academic outcomes, and has been reproduced in the current study.

One study investigated the role of social factors in high school and college students' risk-taking behaviors. Sherman and colleagues (2018) examined the effect of *Likes* (on mobile social

media) on youths' neural and behavioral responses to photographs. High school and college students (N = 61, ages 13–21) viewed theirs and others' Instagram photographs while undergoing functional Magnetic Resonance Imaging (fMRI). Participants more often *Liked* photographs that appeared to have received many (vs. few) *Likes*. Popular photographs elicited greater activity in multiple brain regions, including the nucleus accumbens (NAcc), a hub of the brain's reward circuitry. NAcc responsivity increased with age for high school, but not college students.

When viewing images depicting risk-taking (vs. risk-free photographs), high school students, unlike college students, showed decreased activation of neural regions implicated in cognitive control. However, it should be noted that even though college students did not demonstrate decreased activation of regions implicated in cognitive control while viewing risky photographs, they did report higher overall risk-taking. This heightened risk-taking is not surprising: It is reasonable to assume that factors in their social environment (e.g., living away from home, prevalence of friends' risky behaviors) can largely explain the difference in high school and college students' risk-taking behaviors (Sherman, Greenfield, Hernandez & Dapretto, 2018; Willoughby et al., 2013). Findings highlight the importance of considering the relation between neural and behavioral responses within the larger context of the sociocultural environment, particularly in instances where two distinct developmental cohorts are being compared (Sherman et al., 2018).

Family support, social support and sadness/depression were still strong predictors of positive decision-making in the model after adjusting for variables. Also, family support, social support and sadness/depression still strongly predicted negative decision-making in the model

after adjusting for variables. Therefore, findings point to the significance of social settings and emotional states like depression as being key elements in the context of decision-making in college freshmen. This relates directly to the current study results that emphasize the role played by social support systems in decision-making and risk-taking behaviors in college students and is therefore supported by existing research studies. In other words, these findings suggest that enhancing the role played by social support systems on decision-making may not only improve negative risk-taking tendencies, but also lead to decreased health-risk behaviors.

Aim 3: To ascertain whether or not the effect of family support on decision-making is different for male and female college freshmen;

Hypothesis 3: The effect of family support on decision-making will be different for male and female college freshmen.

The third study aim was to ascertain whether or not the effect of family support on positive decision-making is different for male and female college freshmen. Likewise, the effect of family support on negative decision-making was also analyzed in male and female college freshmen. The hypothesis was that the effect of family support on positive decision-making and negative decision-making will be different for male and female college freshmen. Findings highlight that family support was associated with positive decision-making in both male and female college freshmen-hence the effect was the same for both genders, although male freshmen constituted only 26.5% of the total sample. Only a few research studies exhibited fairly similar results in freshmen for both genders ( Han et al., 2018; Serido et al., 2015; Venetis et al., 2018). The literature mainly supports these findings in college students in general and not for freshmen (Hui & Lent, 2018; Kantamneni et al., 2018; Lewis et al., 2018; Rogers et al., 2018;

Sampson, 2016). Whereas, only a handful of studies support the evidence of the effect of family support on positive decision-making in female college students in the literature (McCabe & Sumerau, 2018; Sorensen, 2019; Storlie et al., 2018).

Interestingly, family support was associated with a decrease in negative decision-making in female freshmen only. The literature conveys varied findings based on this predictive relationship in association with limited theory-driven research on this topic. These results are also supported to a minimal extent in the literature (Fort & Murariu, 2018; Goldstick et al., 2018; Pace et al., 2018). As a result, limited research studies signify the importance of family support on decision-making in female college freshmen. There is no current literature that suggests evidence on the particular role played by family support on decision-making in relation to health-risk behavior based on gender. Therefore, the researcher of the current study investigated this area further. Also, in female freshmen, support from friends negatively correlated with negative decision-making ( $r = -.222, p < .05$ ), support from significant others negatively correlated with negative decision-making ( $r = -.177, p < .05$ ) and, family support negatively correlated with negative decision-making ( $r = -.193, p < .05$ ). Evidence of these results are predominantly found in studies involving college students (Coccia & Darling, 2016; Kouros et al., 2017; Riegle-Crumb & Morton, 2017). Moreover, sadness/depression affected both positive decision-making and negative decision-making in females. This finding was demonstrated in one study involving adolescents (Keller & Olson, 2018). However, to the author's knowledge, no prior research has directly examined the possibility of gender differences with respect to family support and both positive decision-making and negative decision-making notably in college freshmen.

Higher levels of peer support and social support in general, leads to better academic adjustment and learning (Awang, Kutty, & Ahmad, 2014; Grant-Vallone, Reid, Umali, & Pohlert, 2003). One study attempted to study how optimism, perceived social support from family and faculty, might predict college students' overall life satisfaction. The researcher studied 133 college students (54 female, 79 male) in Turkey from all class standings with a mean age of 20.86 years old. The results indicated that perceived social support from family and faculty, and optimism served as significant predictive factors of life satisfaction (Yalcin, 2011). These findings suggest that it is very important for students to build social support networks on campus, as well as continue to strengthen their existing supports in order to experience life satisfaction in general. This study appears to be consistent with previous research concluding that higher levels of perceived social support lead to more adjusted and satisfied individuals, which may in turn result in students being successful in college (Freeman, 2018). These results add to the existing body of evidence that perceived family support is an important factor for overall college student success.

Awang, Kutty and Ahmad (2014) reported that social support could come from peers, siblings, advanced students, and institutional agents. Awang et al. (2014) conducted a qualitative study with 16 first year college students (8 males and 8 females) enrolled at a public research university in Klang, Valley, Malaysia to explore their experiences of receiving social support and how that social support impacted their ability to adapt to the university environment. The authors found that adjustment to academic life and social and emotional adjustment, were dependent on receiving support from friends and family (Awang et al., 2014). These findings suggest that social support plays a significant role in college students' ability to be successful in

identifying and achieving their goals. This finding was also replicated in the current study with decision-making among other study findings.

While social support is important to psychological well-being for people of all genders, it may be a more impactful protective factor against the development of psychiatric symptoms for women than for men. Female emerging adults have been found to report greater levels of nurturance, affection, intimacy, and emotional support from their best friends than did their male counterparts (Barry, Madsen, Nelson, Carroll & Badger, 2009). With regard to college freshmen in particular, it appears that over and above the effects of gender and identity development, social support still provides a measure of protection against depression. Therefore, the best practices for college campuses in welcoming a new class of students should not be limited to providing programming that allows students to meet many other freshmen, but should also extend to helping students foster new, more intimate connections and maintain their previous supports like high school friends and family members. Additionally, while college is a time for exploration and growth, the inclusion of familial support in the measure of social support suggests that students may benefit from ongoing connections with their parents during this period of development. Granted, parents and emerging adults might not maintain the exact same type of relationship with one another; however, as the emerging adult grows, it is important that the family connection remain supportive alongside the emerging adult's increasing agency and competence (Cucco, 2018). Findings suggest the impact of family support as a positive substructure for college student psychological and emotional well-being.

A study was conducted on Latino/Latina college freshmen students. In an attempt to understand the complexity of why Latino males are less likely than Latina females to pursue

higher education, Saenz and Pojuan (2009) have highlighted the ways in which a combination of social stigma, structural inequalities, and peer and cultural pressures work together to influence young Latino males in their educational decisions and experiences. While it is important to note that the trend of more educational progress for females is true across all ethnic groups, it is most prominent among Latinas and African Americans (Contreras & Gandara, 2006). Supporting this trend are statistics from the National Center of Education, in the conclusion is forwarded that fewer college age men are entering college than in the past and that the gap between degrees conferred to males and females is also widening (NCES, 2005). Furthermore, the National Center of Education data indicate that males are not keeping up with females in their same age group across all levels of education, as well as across all racial and ethnic groups (NCES, 2005).

To summarize, family support, support from friends and support from significant others, predicted both positive decision-making and negative decision-making in freshmen, which means that these support systems collectively contribute more when it comes to prevention and/or reduction of negative decision-making actions. In comparison to some similar and other diverse findings in the literature, it appears in the current study that the increased use of social support systems, especially family support, positively influences negative decision-making strategies in freshmen, thereby placing college freshmen at lower risk of engaging in health-risk behaviors that lead to negative health and educational outcomes. It may be reasonable to suggest that social support from family and friends is equally important for both men's and women's mental health during the transition to college. In other words, given the vulnerability of the transition to college, both men and women may need to establish new connections and maintain contact with established supports while adjusting to life in a new community with unfamiliar

expectations (Cucco, 2018). Thus, these findings present the notable support from social support systems within the freshmen population, which may help in identifying factors that contribute to both positive health and educational outcomes. Surprisingly, only a few studies in the literature have examined the same constructs in relation to risk-taking behavior in college students and as of yet, no studies have inspected specific social support systems on decision-making in relation to health-risk behavior in a subset of freshmen. In this way, there is a certain level of divergence in the current literature in relation to this aspect. Therefore, considering the limitations of the current study, research needs to be continued in this area.

### **Summary of Major Findings**

Positive decision-making and health risk-behavior were associated with each other and negative decision-making and health risk-behavior were associated with each other. Decisional self-esteem was associated with a decrease in health-risk behavior. Results showed that freshmen who engaged in negative decision-making were associated with increased health risk behaviors. These findings reveal that negative decision-making has an adverse effect on health-risk behaviors. Therefore, this suggests that preventing negative decision-making may result in decreased health risk behaviors and therefore promote healthy lifestyle behaviors in college freshmen. Based on the current study, more statistically significant relationships were found between negative decision-making and health risk-behavior and; negative decision-making and social support when comparing these variables (health risk-behavior and social support) with positive decision-making. Health-risk behavior, as an entity should be viewed in consideration of the person and context in which conduct takes place.



Family support, social support from friends and significant others were found to be key variables that contributed to freshmen decision-making. As the current model suggests, as family and social support increased, there was a significant decrease in negative decision-making and as family and social support decreased, there was a significant increase in negative decision-making in freshmen. This signifies the strong impact of social support systems in playing an important role in explaining positive decision-making and negative decision-making during the freshmen year. Given the negative consequences associated with risky behaviors it is imperative to continue to explore negative decision-making and how it relates to future decisions made during the final years of college. At the same time, it is equally important to examine positive decision-making in freshmen and to further unfold the mechanisms played by this construct in reinforcing positive behaviors.

Finally, family support in itself was a significant predictor of positive decision-making in male and female freshmen and, lack of family support was a significant predictor of negative decision-making in female college freshmen when compared to male counterparts. Among the social support systems available to freshmen, support from significant others was perceived to be the highest in this group.

### **Limitations**

This study is not without its limitations. The non-experimental design of the study affects the internal validity of the findings and was perhaps the greatest limitation of this study. The correlational nature of the study makes it difficult to propose causal claims regarding the variables of interest (Sadeh & McNeil, 2015). Hence, being a cross-sectional correlational design, no causal relationships can be established. However, the study did identify the

relationship between decision-making and health-risk behavior, therefore adding valuable knowledge regarding the health of college freshmen. Selection bias may have occurred because some freshmen students who participated in the study could have caused this situation by wanting to participate in this study. The participants were from a private religiously-affiliated university in the Midwestern United States. Hence the relationships discovered among the variables in this study may not be consistent with those of other college students from more diverse settings, such as public institutions, secular institutions, or institutions located outside of the Midwest. Caution must also be utilized when reviewing the results, as freshmen may have had personal reasons for choosing to participate that were not disclosed.

Second-semester freshmen students can vary among themselves in regard to their understanding of the decision-making experience and their familiarity with people and the surrounding environment. The influence of media and peer group pressure could also have constituted some factors in this category. As Brandy (2011) indicated, as students adapt to new environments, develop new social relationships, and develop more adaptive methods to cope with academic stressors, the relationships between the variables in this study could change. In other words, the stressors for second-semester students may vary to a certain degree; this element could have affected the responses in the online questionnaires.

The sampling technique did not allow for an equal number of participants for male and female freshmen groups. Due to this aspect, there were more female freshmen than male freshmen, and the difference in the gender number may have contributed to the findings. Another threat to internal validity was instrumentation. The use of on-line self-report questionnaires rely on honest reporting and accurate self-assessment (Tulley, 2018). It is impossible to know if the

study participants gave over or under-estimated responses on decision-making, health-risk behavior, and perceived social support. A thorough review of the literature and careful thought had been completed prior to the selection of the instruments that was utilized in the data collection process. Therefore, reliability was established for each tool in the study. In addition, testing was a concern due to the length of time it took to complete the questionnaires. Response burden may have occurred because the average length to complete the online questionnaires was 30 to 45 minutes. Questionnaires that are long and time-consuming may negatively impact the motivation and effort to answer the items accurately (Tulley, 2018). To address this limitation, the participants were informed of the time required to complete the questionnaire prior to participating in the study. There was no missing data from the online self-report questionnaires.

Maturation threat may have occurred to a specific level, because the level of understanding could vary in 18 and 19-year olds. Time is needed to explore gender identity as maturation takes place, but since this was not a long-term study, this factor was not of major concern. There was no mortality threat as participants were informed of their incentive as reward before beginning the questionnaires. To a certain extent, social interaction threats could have happened if students discussed their participation in the study among themselves. Although the researcher could not entirely eliminate human interactions, this threat was further minimized by administering the questionnaires on-line to participants who might not be known to each other. Convergent validity was established by examining the relationships among the tools to each other. Any threat by statistical conclusion validity was eliminated by consultation with an expert statistician concerning the use of the most suitable analytical procedures for the study.

Using a convenience sample, selection bias, is a threat to external validity by reducing the generalizability to the general population. The racial composition of the county was 65.6% White, 24% Black, American Indian and Alaska Native 0.7%, Asian 7.7%, Native Hawaiian and Pacific Islander 0.1%, Two or more races 1.9%, and Hispanic or Latino 25.5% (Census Bureau: US Department of Commerce, 2017). The racial composition of the study participants was not very similar to the community, with 61.5% White, 21% Asian, 9.5% more than one race, 5% Black or African American, 2% Native Hawaiian or Pacific Islander and 1% American Indian or Alaska Native. The sample was not proportionately representative of the Black, Native Hawaiian, and American Indian communities, with few of these ethnicities enrolled in the study. This study results are generalizable to Loyola undergraduates (who, yes, are predominantly white), with the caveat that certain subgroups of Loyola undergraduates may not have participated in the study and could be underrepresented in this study.

The lack of freshmen participating from the underrepresented groups could have been related to the fact that the study flyer did not target certain ethnic groups. Another explanation could be that freshmen at the private university were predominately White in race (Common Data Set, Office of Institutional Research, 2016-2017). Increase in ethnic participation is a challenge in clinical research; however, this should be a consideration for future researchers conducting this type of work (Tulley, 2018). Novelty effect was present, since data collection was conducted through online questionnaires, which was a first-hand experience to the researcher. It is impossible to determine whether or not the Hawthorne effect took place, as freshmen who chose to participate in the study may have decided to alter their responses to the online questionnaires if they were aware of being observed by a roommate, friend, family

member or significant other. Therefore, these limitations should be noted when interpreting the study findings.

### **Nursing Implications**

Despite the limitations, the findings of this study will contribute to the body of nursing science in several ways. This study was conducted to gain more knowledge on the impact of social support systems on decision-making in relation to health-risk behaviors in college freshmen. First, the results of this study indicate that health risk behaviors are associated with a decrease in positive decision-making and, an increase in negative decision-making. Second, family support and social support from friends and significant others were found to be key elements that contributed to freshmen positive and negative decision-making. These factors, in fact play a major role that affect decision-making in college freshmen. Third, family support in itself was a significant predictor of positive decision-making in male and female college freshmen and, family support was a significant predictor of negative decision-making in female freshmen. Fourth, a key finding from this study is that, among the social support systems investigated, freshmen perceived the most support from significant others.

This research study opened avenues for future studies which may more deeply explore the factors presented in this study. Social factors were found to play a significant role in decision-making among college freshmen, hence strategies in relation to the social factors may be developed to facilitate positive transitioning to college (Tovar, 2015; Vohs et al., 2018). Further analyses of support systems may yield valuable information that may contribute to college adjustment in the first year. Additional studies need to be conducted that emphasize the importance of these supports to the academic success of college freshmen.

Healthcare professionals, a source of social support, can deliver care for college freshman and may develop potential strategies; for example, coping skills training, better prevention programs, support programs and other interventions that might reduce adolescent negative risk-taking and improve public health overall (Hingson & White, 2018; Kenney, Napper, LaBrie & Vaughn, 2018; Park, Russell & Fendrich, 2018; Volkaert, Wante, Vervoort & Braet, 2018). Integrated care teams, comprised of nursing professionals, especially nurse practitioners along with mental health professionals and health promotion educators have been shown to be effective in improving college students' physical, psychological and emotional health (O'Connell, 2018).

Adolescence is a period of transition that involves biological, cognitive, psychological, and social changes (Commendador, 2007). During the vulnerable transition period of adolescence, decisions relating to health-risk behavior may occur. Nurse practitioners should have an added focus on interventions that can improve decision-making skills and stimulate thinking not only around risky behavior, but also regarding relationship and communication with adolescent issues and may therefore facilitate more competent decision-making. Gaining further insight into these relationships will help nurse practitioners and associated healthcare professionals (counselors, psychologists, psychiatrists, social workers and dieticians) provide improved health care services and counseling to college freshmen. Studies have found that when using a collaborative care model, nurse practitioners have the unique opportunity to establish evidence-based guidelines that may address a holistic approach to cater to the biopsychosocial needs of college freshmen (Pate, 2018; Wedgwood et al., 2008). Therefore, nurse practitioners as clinicians can positively affect the decision-making capacity of college freshmen.

Another sector for gaining support is the academic setting freshmen are exposed to while in college. University and college administrators have the responsibility to positively affect student behavior and to enrich the entire learning environment. University and college administrators can benefit from the information received from this study by promoting good role models and by assisting in the allocation of services and recognition of needs for modifications to foster a healthy campus (Huda et al., 2018; Neill, 2007; Wibrowski, Matthews & Kitsantas, 2017). Hence, academic environments play a major role in shaping freshmen perception of social support.

This research has implications for parents and families of college freshmen. Based on the results of this study, it was found that family support has a significant effect on decision-making in college freshmen. Policies that may strengthen the structure between parents and college officials may be put in place so as to improve communication (Epstein, 2018; Feldman, 2016). Offering workshops for parents of college freshmen may furnish them with the tools needed to aid their freshman's decision-making in relation to health-risk behaviors (Brock, 2018). The overall benefit for families could be potential reduction of deaths related to health-risk behaviors that translate to increased medical cost savings and decreased costs to the society.

There may also be other individual and social differences that would moderate the relationship between decision-making processes and risk behaviors. For instance, parenting, in terms of the quality of the parent-child relationship or autonomy granting, affects risk behaviors such as delinquency, as well as deviant peer affiliation (Deutsch, Crockett, Wolff & Russell, 2012), and may also influence decision-making. A recent study of Chinese adolescents found that adolescents who engaged in every day decision-making showed improvement on the Iowa

Gambling Task compared to adolescents whose parents made decisions for them (Xiao et al., 2011), suggesting that parental autonomy granting may help facilitate maturation of decision-making abilities.

Other future endeavors may include other types of individual differences in decision-making and risk behavior. Future research on this topic should include biological aspects such as genetics and brain activation studies. There are several genes that are likely to play a role in risk behavior and cognition, such as dopamine receptor and transporter genes. Also, gene-environment interactions, which are so clearly important for understanding human behavior, may help further simplify issues of decision-making about risk behavior. For instance, genes that are associated with higher levels of reward seeking may be activated in the presence of deviant peers. These types of studies may be able to discern also whether inhibitory responses and analytical competence have different underlying mechanisms that could help further explain what prevents young people from engaging in risk behavior (De Ridder & Lensvelt-Mulders, 2018; Wolff, 2012). These results highlight the importance of individual and social differences that may influence risk-taking behavior.

Behavioral measures and biological measures should also be included along with self-report questionnaires. Some examples of behavioral measures are the Tower of London, which assesses planning, or video games like the one presented in Gardner and Steinberg (2005), which may provide better assessment of risk propensities that one may not be aware of or choose to report in a survey. Behavioral measures also provide the opportunity for studying brain activation while the participant is actually making risky decisions. One example of such a study occurred in Gardner and Steinberg (2005) when brain imaging was assessed during the Stoplight



task video game in which participants had to choose whether or not to run a yellow light in order to get to a party as quickly as possible. Results showed that reward valuation and social cognition areas of the brain were activated for decisions to stop at the red light after participants had been excluded by peers, presumably because participants had heightened sensitivity to what their peers were thinking and a stronger desire for the reward deriving from impressing or pleasing their peers (Peake, Dishion, Stormshak, Moore & Pfeifer, 2013). Therefore, reward sensitivity was considered to be a significant antecedent to risky behaviors.

Similarly, different types of friends or differing qualities of friendship may wield different influences. One study found that risk-taking was more likely after participants had been socially excluded during a computerized task (Peake et al., 2012). It is also likely that other environmental factors such as socio-economic status, quality of school, and neighborhood quality may influence how young people think about the decision to engage in risk behaviors. Other cognitive factors may also play a role: for example, problem-solving, perspective taking, or the ability to think abstractly may influence how an individual makes decisions (Wolff, 2012). In addition to various negative influences that predispose to health-risk behaviors, it is possible that some adolescents may selectively choose to not participate in risky behaviors that result in negative outcomes. These findings emphasize the importance of the influence of friendships and social circles in the lives of adolescents.

On the other hand, national researchers will be able to better perceive the discrepancies in this study and perhaps become motivated to discover more about college freshmen and specific risk behaviors or effective methods of mass behavior modification. Also, these results can provide additional information for comparison to similar studies done at other institutions that

may measure health risk behaviors of their students for a more collective view on the behavior of today's college students (O'Neill, 2007). Comparative studies may also be conducted on decision-making and support systems in relation to health-risk behaviors of college freshmen from diverse ethnic and socio-cultural backgrounds (Perrault & Clark, 2018). Conducting such studies will give a stronger indication of which type of support systems exist in different ethnic and socio-cultural backgrounds (Tyers, Berchoux, Xiang & Yao, 2018).

Another way to appreciate college freshmen decision-making would be to conduct a longitudinal study among incoming students. The data collected from a longitudinal study would allow the opportunity to follow the variables throughout the educational experience, providing further information on how they may change over time (Brandy, 2011; Fleurizard & Young, 2018; Arria, Barrall, Allen, Bugbee & Vincent, 2018). Although one must be cautious about drawing inferences about change over time from cross-sectional research, the current findings provide a foundation for further longitudinal study, using self-reports, behavioral tasks, and brain imaging.

It would also be beneficial to conduct such qualitative investigations as grounded theory study, which would explore the social process used by college freshmen in their decision-making process, and phenomenological studies, which can address lived experiences of how college freshmen experience and understand their decision-making. The information gained from these qualitative data could be valuable in the development of nursing interventions to assist college freshmen struggling with poor decision-making skills. This can also aid in theory generation on college freshmen decision-making (Crisp, Carales, Walls & Cassill, 2018; Little & Mitchell Jr, 2018; Lyons, Dorsch, Bell & Mason, 2018; Porteous & Machin, 2018).

Finally, other types of decisions and other decision-making styles should also be included. Decisions that may be especially pertinent in late adolescence or early adulthood include decisions about college, careers, money, and romantic relationships (Norona, 2018; Puklek Levpušček, Rauch, & Komidar, 2018). To fully understand the complex nature of decision-making, one must look at decisions other than those solely about risk behavior (Lundgren & McMakin, 2018). Also, the dual-process models presented in this study include the two paths of individual decision making. However, decisions are made in other ways. For example, one may defer to another person to make their decisions or one may avoid deciding altogether (Galotti, Ciner, Altenbaumer, Geerts, Rupp, & Woulfe, 2006; Ingold, Dönni & Lievens, 2018). In contrast to the decision-making process, types of decisions and decision-making styles would likely have different predictors that warrant further investigation (Wolf, 2012). Therefore, in order to understand decision-making from this standpoint, it is imperative that further scrutiny be required. This study paves the way for examining the importance of being proactive with health-risk behavior prevention, while providing evidence-based recommendations leading to healthier freshmen student populations, additional student safety measures, and ultimately-improved student retention.

### **Future Research**

As evidenced throughout the current literature, health-risk behaviors in college freshmen are prevalent nationwide. Because of the widespread effects of health-risk behaviors among this high-risk population, priority needs to be given to providing evidence-based healthcare and counseling at all colleges and universities. Future research on the understanding of the role of neuroscience and neuroimaging data are briefly discussed.

The exploration of the developmental neuroimaging literature indicates the importance of including the (anterior insular cortex) AIC in developmental models of risk-taking and decision-making, particularly in theories that highlight the interplay of cognitive and affective processes. Studies propose an extension of the current developmental models that focus on the maturational imbalance between the striatum and the (lateral prefrontal cortex) IPFC to incorporate the AIC into this general framework. More specifically, it is suggested that the relative immaturity of the AIC and its relationship with cognitive control regions leaves adolescents vulnerable to affectively-driven behaviors such as reckless risk-taking. This theory also may serve as a framework for exploring individual differences in risk-taking during adolescence. For instance, it is reasonable to posit that individual differences in risk-taking among adolescents of the same age may be correlated with differences in the degree of connectivity between the AIC and the IPFC. Other brain regions are also closely tied to cognitive-emotional interactions, such as the (anterior cingulate cortex) ACC and amygdala; thus, future research should explore the development of the AIC-amygdala and AIC-ACC relationships for possible influences on adolescent decision-making. Nevertheless, researchers believe that it is critical to study the AIC in research on adolescent decision-making because of its established role as a hub and its demonstrated involvement in the reward processing and cognitive control systems known to mature during the transition between childhood and adulthood (Smith, Steinberg & Chein, 2014). Hence it is important that further work be done in conjunction with neuroimaging techniques for a better understanding of the relationships between brain regions that might better explain risk-taking behavior. Due to the high risk-taking tendencies apparent in adolescence, preventative

care needs to be addressed in a more profound manner to positively affect the health of college freshmen. Next, the need for improved preventative care is discussed.

A lack of standardized prevention strategies and interventions is a research need for the college student population, in general (KappelmanBeyer, 2015). Future nursing research is needed to form specific guidelines for standardized health-risk prevention care at colleges and universities. Formulating such specific prevention guidelines from evidence-based research will then close the gap between varied mental-health activities and will standardize care across all colleges and universities at large. Also required is additional work examining the effect of prevention interventions on the key variables and determining whether or not these interventions predict a change in the association between the study variables and are thus a key component. An example would be a pre-assessment of knowledge of taking care of one's physical and mental health, followed by a post-assessment of knowledge in the same area. Coping skills training may be another intervention that may be administered for freshmen which later is followed by post training evaluation for improvement of skills-building around one's health. Based on the skill that needs training in freshmen, more attention to this can be focused and be further evaluated as needed.

On the other hand, while designing future research studies on college freshmen, there needs to be an increased effort to secure representation from vulnerable populations. Although there may be a sufficient number of studies on college students as a whole, there are even fewer studies of college freshmen that include non-white participants. Developing strategies to recruit more freshmen from other races/ethnicities deserves preference in future work. This is particularly important, as some level of evidence exists that freshmen of non-white race/ethnicity

are understudied and may be at a different level of risk severity for engaging in health-risk behaviors (Gordon, 2018; Kim & Koh, 2018; Warner et al., 2018). Also, cultural beliefs and values may differ among freshmen of non-white race/ethnicity, despite the fact that cultural beliefs may or may not vary among white freshmen. These cultural beliefs and values may have a positive or negative influence on the decision-making competence affecting health-risk behaviors in college freshmen. Future research including freshmen from vulnerable populations will help identify effective interventions for decreasing racial/ethnic disparities in preventing negative decision-making and health risk-behaviors, thereby improving the early college experience.

Another area for future research is to assess and validate existing instruments that can be used to evaluate the key variables in this study in other populations. Participant response burden from lengthy questionnaires can be avoided by using short form instruments (Tulley, 2018). In this study, the ADMQ used 30 items, NYRBS used 20 items and MDPSS used 12 items. Shorter versions of the ADMQ may be an area for further examination in order to decrease participant response burden. Also, the subscales in the ADMQ may be further validated with future work. Continuing appraisal and validation of this instrument may prompt shorter, reliable, and valid attributes. With the application of the Dual Systems Model, it is reasonable to provide further applied research, targeting decision-making and social support systems among students.

As discussed previously, the Dual Systems model attributes elevated levels of risk-taking in adolescence to the heightened arousal of the socioemotional system before the cognitive control system fully attains functional maturity. Moreover, the decrease in risky behavior between adolescence and adulthood is attributed to the continued strengthening of the cognitive

control system and the attenuation of arousal within the socioemotional system. Whether, and in what respects, the contributions of these changes in the cognitive control and socioemotional systems are independent, interactive, or reciprocal or a combination of all three are important questions for future research (Shulman et al., 2016). Together, these changes give rise to increased risk-taking behaviors during adolescence and decreased risk-taking behaviors as adulthood is approached.

As a following note, Shulman et al. (2016) also observes that the ways in which these systems work together in motivating increases in risky behavior between childhood and adolescence are not necessarily the same as the ways in which they combine to create a decline in risky behavior between adolescence and adulthood. It is entirely possible, for example, that the increase in recklessness seen in early adolescence is due mainly to increases in reward sensitivity, whereas the decrease in recklessness seen in young adulthood is driven mainly by improvements in cognitive control. It is also possible that the initial increase and later decline in risk-taking seen during the transition between childhood and adulthood is entirely explained by the rise and fall in socioemotional reactivity and not related to changes in cognitive control. While advances in neuroscience have permitted researchers to distinguish between these systems in studies of brain structure and function, these systems likely engage in ongoing interactions with one another, and it is therefore unwise to think about them as if they are independent entities (Shulman et al., 2016). For this reason, it is important that supplemental fieldwork be carried out to better comprehend the neural underpinnings of these brain processes.

The weight of the evidence amassed to date is consistent with the Dual Systems perspective. Although there are occasional exceptions to the general trends, self-report,

behavioral, and neuroimaging studies that generally support the model, finding that psychological and neural manifestations of reward sensitivity increase between childhood and adolescence, peak sometime during the late teen years, and decline thereafter. Psychological and neural reflections of better cognitive control increase gradually and linearly throughout adolescence and into the early 20s, and the combination of amplified reward sensitivity and still-developing cognitive control makes middle and late adolescence a time of heightened predisposition to risky and reckless behavior. Whether this inclination translates into real-world risk-taking, however, is contingent on the context in which adolescent development occurs (Shulman et al., 2016). Therefore, the model emphasizes how and when adolescents engage in decision-making based on the social context in question. Moreover, as evident from the current study, further research needs to be conducted on the role played by significant others in the lives of college freshmen when decision-making is undertaken in association with positive risk behaviors and negative risk behaviors.

Furthermore, Shulman and colleagues (2016) asserted that published research that has appeared since the introduction of the above-mentioned viewpoints has strengthened, rather than called into question, the model's utility. There have been studies yielding results that are inconsistent with one or more aspects of the dual systems model. This is to be expected given the large number of relevant studies and wide variety of methodologies employed. Importantly, studies that have failed to support the Dual Systems model have not provided consistent evidence for an alternative developmental model. They do, however, serve as a reminder that there may be conditions under which the general finding of heightened reward sensitivity in adolescence or age-related increases in cognitive control may not apply. This highlights the fact that, as the



authors have pointed out, the dual systems perspective is at times overly simplistic. As a heuristic device, the model provides a far better account of adolescent risk-taking than prior models that have attributed this period of transient recklessness to adolescents' cognitive deficiencies. The model also continues to be generative, and has informed ongoing research in multiple fields, which will almost certainly support its continued refinement (Shulman et al., 2016). Although originally derived from a psychological and behavioral perspective, further utilization of the model in ongoing nursing research may bring a wider view of acceptance based on research findings, which then may foster continued application of the model for testing by future nurse researchers.

Importantly, the Dual systems model does not suggest that adolescents are universally risky or incompetent decision-makers. On the contrary, the model recognizes that basic reasoning capacity is almost fully mature by mid-adolescence. Indeed, under conditions that minimize arousal of the socioemotional system and allow for deliberative, calculated decision-making, adolescents tend to make decisions and judgments that are quite similar to those of adults (Chein et al., 2011, Figner et al., 2009, Van Leijenhorst et al., 2008). Instead, what the Dual Systems model suggests is that when decision-making occurs under conditions that excite, or activate, the socioemotional system (e.g., when decisions are made in the presence of friends, under emotionally arousing circumstances, or when there is a potential to obtain an immediate reward) adolescents are more prone than other age groups to pursue exciting, novel, and risky courses of action. Far from being a biologically deterministic model, the Dual Systems perspective explicitly emphasizes the context in which decision-making takes place (Shulman et al., 2016). Consequently, these findings add strong evidence for the future use of the model.

In the current study, the conceptual model, although attained from a psychological and behavioral perspective, was explicit regarding the origins of its underlying theory. There was internal consistency between the context and content; the theory content was stated clearly and concisely. As a newly applied model to nursing, pragmatic adequacy needs to be examined in light of real world nursing practice. In future studies, model-based nursing actions will require analyses to observe compatibility with expectations for nursing practice. Since, in the current study, the model was found to be helpful, the researcher recommends future use and testing of the model for extension of the current understanding of the underlying mechanisms of decision-making and risk-taking behavior. The researcher anticipates that further specification of the model will become possible as the field develops refined ways to integrate nursing, behavioral and neuroscientific sources of evidence. She also welcomes further attempts to confirm, or disconfirm, aspects of the model, as well as the introduction of alternative models and/or theories that might better explain the science of adolescent risk behavior.

APPENDIX A  
INSTRUMENTS

## SOCIODEMOGRAPHIC AND HEALTH SURVEY

1. What is your gender?

Male    Female    Gender non-conforming

2. What is your age?

18 yrs    19 yrs

3. Are you currently working?

Yes, Part-time

Yes, Full-time

No, I am not working

4. Which best describes your race/ethnicity?

White    African American    Asian    Native Hawaiian/ other Pacific Islander

American Indian    Multiple races

Hispanic NonHispanic

Other: \_\_\_\_\_

5. What is your religious affiliation?

Lutheran    Catholic    Muslim

Hindu    Jewish    Eastern Orthodox

Buddhist

Other: \_\_\_\_\_

6. Are you an international student?

Yes    No

If yes, what is your country of origin? \_\_\_\_\_

7. Which department/school are you enrolled in? \_\_\_\_\_

8. How many credit hours are you enrolled in this semester? \_\_\_\_\_

9. Where are you currently living?

With family    University housing

Other: \_\_\_\_\_

10. Are you receiving financial aid for this academic year?

Yes    No

11. Are you currently under the care of a healthcare professional for a specific physical problem?

Yes    No

12. Are you currently under the care of a healthcare professional for a specific emotional problem?

Yes      No

13. Are you currently taking any medications?

Yes      No

14. How many hours of sleep do you get on average during the school week? \_\_\_\_\_

15. In the last month, how often have you felt stressed?

None of the time = 1   Several times = 2   Often = 3   All the time = 4

16. In the last month, how often have you felt sad or depressed?

None of the time = 1   Several times = 2   Often = 3   All the time = 4

17. What is your current height? \_\_\_\_\_

18. What is your current weight? \_\_\_\_\_

### Adolescent Decision-Making Questionnaire

People differ in the way they feel and go about making decisions. Please indicate how you normally make decisions by checking (X) in the box that best describes your way of doing things for each statement.

0=Not at all true for me    1=Sometimes true for me    2=Often true for me    3=Almost always true

for me

1. I feel confident about my ability to make decisions.
2. I am not as good as most people in making decisions.
3. I think that I am a good decision maker.
4. I feel so discouraged that I give up trying to make decisions.
5. The decisions I make turn out well.
6. It is easy for other people to convince me that their decision rather than mine is a correct one.
7. I avoid making decisions.
8. I take a lot of care before I make my choice.
9. I put off making decisions.
10. When faced with a decision I go along with what others suggest.
11. I panic if I have to make decisions quickly.
12. I'd rather let someone else make a decision for me so that it won't be my problem.
13. Once I have made a decision then I don't change my mind.
14. I prefer to leave decisions to others.
15. Whenever I get upset by having to make a decision, I choose on the spur of the moment
16. I like to think about a decision before I make it.
17. When I have to make a decision, I wait a long time before starting to think about it.
18. I feel as if I'm under tremendous pressure when making decisions.
19. I can't think straight if I have to make a decision in a hurry.
20. When I make a decision, I feel that I've made the best one possible.
21. I put little effort into making decisions.
22. The possibility that some small thing might go wrong causes me to immediately change my mind about what I'm going to do.
23. I like to make decisions myself.
24. When I'm forced to make a decision, I couldn't care less? which way I choose.
25. I choose on the basis of some small thing. I choose based on minor factors?
26. I tend to drift into decisions without thinking about them
27. When I decide to do something, I immediately go about it.
28. I don't like to take responsibility for making decisions.
29. When making decisions I tend to choose the first alternative that comes to mind.
30. I prefer to do what others choose because I don't like to be different.

## Decisional self-esteem

**I feel confident about my ability to make decisions.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all true for me	3	1.5	1.5	1.5
	Sometimes true for me	54	27.0	27.0	28.5
	Often true for me	104	52.0	52.0	80.5
	Almost always true for me	39	19.5	19.5	100.0
	Total	200	100.0	100.0	

**I am not as good as most people in making decisions.\***

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Almost always true for me	42	21.0	21.0	21.0
	Often true for me	99	49.5	49.5	70.5
	Sometimes true for me	48	24.0	24.0	94.5
	Not at all true for me	11	5.5	5.5	100.0
	Total	200	100.0	100.0	

*\*Reverse scored, almost always true for me=3, often true for me=2, sometimes true for me=1, not at all true for me=0*

**I think that I am a good decision maker.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all true for me	6	3.0	3.0	3.0
	Sometimes true for me	61	30.5	30.5	33.5
	Often true for me	105	52.5	52.5	86.0

Almost always true for me	28	14.0	14.0	100.0
Total	200	100.0	100.0	

**I feel so discouraged that I give up trying to make decisions.\***

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Almost always true for me	96	48.0	48.0	48.0
	Often true for me	72	36.0	36.0	84.0
	Sometimes true for me	27	13.5	13.5	97.5
	Not at all true for me	5	2.5	2.5	100.0
	Total	200	100.0	100.0	

*\*Reverse scored, almost always true for me=3, often true for me=2, sometimes true for me=1, not at all true for me=0*

**The decisions I make turn out well.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all true for me	1	.5	.5	.5
	Sometimes true for me	62	31.0	31.0	31.5
	Often true for me	124	62.0	62.0	93.5
	Almost always true for me	13	6.5	6.5	100.0
	Total	200	100.0	100.0	

**It is easy for other people to convince me that their decision rather than mine is a correct one.\***

		Frequency	Percent	Valid Percent	Cumulative Percent
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Valid	Almost always true for me	52	26.0	26.0	26.0
	Often true for me	94	47.0	47.0	73.0
	Sometimes true for me	42	21.0	21.0	94.0
	Not at all true for me	12	6.0	6.0	100.0
	Total=	200	100.0	100.0	

## Vigilance

**I take a lot of care before I make my choice.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all true for me	5	2.5	2.5	2.5
	Sometimes true for me	40	20.0	20.0	22.5
	Often true for me	96	48.0	48.0	70.5
	Almost always true for me	59	29.5	29.5	100.0
	Total	200	100.0	100.0	

**Once I have made a decision then I don't change my mind.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all true for me	27	13.5	13.5	13.5
	Sometimes true for me	101	50.5	50.5	64.0
	Often true for me	62	31.0	31.0	95.0
	Almost always true for me	10	5.0	5.0	100.0
	Total	200	100.0	100.0	

**I like to think about a decision before I make it.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all true for me	3	1.5	1.5	1.5
	Sometimes true for me	29	14.5	14.5	16.0
	Often true for me	78	39.0	39.0	55.0
	Almost always true for me	90	45.0	45.0	100.0
	Total	200	100.0	100.0	

**When I make a decision, I feel that I've made the best one possible.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all true for me	2	1.0	1.0	1.0
	Sometimes true for me	78	39.0	39.0	40.0
	Often true for me	91	45.5	45.5	85.5
	Almost always true for me	29	14.5	14.5	100.0
	Total	200	100.0	100.0	

**I like to make decisions myself.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all true for me	6	3.0	3.0	3.0
	Sometimes true for me	65	32.5	32.5	35.5
	Often true for me	83	41.5	41.5	77.0
	Almost always true for me	46	23.0	23.0	100.0
	Total	200	100.0	100.0	

**When I decide to do something, I immediately go about it.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all true for me	21	10.5	10.5	10.5
	Sometimes true for me	97	48.5	48.5	59.0
	Often true for me	71	35.5	35.5	94.5
	Almost always true for me	11	5.5	5.5	100.0
	Total	200	100.0	100.0	

**Panic scale**

**I panic if I have to make decisions quickly.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all true for me	35	17.5	17.5	17.5
	Sometimes true for me	77	38.5	38.5	56.0
	Often true for me	57	28.5	28.5	84.5
	Almost always true for me	31	15.5	15.5	100.0
	Total	200	100.0	100.0	

**Whenever I get upset by having to make a decision, I choose on the spur of the moment.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all true for me	60	30.0	30.0	30.0
	Sometimes true for me	78	39.0	39.0	69.0
	Often true for me	50	25.0	25.0	94.0

Almost always true for me	12	6.0	6.0	100.0
Total	200	100.0	100.0	

**I feel as if I'm under tremendous pressure when making decisions.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all true for me	24	12.0	12.0	12.0
	Sometimes true for me	96	48.0	48.0	60.0
	Often true for me	56	28.0	28.0	88.0
	Almost always true for me	24	12.0	12.0	100.0
	Total	200	100.0	100.0	

**I can't think straight if I have to make a decision in a hurry.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all true for me	31	15.5	15.5	15.5
	Sometimes true for me	83	41.5	41.5	57.0
	Often true for me	63	31.5	31.5	88.5
	Almost always true for me	23	11.5	11.5	100.0
	Total	200	100.0	100.0	

**The possibility that some small thing might go wrong causes me to immediately change my mind about what I'm going to do.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all true for me	29	14.5	14.5	14.5

\*Reverse

scored,

almost

always

true for

me=3,

often true

for me=2,

sometimes

true for

me=1, not

at all true

for me=0

**I put off making decisions.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all true for me	42	21.0	21.0	21.0
	Sometimes true for me	92	46.0	46.0	67.0
	Often true for me	51	25.5	25.5	92.5
	Almost always true for me	15	7.5	7.5	100.0
	Total	200	100.0	100.0	
	Sometimes true for me	115	57.5	57.5	81.0
	Often true for me	30	15.0	15.0	96.0
	Almost always true for me	8	4.0	4.0	100.0
	Total	200	100.0	100.0	

## Cop out scale

**I avoid making decisions.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all true for me	68	34.0	34.0	34.0
	Sometimes true for me	96	48.0	48.0	82.0
	Often true for me	30	15.0	15.0	97.0
	Almost always true for me	6	3.0	3.0	100.0
	Total	200	100.0	100.0	

**I prefer to leave decisions to others.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all true for me	65	32.5	32.5	32.5
	Sometimes true for me	93	46.5	46.5	79.0
	Often true for me	35	17.5	17.5	96.5
	Almost always true for me	7	3.5	3.5	100.0
	Total	200	100.0	100.0	

**When I have to make a decision, I wait a long time before starting to think about it.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all true for me	44	22.0	22.0	22.0
	Sometimes true for me	95	47.5	47.5	69.5
	Often true for me	47	23.5	23.5	93.0
	Almost always true for me	14	7.0	7.0	100.0
	Total	200	100.0	100.0	

**I put little effort into making decisions**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all true for me	122	61.0	61.0	61.0
	Sometimes true for me	57	28.5	28.5	89.5
	Often true for me	15	7.5	7.5	97.0

	Almost always true for me	6	3.0	3.0	100.0
	Total	200	100.0	100.0	

**I don't like to take responsibility for making decisions.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all true for me	71	35.5	35.5	35.5
	Sometimes true for me	82	41.0	41.0	76.5
	Often true for me	34	17.0	17.0	93.5
	Almost always true for me	13	6.5	6.5	100.0
	Total	200	100.0	100.0	

Complacency scale

**When faced with a decision I go along with what others suggest.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all true for me	23	11.5	11.5	11.5
	Sometimes true for me	108	54.0	54.0	65.5
	Often true for me	59	29.5	29.5	95.0
	Almost always true for me	10	5.0	5.0	100.0
	Total	200	100.0	100.0	

**I'd rather let someone else make a decision for me so that it won't be my problem.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all true for me	57	28.5	28.5	28.5



Sometimes true for me	87	43.5	43.5	72.0
Often true for me	40	20.0	20.0	92.0
Almost always true for me	16	8.0	8.0	100.0
Total	200	100.0	100.0	

**When I'm forced to make a decision, I couldn't care less which way I choose.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all true for me	121	60.5	60.5	60.5
	Sometimes true for me	49	24.5	24.5	85.0
	Often true for me	27	13.5	13.5	98.5
	Almost always true for me	3	1.5	1.5	100.0
	Total	200	100.0	100.0	

**I tend to drift into decisions without thinking about them.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all true for me	94	47.0	47.0	47.0
	Sometimes true for me	71	35.5	35.5	82.5
	Often true for me	26	13.0	13.0	95.5
	Almost always true for me	9	4.5	4.5	100.0
	Total	200	100.0	100.0	

**When making decisions I tend to choose the first alternative that comes to mind.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all true for me	71	35.5	35.5	35.5
	Sometimes true for me	98	49.0	49.0	84.5
	Often true for me	26	13.0	13.0	97.5
	Almost always true for me	5	2.5	2.5	100.0
	Total	200	100.0	100.0	

**I prefer to do what others choose because I don't like to be different.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all true for me	77	38.5	38.5	38.5
	Sometimes true for me	82	41.0	41.0	79.5
	Often true for me	32	16.0	16.0	95.5
	Almost always true for me	9	4.5	4.5	100.0
	Total	200	100.0	100.0	

## 2017 National Youth Risk Behavior Survey- Adapted version

This survey is about health behavior. It has been developed so you can tell us what you do that may affect your health. The information you give will be used to improve health education for young people like yourself. This survey asks about risk behaviors that have occurred during your second semester college freshman experience.

DO NOT write your name on this survey. The answers you give will be kept confidential. No one will know what you write. Answer the questions based on what you really do.

Completing the survey is voluntary. Whether or not you answer the questions will not affect your grades in any class. If you are not comfortable answering a question, just leave it blank.

The questions that ask about your background will be used only to describe the types of students completing this survey. The information will not be used to find out your name. No names will ever be reported.

Make sure to read every question. Fill in the ovals completely. When you are finished, follow the instructions of the person giving you the survey.

**Thank you very much for your help.**

1. During the past 3 months, how many times did you eat fruit? (Do not count fruit juice.)

A. I did not eat fruit during the past 3 months (5) B. 1 to 3 times during the past 3 months (4)

C. 4 to 6 times during the past 3 months (3) D. 1 time per day (2) E. 2 times per day (1)

2. During the past 3 months, how many times did you eat green salad?

A. I did not eat green salad during the past 3 months (5) B. 1 to 3 times during the past 3 months

(4) C. 4 to 6 times during the past 3 months (3) D. 1 time per day (2) E. 2 times per day (1)

3. During the past 3 months, how many times did you drink a bottle or glass of plain water? (Count tap, bottled, and unflavored sparkling water.)

A. I did not drink water during the past 3 months (5) B. 1 to 3 times during the past 3 months (4)

C. 4 to 6 times during the past 3 months (3) D. 1 time per day (2) E. 2 times per day (1)

4. During the past 3 months, on how many days were you physically active for a total of at least 60 minutes per day? (Add up all the time you spent in any kind of physical activity that increased your heart rate and made you breathe hard some of the time.)

A. 0 days (5) B. 1 day (4) C. 2 days (3) D. 3 days (2) E. 4 or more days (1)

5. During the past 3 months, on how many days did you do exercises to strengthen or tone your muscles, such as push-ups, sit-ups, or weight lifting?

A. 0 days (5) B. 1 day (4) C. 2 days (3) D. 3 days (2) E. 4 or more days (1)

6. During the past 3 months, on how many days did you smoke cigarettes?

A. 0 days (1) B. 1 or 2 days (2) C. 3 to 5 days (3) D. 6 to 9 days (4) E. 10 or more days (5)

7. During the past 3 months, on the days you smoked, how many cigarettes did you smoke per day?

A. I did not smoke cigarettes during the past 3 months (1) B. Less than 1 cigarette per day (2) C. 1 cigarette per day (3) D. 2 to 5 cigarettes per day (4) E. 6 or more cigarettes per day (5)

8. During the past 3 months, on how many days did you have 4 or more drinks of alcohol in a row (if you are female) or 5 or more drinks of alcohol in a row (if you are male)?

A. 0 days (1) B. 1 day (2) C. 2 days (3) D. 3 to 5 days (4) E. 6 to 9 days (5)

9. During the past 3 months, what is the largest number of alcoholic drinks you had in a row?

A. I did not drink alcohol during the past 3 months (1) B. 1 or 2 drinks (2) C. 3 drinks (3) D. 4 drinks (4) E. 5 drinks (5)

10. During the past 3 months, how many times did someone you were dating or going out with force you to do sexual things that you did not want to do? (Count such things as kissing, touching, or being physically forced to have sexual intercourse.)

A. I did not date or go out with anyone during the past 3 months (1) B. 1 time (2) C. 2 times (3) D. 3 times (4) E. 4 or 5 times (5)

11. During the past 3 months, how many times did someone you were dating or going out with physically hurt you on purpose? (Count such things as being hit, slammed into something, or injured with an object or weapon.)

A. I did not date or go out with anyone during the past 3 months (1) B. 1 time (2) C. 2 times (3) D. 3 times (4) E. 4 or 5 times (5)

**12.** During your life, with how many people have you had sexual intercourse?

A. I have never had sexual intercourse (1) B. 1 person (2) C. 2 people (3) D. 3 people (4) E. 4 or more people (5)

**13.** During the past 3 months, with how many people did you have sexual intercourse?

A. I have never had sexual intercourse (1) B. I have had sexual intercourse, but not during the past 3 months (2) C. 1 person (3) D. 2 people (4) E. 3 or more people (5)

**14.** During the past 3 months, how many times did you use marijuana?

A. 0 times (1) B. 1 or 2 times (2) C. 3 to 9 times (3) D. 10 to 19 times (4) E. 20 or more times (5)

**15.** During your life, how many times have you taken steroid pills or shots without a doctor's prescription?

A. 0 times (1) B. 1 or 2 times (2) C. 3 to 9 times (3) D. 10 to 19 times (4) E. 20 or more times (5)

**16.** During your life, how many times have you taken prescription pain medicine without a doctor's prescription or differently than how a doctor told you to use it? (Count drugs such as codeine, Vicodin, OxyContin, Hydrocodone, and Percocet.)

A. 0 times (1) B. 1 or 2 times (2) C. 3 to 9 times (3) D. 10 to 19 times (4) E. 20 or more times (5)

**17.** During the past 3 months, on how many days did you carry a gun? (Do not count the days when you carried a gun only for hunting or for a sport, such as target shooting.)

A. 0 days (1) B. 1 day (2) C. 2 or 3 days (3) D. 4 or 5 days (4) E. 6 or more days (5)

**18.** During the past 3 months, on how many days did you not go to school because you felt you would be unsafe at school or on your way to or from school?

A. 0 days (1) B. 1 day (2) C. 2 or 3 days (3) D. 4 or 5 days (4) E. 6 or more days (5)

**19.** During the past 3 months, how many times has someone threatened or injured you with a weapon such as a gun, knife, or club on school property?

A. 0 times (1) B. 1 time (2) C. 2 or 3 times (3) D. 4 or 5 times (4) E. 6 or more times (5)

**20.** During the past 3 months, how many times did you actually attempt suicide?

A. 0 times (1) B. 1 time (2) C. 2 or 3 times (3) D. 4 or 5 times (4) E. 6 or more times (5)

### Item Statistics

	Mean	Std. Deviation	N
During the past 3 months, how many times did you eat fruit? (Do not count fruit juice.)	3.64	.925	200
During the past 3 months, how many times did you eat green salad?	3.08	.893	200
During the past 3 months, how many times did you drink a bottle or glass of plain water? (Count tap, bottled, and unflavored sparkling water.)	4.58	.773	200
During the past 3 months, on how many days per week were you physically active for a total of at least 60 minutes per day? (Add up all the time you spent in any kind of physical activity that increased your heart rate and made you breathe hard some of the	3.89	1.235	200
During the past 3 months, on how many days per week did you do exercises to strengthen or tone your muscles, such as push-ups, sit-ups, or weight lifting?	3.08	1.535	200
During the past 3 months, on how many days did you smoke cigarettes?	1.50	1.066	200

During the past 3 months, on the days you smoked, how many cigarettes did you smoke per day?	1.35	.774	200
During the past 3 months, on how many days did you have 4 or more drinks of alcohol in a row (if you are female) or 5 or more drinks of alcohol in a row (if you are male)?	2.52	1.530	200
During the past 3 months, what is the largest number of alcoholic drinks you had in a row?	2.88	1.653	200
During the past 3 months, how many times did someone you were dating or going out with force you to do sexual things that you did not want to do? (Count such things as kissing, touching, or being physically forced to have sexual intercourse.)	1.42	.989	200
During the past 3 months, how many times did someone you were dating or going out with physically hurt you on purpose? (Count such things as being hit, slammed into something, or injured with an object or weapon.)	1.21	.675	200
During your life, with how many people have you had sexual intercourse?	2.63	1.590	200

During the past 3 months, with how many people did you have sexual intercourse?	2.25	1.141	200
During the past 3 months, how many times did you use marijuana?	1.83	1.269	200
During your life, how many times have you taken prescription pain medicine without a doctor's prescription or differently than how a doctor told you to use it? (Count drugs such as codeine, Vicodin, OxyContin, Hydrocodone, and Percocet.)	1.26	.725	200
During your life, how many times have you taken steroid pills or shots without a doctor's prescription?	1.16	.619	200
During the past 3 months, on how many days did you carry a gun? (Do not count the days when you carried a gun only for hunting or for a sport, such as target shooting.)	1.14	.585	200
During the past 3 months, on how many days did you not go to school because you felt you would be unsafe at school or on your way to or from school?	1.20	.655	200
During the past 3 months, how many times has someone threatened or injured you with a weapon such as a gun, knife, or club on school property?	1.13	.539	200



During the past 3 months, how many times did you actually attempt suicide?	1.12	.536	200
----------------------------------------------------------------------------	------	------	-----

### The Multi-Dimensional Support Scale

We are interested in how you feel about the following statements. Read each statement carefully. Indicate how you feel about each statement.

Circle the "1" if you **Very Strongly Disagree**

Circle the "2" if you **Strongly Disagree**

Circle the "3" if you **Mildly Disagree**

Circle the "4" if you are **Neutral**

Circle the "5" if you **Mildly Agree**

Circle the "6" if you **Strongly Agree**

Circle the "7" if you **Very Strongly Agree**

1. There is a special person who is around when I am in need.  
1 2 3 4 5 6 7
2. There is a special person with whom I can share my joys and sorrows.  
1 2 3 4 5 6 7
3. My family really tries to help me.  
1 2 3 4 5 6 7
4. I get the emotional help and support I need from my family.  
1 2 3 4 5 6 7
5. I have a special person who is a real source of comfort to me.  
1 2 3 4 5 6 7
6. My friends really try to help me.  
1 2 3 4 5 6 7
7. I can count on my friends when things go wrong.  
1 2 3 4 5 6 7
8. I can talk about my problems with my family.  
1 2 3 4 5 6 7
9. I have friends with whom I can share my joys and sorrows.  
1 2 3 4 5 6 7
10. There is a special person in my life who cares about my feelings.  
1 2 3 4 5 6 7
11. My family is willing to help me make decisions.  
1 2 3 4 5 6 7
12. I can talk about my problems with my friends.  
1 2 3 4 5 6 7

**This is the end of the survey. Thank you very much for your help.**

### Item Statistics

	Mean	Std. Deviation	N
There is a special person who is around when I am in need.	5.55	1.483	200
There is a special person with whom I can share my joys and sorrows.	5.74	1.409	200
I get the emotional help and support I need from my family.	5.35	1.721	200
My family really tries to help me.	5.61	1.594	200
I have a special person who is a real source of comfort to me.	5.71	1.392	200
My friends really try to help me.	5.60	1.443	200
I can talk about my problems with my family.	4.97	1.826	200
I can count on my friends when things go wrong.	5.56	1.409	200
I have friends with whom I can share my joys and sorrows.	5.75	1.400	200
There is a special person in my life who cares about my feelings.	5.80	1.461	200
My family is willing to help me make decisions.	5.75	1.456	200
I can talk about my problems with my friends.	5.81	1.339	200

## APPENDIX B

## Outline of On-line Invitation to Freshmen University students

### I. Thank you for participating in this study

#### a. Purpose of the study

1. To inform about my current research project and request voluntary participation
2. Choosing to voluntarily participate in the study will have no influence on grades

### II. My current roles

a. PhD in Nursing Science student at Loyola University Chicago

b. Nurse Practitioner at the Wellness Center at Loyola University

### III. Current study

#### a. Exploring decision-making and health-risk behaviors in college freshmen

1. Perceived family support
2. Perceived support from friends

#### b. Anticipated usefulness of results

1. Assist in early identification and early intervention for freshmen who may need assistance because of negative feelings

#### c. Request participation

1. Demographic form and three questionnaires to be completed
2. Anticipate approximately 60 minutes to complete
3. Participation is completely voluntary; may skip questions if not wishing to answer
4. There are no right or wrong answers
5. Will be completely anonymous; will not be able to connect answers to the person
6. Please do not put any identifiable information in the open bar fields
7. All data will be reported in aggregate
8. After completion, will be directed via email for contact information to provide with \$10 Amazon gift card
9. After completion, study subjects will be asked to contact the university wellness center, if needed for emotional assistance
10. May contact the researcher to request copy of results when available

APPENDIX C  
INFORMED CONSENT

## Consent to Take Part in a Human Research Study

### **Title of Research Study: Predicting Decision-making in relation to Health-Risk Behavior in College Freshmen**

**Principal Investigator: Anne B. Luckose, PM-ANP, APRN, NP-C**

**Address:** Loyola University Chicago, Marcella Niehoff School of Nursing  
2160 S. Ist Avenue/Maywood, IL 60153

**Phone:** 847-271-1379

Thank you for volunteering to participate in this study exploring decision-making and health-risk behaviors in college freshmen. I am a PhD Nursing student at Loyola University, Chicago, Illinois. Your participation in this study is voluntary and will have no influence on your grades. There is a demographic form along with three questionnaires. It should take you approximately 60 minutes to complete the questionnaires. There are no right or wrong answers to the questions presented, and you may skip questions if you do not wish to answer. Your answers will be anonymous; there will be no way to connect your answers to you. Please do not put any identifiable (names, birthday, address, etc.) information into the open-ended respect bar fields.

You may save the data responses at any time and can return to complete answering the questions. All data collected in this study will be reported in aggregate.

After completion of all questionnaires, you will be provided with \$10 Amazon gift card as compensation. You will be asked to complete a sign-up process for your incentive. No fees are required to sign up and you will be paid for your participation.

Also, after completion, you may contact your University Counseling Center, as well as local community mental health providers, should you feel the need to seek emotional assistance.

Included is a variety of resources so you can choose to contact the one(s) you think would be most helpful to you.

You may contact me via e-mail address to request a copy of the study results when they are available: [aluckose@luc.edu](mailto:aluckose@luc.edu).

Thank you for your time and effort!



APPENDIX D

SUBJECT RECRUITMENT FLYER

**On-line Study Flyer**

**Are you an 18-19 year old who just completed second semester college freshman at Loyola University?**

**Volunteers needed for research study**



The purpose of the study is to understand decision-making in college freshmen.

**Receive a \$10 Amazon gift card for your participation!**

Principal Investigator: Anne B. Luckose PhDc, PM-ANP, APRN, NP-C

Faculty Advisor: Barbara Velsor-Friedrich PhD, RN, FAAN

If interested, please contact: [aluckose@luc.edu](mailto:aluckose@luc.edu)

APPENDIX E

INFORMATION AND PSYCHOLOGICAL COUNSELING REFERRAL SOURCES

**If you feel you are in need of assistance for emotional issues or have psychosocial stress and would like to speak to someone, you may contact the following site for assistance:**

**During Wellness Center Hours:**

Contact the Wellness Center at 773.508.2530 or Dial-A-Nurse at 773.508.8883

**After Wellness Center Hours:**

Call 312.926.8100 for the Northwestern Memorial Hospital Crisis Line or call 800.273.8255 for the National Suicide Prevention Lifeline.

Campus Safety: On campus, dial 44.911

Off Campus: Dial 911

You may also visit Loyola University's website for more information

<http://luc.edu/wellness/resources/emergencyandafterscare/>

If you live on campus, you may also contact your Resident Director, who will know exactly where to obtain assistance.

(Loyola Wellness Center Website, June 2017)

Thank you.

APPENDIX F  
STUDY VARIABLES AND MEASUREMENTS

<b>Variable</b>	<b>Instrument</b>	<b>Items</b>	<b>Reliability and Validity</b>	<b>Interpretation of scores/values</b>
Decision-making	ADMQ	30  4-point Likert scale	Cronbach's Alpha 0.81  Content Validity and Criterion-related Validity established	Scale is scored by totaling the scores for each of the items Higher Score r/t vigilance & confidence= Better decision-making behaviors Higher score r/t complacency, panic & cop out = Poor decision-making behaviors
Health-risk behavior	Adapted YRBSS	20  5-point Likert Scale	Reliability established by CDC test-retest analysis on 2 occasions *	Quantity/frequency analysis
Family support	MSPSS  Family subscale	Total of 4 items 7-point Likert Scale	Cronbach's Alpha 0.87  Content Validity Established	Sub-scale is scored by totaling the scores for each of the items Higher Scores = Greater Perception of Social Support from Family
Social support	MSPSS  Friends subscale	Total of 8 items 7-point Likert Scale	Cronbach's Alpha 0.85  Content Validity Established	Sub-scale is scored by totaling the scores for each of the items Higher Scores = Greater Perception of Social Support from Friends

\* Validity may be affected by cognitive and situational factors (Brenner et al., 2013)

## FIGURES

Figure 1: Study Conceptualization using the Dual Systems Model of Adolescent Risk-taking (Steinberg, 2010).

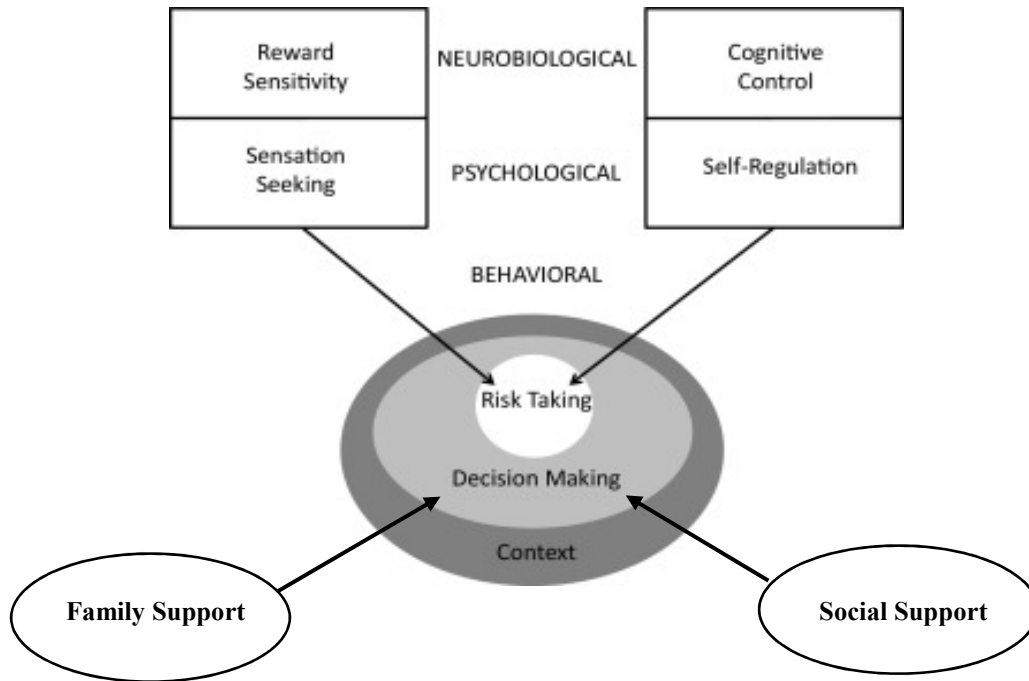
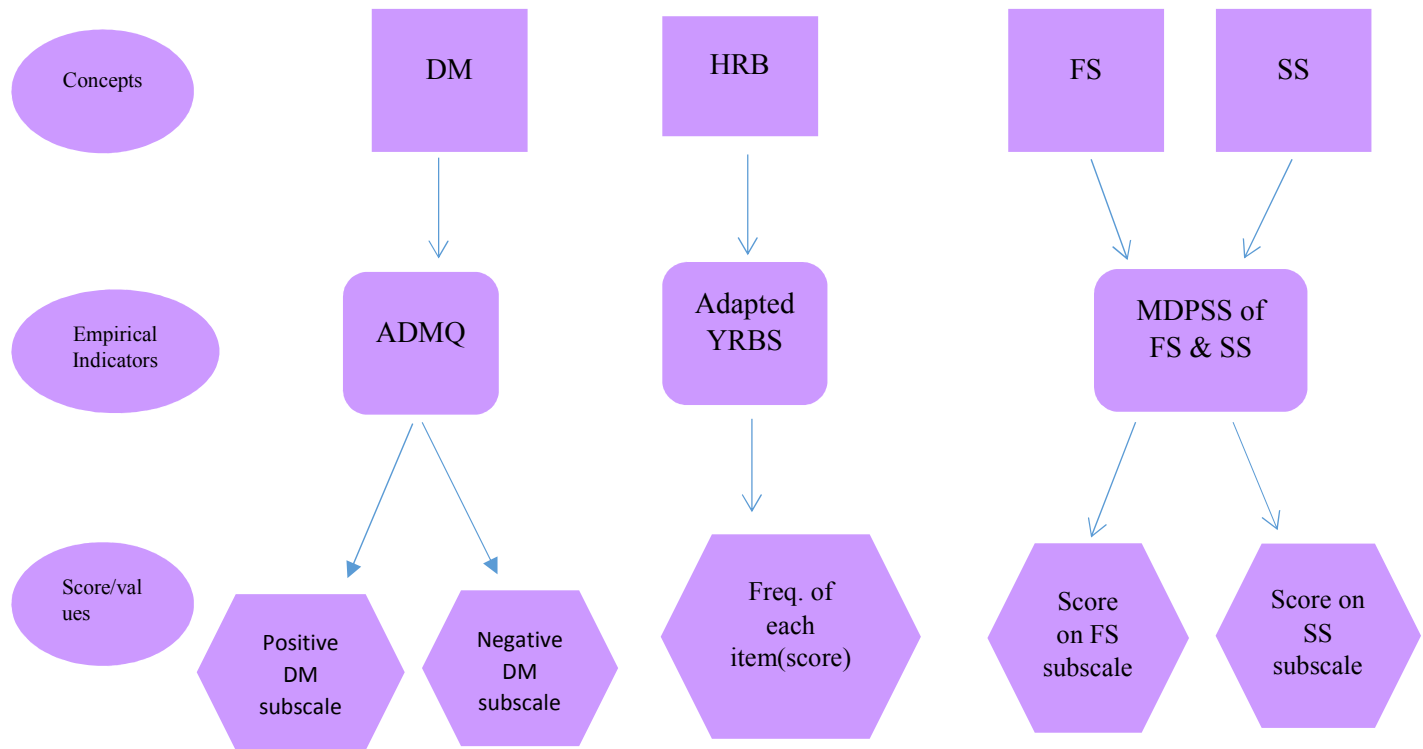




Figure 2: Substruction of Proposed Concepts



## Abbreviations:

DM: Decision-making

HRB: Health-risk behavior

FS: Family support

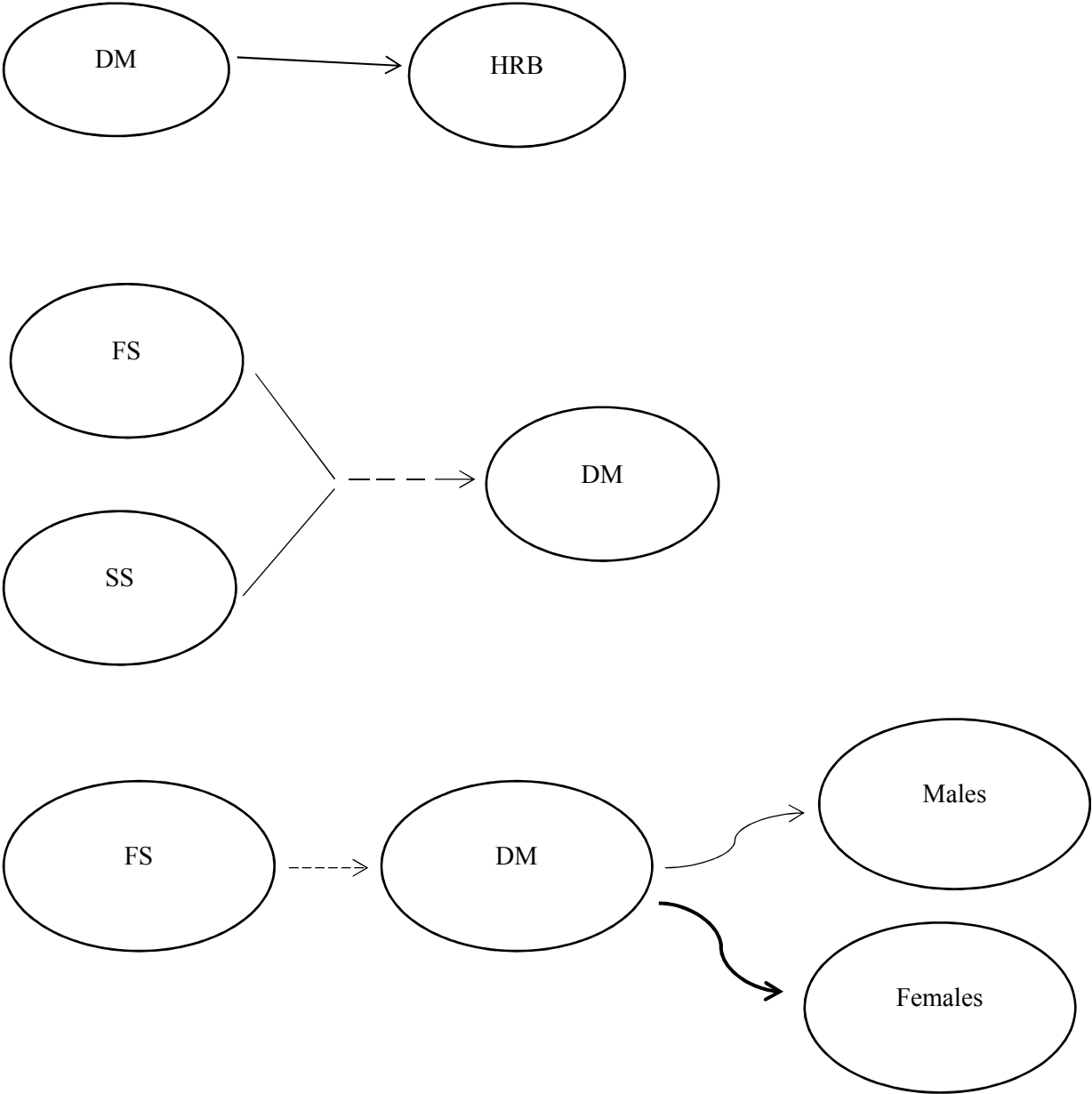
SS: Social support

ADMQ: Adolescent Decision-Making Questionnaire

YRBS: Youth Risk Behavior Survey

MDS: Multidimensional Scale of Perceived Social Support

Figure 3: Study Conceptualization for Hypothesis Testing



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## VITA

Anne B. Luckose graduated with a B.Sc(N) from Rajiv Gandhi University of Health Sciences, Bangalore, India in 1996. She earned her M.Sc(N) from Rajiv Gandhi University of Health Sciences, Mangalore, India in 2000. In 2007, she completed her Post-Master's Adult Nurse Practitioner program at North Park University Chicago. She maintains a current Board Certified Adult Nurse Practitioner certification since 2007.

Anne has worked in a variety of patient care clinical settings. As a registered nurse at Escorts Heart Institute and Research Center, Delhi, India she managed the care of cardiac surgical patients in the recovery/ICU unit. In the US, she worked as an Adult Day Care Coordinator for South-East Asia Center, Chicago. At the center, she coordinated the adult day care program, oversee case analysis, program development and documentation, address the physical, emotional and cognitive needs of the center's clients, develop and implement curricular and administrative program components and; coordinate and direct social services, medical programs and staff development policies. As a registered nurse, she worked in medical telemetry/critical care at Resurrection Medical Center, Chicago. As a Nurse Practitioner, she brings a variety of experience in diagnostic radiology (Northshore University Health System), wound care, women's health, Fall Prevention clinics of America, adult primary care/geriatrics in office setting, assisted living, independent living, long-term care and skilled nursing facilities (Midwest Medical Care) and hematology/medical oncology (American Cancer Care). She

currently works as an adult nurse practitioner in internal medicine/college health in the wellness center at the Lake Shore Campus of Loyola University Chicago.

Anne began her nurse faculty career at UHC School of Nursing, Chitradurga, Karnataka, India where she worked as a clinical instructor in the undergraduate nursing program. She became an assistant lecturer at Faran College of Nursing, Bangalore, India and then later worked as lecturer at S.C.S. College of Nursing, Mangalore, India in the undergraduate nursing program. In the US, Anne also served as Adjunct faculty at Northbrook College of Healthcare, Wheeling in 2012. In 2019, she has accepted to be part-time adjunct faculty for the school of nursing at Loyola University.

Anne has engaged in several scholarly activities. She presented her PhD Nursing internship project findings at the Midwest Nursing Research Society (MNRS) conference in March 2016, where she was awarded abstract of distinction on the project titled “Effect of NP Visits on Health Outcomes in African American Teens with Asthma”. It was later published in the Western Journal of Nursing Research (Article vol. 38, 10: pp. 1389., first published September 20, 2016). She also published an article titled “Mental Health during Adolescence” in the Indian Nurses Association of Illinois 15th anniversary souvenir publication 2018. She has also conducted workshops and seminars and, presented at several conferences on topics related to challenges with teen parenting, current treatment guidelines on selected sexually transmitted diseases, women's wellness, breast health awareness and, adolescent brain development. She expands her knowledge on adolescent health and prevention of risky behavior to the community by providing seminars on adolescent brain development with a neuroscience perspective. Anne has received several honors and has served on the Research/Grants committee for the National

Association of Indian Nurses of America (NAINA) in 2016. She currently serves as Research/Grants committee chair of NAINA for the term 2018-2020.