Properties of Possible Selves and the Social Context:

Determinants of Risky Behaviors in Adolescents

BY

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THESIS

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This thesis is dedicated to my family for their endless support and the memory of Dr. Beverly McElmurry for inspiring me to pursue this program, without whom it would never have been accomplished.

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LIST OF ABBREVIATIONS

CAST	Children of Alcoholics Screening Test
CDC	Center for Disease Control and Prevention
CI	Confidence Interval
DF	Degree of Freedom
FACES II	Family Adaptability and Cohesion Scales
LR	Likelihood Ratio Test
NIAAA	National Institute on Alcohol Abuse and Alcoholism
OR	Odds Ratio
SD	Standard Deviation
USDHHS	U.S. Department of Health and Human Services

SUMMARY

Adolescent alcohol and tobacco use are serious public health problems. Though numerous social determinants of adolescent alcohol use and tobacco use have been identified, many of these factors are difficult to change, e.g., living in a single parent home, family dysfunction, parental alcohol problems. Moreover, intrapersonal factors, e.g., alcohol expectancies (beliefs about the effects of alcohol on people in general) become more positive for the majority of youth about age 10–11, and as such, are not highly discriminating. *Possible selves*–the selves one hopes to be, fears becoming, and expects to become–have been shown to powerfully predict behavior, but have been underexplored as predictors of alcohol and tobacco use in adolescents. Because possible selves are highly personalized future-oriented cognitions, they may distinguish those adolescents who are at highest risk. To date, studies have focused on the effects of different properties of possible selves on behavior, but there is no clear theoretical framework for understanding which properties may regulate adolescent alcohol and tobacco use.

Our first aim was to determine the prospective effects of multiple properties of possible selves on level of alcohol consumption and degree of alcohol problems in adolescents. Our second aim was to determine whether having an expected possible self as a "drinker" predicts tobacco use, and whether the effect persists after controlling for alcohol consumption. We conducted a secondary analysis of data from 137 adolescents (50% girls; 84% Caucasian) across the transition to high school–a peak period of vulnerability for alcohol and tobacco use in adolescents. Possible selves in 8th grade were measured with an open-ended format questionnaire. Alcohol consumption, alcohol problems, and tobacco use were measured in 8th grade (control variables) and 9th grade (outcome variables) using closed-ended questionnaires. Social determinants measured in 8th grade (family structure, family cohesion, parental alcohol problems, and friend influence) were used as control variables.

For the first aim, properties of the total array of possible selves (number of hoped-for, feared, and expected possible selves and number of balanced hoped-for/feared possible self pairs) and properties of a single content domain (related to alcohol and the most important possible selves) in 8th grade were examined as predictors of 9th grade level of alcohol consumption (number of drinks/week) and degree of alcohol problems in the past 12 months after controlling for family structure, family cohesion, parental alcohol problems, friend influence, gender, and 8th grade alcohol consumption/problems. Regression models showed that domain-specific possible selves were more consistently predictive of adolescent alcohol consumption and alcohol problems than properties of the total array of possible selves. Having an expected possible self as a "drinker" in 8th grade predicted higher alcohol consumption and more alcohol problems in 9th grade. Having a most important hoped-for possible self related to academics in 8th grade predicted lower alcohol consumption and fewer alcohol problems in 9th grade. Having many hoped-for possible selves and having a feared possible self as a "drinker" in 8th grade predicted lower alcohol consumption in 9th grade, whereas having a most important feared possible self related to academics in 8th grade predicted fewer alcohol problems in 9th grade.

For the second aim, we focused on whether having an expected possible self as a "drinker" in 8th grade predicted ever using tobacco by 9th grade in adolescents controlling for social determinants, gender, and 8th grade tobacco use, and whether this influence persists after controlling for concurrent (9th grade) alcohol consumption. Logistic regressions showed that having an expected possible self as a "drinker" in 8th grade predicted ever using tobacco by 9th grade even after controlling for social determinants and concurrent alcohol consumption.

To our knowledge this is the first study to examine the simultaneous effects of multiple properties of possible selves on alcohol consumption and alcohol problems in adolescents. It was also the first study to determine whether an expected possible self as a "drinker" might explain the

relationship between alcohol and tobacco use in adolescents. Given that possible selves are modifiable, particularly in the formative years, these findings provide evidence that possible selves may be a viable intervention target to prevent alcohol and tobacco use in adolescents. Interventions to foster the development of expectations in a variety of healthy domains, highlighting the potential negative consequences of drinking, and fostering the importance and personal relevance of academics may be beneficial.

I. INTRODUCTION

This dissertation is comprised of two manuscripts that focus on the influence of future-oriented cognitions about the self (called possible selves) on alcohol and tobacco use. The purpose of the first manuscript is to determine which properties of possible selves are the strongest prospective predictors of alcohol consumption and alcohol problems in adolescents. This manuscript fills two critical gaps in the literature. The first gap is that although a large body of literature has shown that possible selves predict behaviors, including binge drinking in college students, possible selves have been underexplored in relation to alcohol use in adolescents. The second gap is that some studies to date have focused on properties of the total array of possible selves (e.g., the number of hoped-for possible selves, the number of feared possible selves, the number of expected possible selves, and the number of balanced hoped-for/feared possible self pairs) whereas other studies have focused on properties related to a possible self in a single content domain (e.g., possible self related to alcohol, the most important domain). In this paper, we report the findings of a secondary analysis of data to examine each of these properties in the 8th grade as predictors of alcohol consumption and alcohol problems in 9th grade, controlling for family structure, family cohesion, parental alcohol problems, friend influence, gender, and 8th grade alcohol consumption/problems.

The purpose of the second paper is to determine whether availability in memory of an expected possible self as a "drinker" in 8th grade predicts ever using tobacco by 9th grade in adolescents, controlling for known social determinants, gender, and 8th grade tobacco use, and whether this influence persists even after controlling for concurrent (9th grade) alcohol consumption. Some limited evidence in adults suggests that having a possible self related to one substance (e.g., alcohol) may enhance the processing of information and motivate behavior related to a correlated substance (e.g., tobacco). This would be important because it may explain, at least in part, the correlation between alcohol and tobacco use. In this paper, we use the same dataset as above for the first paper. The main predictor is presence

(yes/no) of an expected possible self as a “drinker” (8th grade) and the outcome variable is report of any tobacco use (9th grade). In a second logistic regression analysis the following control variables are added to the model: family structure, family cohesion, parental alcohol problems, friend influence, gender, and 8th grade tobacco use. In the final logistic regression model, 9th grade alcohol consumption is added as a predictor.

This comprehensive evaluation of the effects of multiple properties of possible selves on alcohol consumption and alcohol problems, and determining whether an expected possible self as a “drinker” accounts at least in part for the correlation between alcohol and tobacco use contributes valuable new information about the influence of possible selves on adolescent risk behavior. Findings from this dissertation study are expected to guide the development of interventions that protect against and reduce risk for alcohol and tobacco use in adolescents.

II. PROSPECTIVE EFFECTS OF POSSIBLE SELVES ON ALCOHOL CONSUMPTION AND ALCOHOL PROBLEMS IN ADOLESCENTS

A. Introduction

Underage drinking continues to be a significant public health problem leading to injuries, alcohol poisoning, risky behavior (e.g., driving after drinking, sex after drinking), and death (National Institute on Alcohol Abuse and Alcoholism [NIAAA], 2009a, 2009b; Tapert & Schweinsburg, 2005). Alcohol is the most common substance used by adolescents in the United States (Centers for Disease Control and Prevention [CDC], 2012; Johnston, O'Malley, Bachman, & Schulenberg, 2012). Researchers have found that alcohol initiation often occurs in 7th to 8th grade in the U.S., with the transition to high school being a peak period of escalation of use (CDC, 2012; Chartier, Hesselbrock, & Hesselbrock, 2010; Duncan, Duncan, & Strycker, 2006; Faden, 2006; Johnston et al., 2012). Though experimentation with alcohol is common during adolescence, not all adolescents who experiment with alcohol go on to drink frequently or heavily or develop problems as a result of alcohol consumption (DeWit, Adlaf, Offord, & Ogborne, 2000; McGue & Iacono, 2005). The subgroup of adolescents who do are at highest risk for developing longstanding problems with alcohol, e.g., alcohol use disorders and the related and often devastating psychosocial, physical, and legal consequences (Ellickson, Tucker, & Klein, 2003; Hingson, Heeren, & Winter, 2006; Huurre et al., 2010; McGue & Iacono, 2005; Trim, Meehan, King, & Chassin, 2007).

Determinants of adolescent alcohol consumption/problems from various domains of influence have been identified, yet many of these determinants are difficult to change. Moreover, considerable variance in alcohol consumption/problems remains unexplained. Parents and family are major domains of influence. Parental alcohol problems influence adolescent alcohol use both genetically and through modeling of alcohol use (Abar, Abar, & Turrisi, 2009; Jordan & Lewis, 2005; Trim et al., 2007). Familial risk factors include family structure and family functioning. Researchers have found that adolescents who live in single-parent families are more likely to report lifetime alcohol use and symptoms of

abuse/dependence compared to those from two-parent families (Barrett & Turner, 2006; Habib et al, 2010). While the mechanism is not entirely clear, adolescents of single-parents may have more unsupervised time, and thus, fewer limits on accessing alcohol (Barrett & Turner, 2006). Other researchers have found that poor family functioning is a risk factor. Adolescents who perceive either *insufficient* family cohesion (i.e., lack of the emotional bonding among family members) or *extreme* cohesion (i.e., enmeshed family, extreme bonding and limited individual independence) were more likely to use alcohol compared to those with more balanced or mid-range family cohesion (Marsiglia, Kulis, Parsai, Villar, & Garcia, 2009; Smart, Chibucos, & Didier, 1990).

Another major domain of influence on adolescent alcohol consumption/problems is peers. The effects of peer drinking and positive peer attitudes toward alcohol use have been well-documented (Donovan, 2004; Nash, McQueen, & Bray, 2005; Scheier, Botvin, & Baker, 1997). But because adolescents choose their friends, positive peer attitudes toward alcohol and peer alcohol use likely reflect an already heightened vulnerability in the adolescent.

Intrapersonal determinants are another important domain of influence. Externalizing personality traits (e.g., aggression, impulsivity) have consistently been shown to predict adolescent alcohol consumption/problems (Burk et al., 2011; Krank et al., 2011), but they are difficult to mitigate because personality traits are fairly enduring (Hampson & Goldberg, 2006; Hopwood et al., 2009). Cognitions about the positive effects of alcohol, called positive alcohol expectancies, have also been shown to predict alcohol use in adolescents (Simons-Morton, 2004; Zamboanga, Schwartz, Ham, Hernandez Jarvis, & Olthuis, 2009). But researchers have found that alcohol expectancies are negative in early childhood for *most* children and become more positive by about age 10 for *most* children (Dunn & Goldman, 1996; Miller, Smith, & Goldman, 1990). As such, positive alcohol expectancies are not highly discriminating.

Possible selves, cognitions about the selves one hopes to become ("hoped-for" possible selves), fears becoming ("feared" possible selves), or expects to become ("expected" possible selves) in the future (Markus & Nurius, 1986), are likely to be much more discriminating because they are *highly personalized cognitions*. They include vivid images of the self in the future state as well as strategies for achieving or avoiding possible selves (Cross & Markus, 1991; Markus & Nurius, 1986; Oyserman & James, 2009; Oyserman & Markus, 1990a; vanDellen & Hoyle, 2008). Possible selves have been shown to be powerful predictors of adolescent behaviors (Aloise-Young, Hennigan, & Leong, 2001; Newberry & Duncan, 2001; Oyserman, Bybee, & Terry, 2006; Oyserman & Markus, 1990a, 1990b; Stein, Roeser, & Markus, 1998), including alcohol use in college students (Quinlan, Jaccard, & Blanton, 2006), but they have been underexplored in relation to adolescent alcohol use. Because possible selves are modifiable, particularly in the formative stages of development (Oyserman et al., 2006), they may be very promising intervention targets. The purpose of the present study was to determine the prospective influence of possible selves on alcohol consumption and alcohol problems controlling for other known determinants during a peak developmental period for escalation of alcohol use—the transition to high school.

1. Possible selves: Future aspects of the self-system

Development of the self-system, i.e., identity development, is the most significant life task for adolescents (Erikson, 1968, 1980). During this developmental period, adolescents "try on" identities as a way of determining possibilities for who they will be in the future. These "hoped-for," "feared," and "expected" possible selves serve as a roadmap for the future (Oyserman, Bybee, Terry, & Hart-Johnson, 2004). As such, the importance of an adolescent's possible self choices cannot be overstated. Owing to different values, experiences, and goals, each adolescent has a unique collection of possible selves.

Various properties of possible selves have been shown to predict behavior, though only one or two properties have been examined in a single study. As such, it is not clear which possible self properties have the strongest relationships with behavior. Some researchers have focused on properties

of the total collection of possible selves, e.g., number of hoped-for, feared, and/or expected possible selves, or the number of balanced pairs (hoped-for and feared possible selves in the same domain) (Aloise-Young et al., 2001; Black, Stein, & Loveland-Cherry, 2001; Oyserman & Markus, 1990a, 1990b). Other researchers have focused on properties of a single domain (presence or absence of a possible self in a specific content domain such as health or drinking; content of the *most important* possible self) (Hooker & Kaus, 1992; Quinlan et al., 2006). The relative effects of the different possible self properties on adolescent alcohol consumption/problems are not known.

a. Properties of the total array of possible selves

Four possible self properties pertain to the total array of possible selves: the number of hoped-for, feared, and expected possible selves and the number of balanced pairs of possible selves. Aloise-Young et al. (2001) found that having few positive expected selves was associated with more alcohol and tobacco use in 6th to 9th graders. In another study of adolescents, Newberry and Duncan (2001) found that adolescents with high levels of delinquent behaviors had more negative possible selves, but it is not clear whether these negative selves were feared possible selves or negative expected possible selves. Taken together, these studies suggest that positively valenced possible selves may be protective, and negatively valenced possible selves may be a vulnerability for risk behavior. Another property of the total array of possible selves is balance. Balance refers to a content match between a hoped-for (or expected) and feared possible self. In a series of studies, Oyserman and colleagues found that balance (e.g., “hope I will do well in school,” “fear I won’t do well in school”) was protective against delinquency (Oyserman & Markus, 1990a, 1990b) and was associated with improved academic performance among adolescents (Oyserman et al., 2006; Oyserman et al., 2004; Oyserman, Gant, & Ager, 1995). In contrast, Aloise-Young et al. (2001) found that balance was not associated with alcohol and tobacco use in 6th to 9th graders. Thus, the findings on the influence of balanced possible self pairs on adolescent risk behavior are mixed.

b. Properties related to a specific content domain

A large body of literature has shown that a possible self in a given content domain predicts behavior in that domain. In a sample of college students, Harju and Reed (2003) showed that having a hoped-for possible self related to exercise was associated with more workout hours and better fitness levels. In another sample of college students, Quinlan et al. (2006) found that having a possible self as a binge drinker was positively associated with the number of binge-drinking episodes. Other researchers have shown that *the most important possible self* has a powerful influence on behavior. In older adults, Hooker and colleagues found that having a most important hoped-for or feared possible self related to health was associated with more positive health behaviors (Hooker & Kaus, 1992) and greater perceived health (Hooker, 1992). This finding did not hold, however, for young and middle-aged adults (Hooker & Kaus, 1994). It is not clear whether the finding did not hold for young and middle-aged adults because the content domain (health) was not perceived as relevant in this age group or having a most important domain is not as relevant in this age group.

Based on the social cognitive theoretical model of the self-concept and empirical evidence, the following hypotheses were tested after controlling for gender and alcohol consumption (or alcohol problems) in 8th grade:

Hypothesis 1: Having many hoped-for possible selves in 8th grade will predict lower levels of alcohol consumption and fewer alcohol problems in 9th grade.

Hypothesis 2: Having many balanced (hoped-for and feared) possible self pairs in 8th grade will predict lower levels of alcohol consumption and fewer alcohol problems in 9th grade.

Hypothesis 3: Having many feared possible selves in 8th grade will predict higher levels of alcohol consumption and more alcohol problems in 9th grade.

Hypothesis 4: Having a possible self related to “alcohol” in 8th grade will predict higher levels of alcohol consumption and more alcohol problems in 9th grade.

Hypothesis 5: The most important hoped-for and feared possible selves in 8th grade will predict lower levels of alcohol consumption and fewer alcohol problems in 9th grade.

Because expected possible selves may contain both positive and negative content, we could not hypothesize the direction of the effects of expected possible selves on alcohol consumption and alcohol problems. As such, we asked the following research questions:

Research Question 1: Does the number of expected possible selves in 8th grade predict alcohol consumption and degree of alcohol problems in 9th grade?

Research Question 2: Does the *most important* expected possible self in 8th grade predict alcohol consumption and degree of alcohol problems in 9th grade?

B. Method

We conducted a secondary analysis of a longitudinal dataset from a study of adolescents' self-cognitions and a wide range of behaviors across the transition from 8th grade to 9th grade in a single public junior high school in a working-class, suburban community (Stein et al., 1998). In the original study, possible selves and risky behaviors were measured in the Spring semester of both 8th and 9th grades (1992 and 1993). Possible selves and perceived friends' influence were measured using individual interviews during the school day in a designated room at the school. Approximately three weeks later, alcohol consumption/problems, family cohesion, parental alcohol problems, demographics, and other measures not reported in this analysis were measured using a group administration of questionnaires. In this analysis, we examined 8th grade possible selves, social determinants, and gender as well as the level of alcohol consumption and alcohol problems in both 8th and 9th grades.

1. Participants

Of the 160 adolescents in the original study, 137 (n = 69; 50% girls) completed measures in both 8th and 9th grades, and, thus, were included in this analysis. The adolescents' mean age was 13.5±0.6

years in the 8th grade and 14.5±0.6 years in the 9th grade. Most adolescents were Caucasian (84%), followed by African Americans (13%), and others (3%).

2. Measures

a. Alcohol consumption and alcohol problems

Alcohol consumption (average number of drinks per week in the last 12 months) and degree of alcohol problems in the last 12 months were measured in the 8th and 9th grades. Alcohol consumption and alcohol problems in 8th grade were treated as control variables, and 9th grade alcohol consumption and alcohol problems were treated as outcome variables.

1) Alcohol consumption

The level of alcohol consumption was measured by three questions about frequency of use (beer, wine, and hard liquor separately) and three questions about quantity of use of beer, wine, and hard liquor (separately) in the previous 12 months (Shope, Copeland, & Dielman, 1994). The frequency questions, e.g., "*How often did you drink beer (wine, hard liquor) in the past 12 months?*" included the following response categories: haven't had a drink in the past 12 months, a few times a year or less, about once a month, about once a week, three or four days a week, every day. The quantity questions, e.g., "*When you drank beer (wine, hard liquor) during the past 12 months, how many cans or bottles (glasses or shots) did you usually have at one time?*" included the following response categories: haven't had a drink in the past 12 months, less than one, one, two, three or four, five or six, or seven or more. Quantity and weekly frequency were multiplied to reflect the average number of drinks per week in the previous 12 months for beer, wine, and hard liquor (separately). Then, the number of drinks per week for each beverage type was summed to reflect the level of total alcohol consumption per week in the previous 12 months.

2) Alcohol problems

Alcohol problems were measured with the Alcohol Misuse Scale (Shope et al., 1994), a 10-item scale that reflects negative consequences of alcohol use in the previous 12 months, e.g., "*How many times did you get into trouble with the police (parents, friends) because of your drinking?*" Responses included never, once, two times, and three or more times. The items were summed to create a total alcohol problems score. Shope et al. (1994) reported adequate validity and reliability of the measure in 10th and 12th graders. In this study, Cronbach's alpha was 0.73 in 8th graders and 0.84 in 9th graders.

b. Possible selves

Hoped-for, feared, and expected possible selves in 8th grade were measured with an open-ended format possible-selves questionnaire (Oyserman & Markus, 1990a). Participants listed as many hoped-for possible selves as they could (at least three) in response to "*What do you hope you will be like next year?*" They similarly listed feared possible selves in response to "*What do you want to avoid being or are afraid you might be next year?*" and expected possible selves in response to "*What do you expect you might be like next year?*" The hoped-for, feared, and expected possible self-descriptors were content coded in the parent study using a coding scheme developed by Herzog and Markus (1999). The coding scheme contained major categories (social relationships, work and activities, health/health activities, physical appearance, other personal characteristics, attitudes and philosophy of life, and psychological characteristics) that were subdivided into increasingly specific codes (e.g., one of the subdivisions under social relationships was family, which was divided into relationships with parents, siblings, grandparents, etc.). Although this coding scheme was originally developed for adults, the domains are consistent with domains known to be relevant to adolescents (Knox, Funk, Elliott, & Bush, 2000; Oyserman & Markus, 1990a). Interrater reliability for the most specific content code category was 83% in 8th grade and 89% in 9th grade. In the current study, we used the middle-level codes (e.g., relationships with parents, friendships, occupation, academics, sports/exercise activities, health

behaviors, risky behaviors, physical appearance, and delinquency) to establish balanced possible self pairs. We recoded a random sample of 10% of participants' possible selves using the middle level categories to confirm accuracy and relevance of the original coding.

1) Properties of the total array of possible selves

The number of hoped-for, feared, and expected possible selves was derived from each participant's self-generated list. In order to determine the number of balanced pairs of possible selves, the content of hoped-for and feared possible selves was examined for content matches using the middle-level codes. Each possible self was only counted in one possible self pair.

2) Drinking possible self

We examined all possible selves and coded them for presence/absence of alcohol-related content (yes/no).

3) The most important possible selves

Given that basic memory literature shows that the order of spontaneously generated items (e.g., self-descriptors) reflects accessibility in memory and thus, relative importance (Krosnick, 1989; Towse, Cowan, Hitch, & Horton, 2008), we considered the first hoped-for, feared, and expected possible selves listed to be the most important possible selves. The most important hoped-for, feared, and expected possible selves were content coded using the middle-level content code categories.

c. Social determinants of alcohol use

Known social determinants of alcohol use in 8th grade included family structure, family cohesion, parental alcohol problems, and perceived friends' influence.

1) Family structure

Family structure was measured by using multiple-choice questions to ask participants, "*Who do you live with?*" The response options were included: Mother, father, stepparent, grandparent, other

adult, and someone else. Based on their answers, family structure was dichotomized into “single-parent family” and “two-parent family.”

2) Family cohesion

The 16-item cohesion subscale from Family Adaptability and Cohesion Scales (FACES II) (Olson, 1982) was used to measure the degree of family cohesion, an indicator of family functioning. A five-point response for each statement ranges from “almost never” to “almost always.” Adequate reliability and validity has been demonstrated in a study with a national survey of couples and families (Olson, 1982). Cronbach’s alpha for family cohesion was 0.86 in the present study. Moreover, family cohesion has been determined to have a curvilinear relationship to family functioning (Green, Harris, Forte, & Robinson, 1991; Olson, 1991; Olson & Gorall, 2003). Midrange levels of cohesion (i.e., “effective cohesion”) reflect optimal family functioning whereas high or low cohesion (i.e., “ineffective cohesion”) reflect poor family functioning (Green et al., 1991; Olson, 1982).

3) Parental alcohol problems

Parental alcohol problems were measured with the short form of the Children of Alcoholics Screening Test (CAST) (Hodgins, Maticka-Tyndale, El-Guebaly, & West, 1993). The CAST has been found to have high agreement with close family member reports regarding parental alcohol problems (Staley & El-Guebaly, 1991). Five items in a yes/no format addressed the experiences and attitudes related to a parent's alcohol problems (e.g., “Did you ever wish that a parent would stop drinking?”). All “yes” answers were summed to obtain a total score for each adolescent (ranged 0–5). In the current study, the Cronbach's alpha coefficient was 0.77.

4) Perceived friends’ influence

Adolescents’ perceived social influence from friends was measured by a question: “*How important do you think your friends were in making you the way you are now?*” (Oyserman, 1993).

Responses are scored on a five-point scale ("not at all" to "very"). Higher scores indicated that the adolescent perceived higher friends' influence.

3. Statistical analysis

The analyses were conducted with Stata 12.0. Descriptive statistics were computed for all variables for boys, girls, and the total sample. Bivariate correlation was used to estimate the relationships among the predictor variables. Then, multiple regression analyses were conducted to determine the significance and estimate the direction and size of the effects of possible self properties on alcohol consumption and alcohol problems separately, controlling for family structure, family cohesion, parental alcohol problems, friend influence, gender, and the corresponding 8th alcohol consumption/problems variable. In each model, all relevant predictors were entered into the models simultaneously. Robust standard error estimation method was applied because the residual variances of the outcome variables were not homogeneous (Heritier, Cantoni, Copt, & Victoria-Feser, 2009).

C. Results

1. Alcohol consumption and alcohol problems

Table I shows the average alcohol consumption and alcohol problem scores for those who reported drinking. Fifty-seven percent (n = 78) of the adolescents reported alcohol consumption (range 0.03–25.6 drinks/week) in 8th grade and 68% (n = 94) reported alcohol consumption in the 9th grade (range 0.03–80.6 drinks/week). Mean alcohol consumption for those who reported drinking was 1.3 (SD = 4.1) in 8th grade and 3.8 (SD = 10.0) in 9th grade. There were no gender differences in level of alcohol consumption in either 8th or 9th grade. The mean alcohol problem score was 12.0 (SD = 3.6) in 8th grade and 13.0 (SD = 5.0) in 9th grade, with girls reporting higher alcohol problem scores than boys ($p < 0.05$) in both 8th and 9th grades. Paired t-test showed that both level of alcohol consumption and the degree of alcohol problems increased significantly from 8th to 9th grade for girls ($p < 0.01$). One boy reported very high alcohol consumption (80.6 drinks/week) in 9th grade, and he also reported the highest alcohol

problem score. We ran further analyses with and without this participant and the findings were unchanged so we kept this participant in the analysis.

2. Properties of possible selves

Table II shows the descriptive statistics for all possible self properties. No significant differences between boys and girls in any of the possible self properties were found.

a. Total array of possible selves

Adolescents generated an average of 3.3 hoped-for possible selves (range 1–7), 3.4 feared possible selves (range 0–7), and 3.5 expected possible selves (range 0–10). The mean number of balanced pairs (content matches between hoped-for and feared possible selves) of possible selves was 1.0 (range 0–3).

b. Drinking possible self

Only 6% (n = 8) of the sample spontaneously generated a possible self related to alcohol. In every case, these possible selves were feared possible selves related to alcohol (i.e., *feared drinker* possible selves), e.g., “hope I won’t drink like my sister,” “I don’t want to turn into someone who drinks,” and “I am afraid of getting back into drinking.” We were surprised by this because existing studies to date (all using closed-ended measures) have focused on an “expected” drinker possible self (Corte & Szalacha, 2010; Quinlan et al., 2006), not a “feared” drinker possible self. Given that the original study also included a closed-ended measure of an *expected drinker* possible self, we decided to include responses from this measure as well. Adolescents rated the likelihood that “*DRINK TOO MUCH ALCOHOL IN THE FUTURE*” would describe them in the future on a five-point scale (“not at all likely,” “a little,” “somewhat,” “quite a bit,” or “very likely”). Eighty-nine percent of the sample (n = 122) reported “not at all” (no evidence of an expected drinker possible self). Of the other 15 adolescents, 13 reported “a little,” one adolescent reported “somewhat,” one adolescent reported “quite a bit,” and none reported “very likely.” Given the distribution, and consistent with Corte and Szalacha (2010), we

considered any positive endorsement (a little to very likely) as evidence of an *expected drinker* possible self (11%, n = 15). Two participants had both *feared and expected drinker* possible selves.

c. Most important domain

Academics was most frequently listed as the first (and, therefore, considered the most important) content domain for hoped-for, feared, and expected possible selves. Thirty-two percent (n = 44) of the sample had a most important hoped-for possible self related to academics, 26% (n = 35) had a most important feared possible self related to academics, and 44% (n = 60) had a most important expected possible self related to academics in 8th grade.

3. Social determinants

Table III shows the descriptive statistics for the social determinants in 8th grade. Over a third of the sample (36.5%) reported living in a single-parent home. Approximately half reported ineffective (either lack of or extreme) family cohesion. Among those with poor family cohesion, 93% (n = 64) reported very low levels of cohesion (disengaged) and 7% (n = 5) reported very high levels of cohesion (enmeshed). Parental alcohol problem scores ranged from none (0) to very high (5), but the mean was less than 1. The mean perceived influence of friends was 3.6 and ranged from low (1) to high (5). Perceived friend influence was the only social determinant showing a gender difference, with girls reporting higher scores than boys.

4. Bivariate relationships among predictors

Bivariate correlations among the predictors were examined. Spearman's Rho coefficient was used for two ordinal predictors, phi coefficient was used for two binary predictors, and point-biserial coefficient was used for one dichotomous predictor with one continuous predictor. Table IV shows the bivariate correlations. Possible self properties were modestly but not highly correlated with each other; the largest correlation coefficient was 0.47 between the many feared possible selves and having a feared drinker possible self. Ineffective family cohesion was associated with higher parental alcohol

problems, having an expected drinker possible self, and not having a most important feared possible self related to academics. In addition to ineffective family cohesion, single-parent family was associated with many feared possible selves. More parental alcohol problems were associated with having many expected possible selves. Finally, higher friend influence was associated with more balanced possible self pairs.

5. Predicting alcohol consumption and alcohol problems

The traditional ordinary least squares regression is widely used for continuous dependent variables. However, the normality assumption of ordinary least squares regression could not be applied to the dependent variables in this study, because the distributions of alcohol consumption level and alcohol problems were highly skewed to the right with many zero values. As a common alternative method for non-normality, transformed scales (e.g., logarithm), are applied to make skewed data more normally distributed. However, for dependent variables that are highly skewed to the right, even log-transformations do not normalize the distribution. Also, the results of logarithmic transformation may not be easy to interpret directly.

In contrast, the gamma regression, as one of the generalized linear models, has more flexibility to handle this skewness and avoid the transformation issues (Blough & Ramsey, 2000). Therefore, we used gamma regression with a log link. Estimated regression coefficients were exponentiated (Exp(b)), such that the Exp(b) reflects a ratio of the mean outcome variable for the corresponding group divided by reference groups (Blough & Ramsey, 2000; Murakami, Okamura, Nakamura, Miura, & Ueshima, 2013). Increasing each unit of predictor results in an increase/decrease of the outcome value multiplied by Exp(b), namely the (Exp(b)-1) percent of mean outcome value changed. For example, if the Exp(b) is 1.6, the estimated mean outcome value would increase 60% at average when the quantitative predictor increases one unit. For the dichotomized predictor, Exp(b) = 1.6 represents the estimated mean outcome value of the corresponding group is 1.6 times higher than reference group.

Table V shows the results of predicting level of alcohol consumption with all predictors in the model simultaneously controlling for gender and baseline (8th grade) alcohol consumption. The collinearity diagnostics showed that the Variance Inflation Factor was 1.3, indicating low levels of multicollinearity. The model was significant, χ^2 (*15*) = 138.15, $p < 0.001$. Controlling for 8th grade alcohol consumption, having an expected drinker possible self predicted higher alcohol consumption, whereas having many hoped-for possible selves, having a feared drinker possible self, and having a most important possible self related to academics predicted lower alcohol consumption. Living in a single-parent family and being a girl also predicted higher alcohol consumption. Based on the exponentiated coefficients, having an expected drinker possible self predicted 3 times higher mean alcohol consumption compared to those who did not have an expected drinker possible self. Having a feared drinker possible self predicted 82% lower mean alcohol consumption compared to those who did not have a feared drinker possible self. Having a most important hoped-for possible self related to academics predicted 85% lower mean alcohol consumption than those who did not have a most important hoped-for possible self related to academics. Adolescents who lived in single-parent families had more than 5 times the mean alcohol consumption than those in two-parent families. Being a girl had 5.5 times higher mean alcohol consumption than being a boy. Moreover, at average, having one more number of hoped-for possible self predicted 43% lower of mean alcohol consumption.

Table VI shows the results of all predictors in the model simultaneously in predicting the degree of alcohol problem after controlling for gender and baseline (8th grade) alcohol problems. The collinearity diagnostics showed that the Variance Inflation Factors was 1.3, indicating low levels of multicollinearity. The model was significant, χ^2 (*15*) = 248.29, $p < 0.001$. Controlling for 8th grade alcohol problems, having an expected drinker possible self significantly predicted more alcohol problems in 9th grade, whereas having a most important hoped-for possible self related to academics and having a most important feared possible self related to academics both significantly predicted fewer alcohol problems

in 9th grade. Also, living in a single-parent family and being a girl significantly predicted more alcohol problems in 9th grade. Based on the exponentiated coefficients, having an expected drinker possible self predicted 23% higher mean alcohol problem scores compared to those who did not have an expected drinker possible self. Having a most important hoped-for possible self related to academics predicted 8% lower mean alcohol problem score and having a most important feared possible self related to academics predicted 9% lower mean alcohol problem score. Adolescents who lived in single-parent families had 10% higher mean alcohol problem scores compare to those who lived in two-parent families. Being a girl predicted 12% higher mean alcohol problem scores than being a boy.

6. Additional analyses

Because expected possible selves included both positive (e.g., get good grades, join the basketball team) and negative (e.g., pretty much alone, get more nervous) content, this may have neutralized the effects of expected possible selves on risky behaviors. To be sure, we examined the content of the expected possible self descriptors for those adolescents in the upper quartile for alcohol consumption (n = 34) and those who had no alcohol consumption (n = 42). We found that adolescents who were in the upper quartile for alcohol consumption generated more expected possible selves related to getting into trouble (negative expected possible selves), whereas adolescents who had no alcohol consumption did not. This suggests that the content and valence of expected selves may influence alcohol consumption in adolescents.

7. Summary of findings

Our first hypothesis was partially supported; having many hoped-for possible selves predicted lower levels of alcohol consumption but did not predict fewer alcohol problems. The second hypothesis that having many balanced hoped-for and feared possible self pairs would predict lower levels of alcohol consumption and fewer alcohol problems was not supported. The third hypothesis that having many feared possible selves would predict higher levels of alcohol consumption and more alcohol problems

was not supported. Our fourth hypothesis that having a possible self related to alcohol would predict higher levels of alcohol consumption and more alcohol problems was partially supported. Having an expected drinker possible self predicted higher alcohol consumption and higher alcohol problems; however, having a feared drinker possible self predicted lower alcohol consumption. The fifth hypothesis that the most important hoped-for and feared possible selves would predict lower levels of alcohol consumption and fewer alcohol problems was partially supported. Having a most important hoped-for possible self related to academics predicted both lower alcohol consumption and fewer alcohol problems. Having a most important feared possible self related to academics predicted fewer alcohol problems, but did not predict lower alcohol consumption. In answer to the first research question, the number of expected possible selves was not a significant predictor of alcohol consumption or alcohol problems. In answer to the second research question, the most important expected possible self related to academics did not predict alcohol consumption or alcohol problems.

D. Discussion

Our objective was to determine the prospective influence of possible selves on alcohol consumption and alcohol problems controlling for other known determinants during a peak developmental period for escalation of alcohol use—the transition to high school. Single domain-specific possible selves, namely expected drinker and feared drinker possible selves, and most important hoped-for and feared possible selves related to academics were more consistently predictive of alcohol consumption and alcohol problems than properties of the total array of possible selves. In terms of the total array of possible selves, only having few hoped-for possible selves predicted alcohol consumption.

Our finding that an *expected drinker* possible self predicts alcohol consumption and alcohol problems is consistent with the few other studies that have examined it. Using the same measure of the expected drinker possible self in a sample of pre-adolescents aged 9 to 12, Corte and Szalacha (2010) found that having an expected drinker possible self was positively associated with ever drinking. In

another study, Quinlan et al. (2006) found that college students who expected that in two years they would have the attributes of a binge drinker (e.g., drinks all the time, gets sick from drinking too much, out-of-control) were more likely to binge drink than those who did not expect to have the attributes of a binge drinker two years later. Though only a small proportion of our sample (11%) had an *expected drinker* possible self, this finding was not surprising. Other studies have also found that only a small proportion of the sample had a drinking-related cognition. In the Corte and Szalacha study of pre-adolescents (N = 79), 19% of the sample had an *expected drinker* possible self. In another study of 16- to 24-year-old lesbian, gay, bisexual, and transgender persons (N = 122), 10% of the sample had a *current drinker* self-cognition (Corte, 2012).

To our surprise, the only alcohol-related possible self that emerged in the open-ended possible selves measure was a *feared drinker* possible self. Although having a *feared drinker* possible self was protective against alcohol consumption, the content of these possible selves suggests that at least some of these eight adolescents had already been in trouble due to drinking or had a family member or friends who had trouble related to alcohol. These findings suggest that a *feared drinker* possible self may form as a result of negative personal or familial experience with alcohol. It is noteworthy that two participants had both *feared* and *expected drinker* possible selves; both of these adolescents reported drinking in both the 8th and 9th grades. Taken together, the pattern of findings suggests that possible selves related to alcohol may be good intervention targets. For example, interventions to prevent the development of drinker possible self by fostering expectations in other domains may be useful.

In this sample, academics was the most important domain across hoped-for, feared, and expected possible selves. This was not surprising, because given that school is one of the major social contexts for adolescents, academics may be a central concern for many adolescents. Other studies have similarly shown that the majority of high school adolescents' possible selves fall in the domain of academics (Knox et al., 2000; Oyserman & Markus, 1990a). In general, having academics as the most

important possible self was protective. Having a *most important hoped-for possible self related to academics* was protective against alcohol consumption and alcohol problems. Having a *most important feared possible self related to academics* was protective against alcohol problems. Additional analyses that showed that just having an academic possible self anywhere in the possible self repertoire was not a significant predictor of alcohol problems suggests that to be protective against risk behavior, academics must be the most important domain. These findings are consistent with those of a recent longitudinal study that showed that adolescents with high levels of academic investment (e.g., participation in academic activities, academic plans, perceived importance of school, grades, and how much they liked school) in 10^{th} to 12^{th} grades had less substance use (getting drunk, cigarette use, and marijuana) seven years later compared to those who had relatively low levels of academic investment (Carlo, Crockett, Wilkinson, & Beal, 2011).

The number of hoped-for possible selves was the only property of the total array of possible selves that significantly influenced alcohol consumption. Aloise-Young et al. (2001) found that the number of positive possible selves predicted lower levels of substance use in 6^{th} to 9^{th} graders. However, they focused on positive expected possible selves. In our study, expected possible selves included positive and negative content. Closer examination to compare the content of the expected possible selves in adolescents with the highest alcohol consumption and those with no alcohol consumption revealed that suggest that the opposite valence appeared to neutralize the effects of expected possible selves on risky behaviors. Similar to Aloise-Young et al.'s study, we also found that balanced possible self pairs did not predict alcohol consumption or alcohol problems.

In terms of other determinants, living in a single-parent family was a predictor of both alcohol consumption and alcohol problems, controlling for gender, baseline alcohol consumption/problems, and other predictors. This was the strongest social determinant in our study. Though we did not measure these variables, less parental monitoring, greater access to alcohol, and/or greater parental approval of

alcohol use are potential explanatory mechanisms (Barrett & Turner, 2006). Parental alcohol problems was not a significant predictor of alcohol consumption or alcohol problems. This was somewhat surprising to us. This finding may have been due to our parental alcohol problems variable representing the adolescent's perception rather than actual parental drinking behavior or diagnosis of alcohol use disorder. But in a secondary analysis of data from adolescents in a high-risk family study of alcoholism in which parental alcohol problems were diagnosed, Corte and Zucker (2008) found that parental alcohol problems did not predict age of onset of drinking or age of onset of first drunk episode in adolescents who reported drinking/getting drunk. Parental alcohol problems did, however, distinguish adolescents who reported ever drinking by age 15 to 17 from those who did not. In another prospective study, Capaldi, Stoolmiller, Kim, and Yoerger (2009) found that the level of parental alcohol use predicted their children's alcohol use and volume of use in 6th grade; it did not predict the growth of alcohol consumption across 6th to 8th grade or alcohol use and volume of use in 9th grade.

Inconsistent with literature that shows that influence from peers predicts adolescent alcohol consumption and alcohol problems (Donovan, 2004; Nash et al., 2005; Scheier, Botvin, & Baker, 1997), in our study, perceived friends' influence did not significantly predict alcohol consumption or alcohol problems. We believe that these findings likely reflect the fact that in our dataset, participants were asked to respond to how much influence the friends had on "making you the way you are now" rather than asking about attitudes toward or use of alcohol by the target person or group. Thus, our measure reflected more the influence of friends on the "self" rather than the influence of friends on alcohol use. In addition, high scores on our friends' influence variable could have reflected strong positive influences for some adolescents and strong negative influences on other adolescents. It is possible that these effects may have cancelled each other out.

In our study, girls had more alcohol problems in the 9th grade compared to boys. The 1993 report of Youth Risk Behavior Surveillance among 9th grade adolescents (the year our risk behavior data

were collected) (CDC, 1995) showed that girls had a slightly higher prevalence of alcohol consumption compared to boys, but the difference was not statistically significant. In addition, gender was a significant covariate in multiple regression models for both alcohol consumption and alcohol problems, which revealed that girls were more likely to engage in higher levels of alcohol consumption and had more alcohol problems. Unfortunately, our sample was not large enough to run separate models for boys and girls to determine whether possible self properties influenced risky behavior differently for boys and girls. Future studies with larger samples are needed to examine gender-specific models.

E. Limitations

One limitation is that the *expected drinker* possible self, one of the most consistent predictors of alcohol consumption/problems, was the only possible self property measured with a closed-ended questionnaire. No adolescents listed expected possible selves related to alcohol in the open-ended measure. This raises the question about whether adolescents were more comfortable acknowledging expectations about the self related to drinking on the closed-ended measure or whether expectations about the self related to drinking were not salient enough to be accessible in memory and, thus, were not spontaneously generated on the open-ended measure. On the open-ended measure, only *feared drinker* possible selves emerged. This could mean that adolescents were comfortable acknowledging fears related to drinking on the open-ended measure or that feared drinker possible selves are more salient (and thus accessible in memory) than expected drinker possible selves. As noted above, our measures of social influences from parents, peers, and significant others were not optimal for predicting alcohol consumption and alcohol problems. Because the majority of adolescents were Caucasian and from a working-class suburban community, the findings may not generalize to more racially diverse adolescents and those from other socioeconomic classes. Finally, the original data were collected in the 1990s. Although the variables of interests are not particularly time sensitive, more contemporary studies could be done to validate the findings of this secondary analysis of data.

F. Conclusion

To our knowledge, this was the first study to determine the prospective effects of multiple properties of possible selves simultaneously on alcohol consumption and alcohol problems. This study provides evidence that specific types of content (e.g., related to alcohol and academics) influence alcohol consumption and alcohol problems more strongly than properties of the total array of possible selves in adolescents. Having an *expected drinker* possible self is a vulnerability for both alcohol consumption and alcohol problems, whereas having a *most important hoped-for* possible self related to academics, having a *most important feared* possible self related to academics, having many *hoped-for* possible selves, and having a *feared drinker* possible self are protective against alcohol consumption or alcohol problems. The findings from this study suggest that fostering the importance and personal relevance of academics and developing hoped-for possible selves as well as developing interventions to prevent the development of an expected drinker possible self may reduce adolescent alcohol consumption and alcohol problems.

G. References

Abar, C., Abar, B., & Turrisi, R. (2009). The impact of parental modeling and permissibility on alcohol use and experienced negative drinking consequences in college. *Addictive Behaviors,* 34, 542-547. doi: 10.1016/j.addbeh.2009.03.019

Aloise-Young, P. A., Hennigan, K. M., & Leong, C. W. (2001). Possible selves and negative health behaviors during early adolescence. *Journal of Early Adolescence, 21*(2), 158-181. doi: 10.1177/0272431601021002002

Barrett, A. E., & Turner, R. J. (2006). Family structure and substance use problems in adolescence and early adulthood: Examining explanations for the relationship. *Addiction, 101*(1), 109-120.

Black, M. E. A., Stein, K. F., & Loveland-Cherry, C. J. (2001). Older women and mammography screening behavior: Do possible selves contribute? *Health Education & Behavior, 28*(2), 200-216. doi: 10.1177/109019810102800206

Burk, L. R., Armstrong, J. M., Goldsmith, H. H., Klein, M. H., Strauman, T. J., Costanzo, P., & Essex, M. J. (2011). Sex, temperament, and family context: How the interaction of early factors differentially predict adolescent alcohol use and are mediated by proximal adolescent factors. *Psychology of Addictive Behaviors, 25*(1), 1-15. doi: 10.1037/a0022349

Capaldi, D. M., Stoolmiller, M., Kim, H. K., & Yoerger, K. (2009). Growth in alcohol use in at-risk adolescent boys: Two-part random effects prediction models. *Drug and Alcohol Dependence, 105*, 109-117. doi: 10.1016/j.drugalcdep.2009.06.013

Carlo, G., Crockett, L. J., Wilkinson, J. L., & Beal, S. J. (2011). The longitudinal relationships between rural adolescents' prosocial behaviors and young adult substance use. *Journal of Youth and Adolescence, 40*(9), 1192-1202.

Centers for Disease Control and Prevention (CDC). (1995). Youth risk behavior surveillance – United States, 1993. *Morbidity and Mortality Weekly Report* (Vol. 44, pp. 1-55). Atlanta, GA: CDC.

Centers for Disease Control and Prevention (CDC). (2012). Youth risk behavior surveillance – United States, 2011. *Morbidity and Mortality Weekly Report* (Vol. 61, pp. 1-162). Atlanta, GA: CDC.

Chartier, K. G., Hesselbrock, M. N., & Hesselbrock, V. M. (2010). Development and vulnerability factors in adolescent alcohol use. *Child and Adolescent Psychiatric Clinics of North America, 19*(3), 493-504. doi: 10.1016/j.chc.2010.03.004

Corte, C. (2012). Drinker possible self and alcohol use in LGBT young people. Unpublished raw data.

Corte, C., & Szalacha, L. (2010). Self-cognitions, risk factors for alcohol problems, and drinking in preadolescent urban youths. *Journal of Child & Adolescent Substance Abuse, 19*(5), 406-423.

Corte, C., & Zucker, R. A. (2008). Self-concept disturbances: Cognitive vulnerability for early drinking and early drunkenness in adolescents at high risk for alcohol problems. *Addictive Behaviors, 33*(10), 1282-1290.

Cross, S., & Markus, H. (1991). Possible selves across the life span. *Human Development, 34*(4), 230-255. doi: 10.1159/000277058

DeWit, D. J., Adlaf, E. M., Offord, D. R., & Ogborne, A. C. (2000). Age at first alcohol use: A risk factor for the development of alcohol disorders. *American Journal of Psychiatry, 157*(5), 745-750. doi: 10.1176/appi.ajp.157.5.745

Donovan, J. E. (2004). Adolescent alcohol initiation: A review of psychosocial risk factors. *Journal of Adolescent Health, 35*(6), 529.e7-529.e18.

Duncan, S. C., Duncan, T. E., & Strycker, L. A. (2006). Alcohol use from ages 9 to 16: A cohort-sequential latent growth model. *Drug and Alcohol Dependence, 81*(1), 71-81. doi: 10.1016/j.drugalcdep.2005.06.001

Dunn, M. E., & Goldman, M. S. (1996). Empirical modeling of an alcohol expectancy memory network in elementary school children as a function of grade. *Experimental and Clinical Psychopharmacology, 4*(2), 209-217. doi: 10.1037/1064-1297.4.2.209

Ellickson, P. L., Tucker, J. S., & Klein, D. J. (2003). Ten-year prospective study of public health problems associated with early drinking. *Pediatrics,* 111(5), 949-955.

Erikson, E. H. (1968). *Identity, youth, and crisis*. New York: W. W. Norton.

Erikson, E. H. (1980). *Identity and the life cycle*. New York: W.W. Norton.

Faden, V. B. (2006). Trends in initiation of alcohol use in the United States 1975 to 2003. *Alcoholism: Clinical and Experimental Research, 30*(6), 1011-1022. doi: 10.1111/j.1530-0277.2006.00115.x

Froming, W. J., Nasby, W., & McManus, J. (1998). Prosocial self-schemas, self-awareness, and children's prosocial behavior. *Journal of Personality and Social Psychology,* 75(3), 766-777. doi: 10.1037/0022-3514.75.3.766

Green, R. G., Harris, R. N., Jr., Forte, J. A., & Robinson, M. (1991). Evaluating FACES III and the Circumplex Model: 2,440 families. *Family Process, 30*(1), 55-73.

Habib, C., Santoro, J., Kremer, P., Toumbourou, J., Leslie, E., & Williams, J. (2010). The importance of family management, closeness with father and family structure in early adolescent alcohol use. *Addiction, 105*(10), 1750-1758. doi: 10.1111/j.1360-0443.2010.03021.x

Hampson, S. E., & Goldberg, L. R. (2006). A first large cohort study of personality trait stability over the 40 years between elementary school and midlife. *Journal of Personality and Social Psychology*, 91(4), 763-779.

Harju, B. L., & Reed, J. M. (2003). Potential clinical implications of implicit and explicit attitudes within possible exercise selves schemata: A pilot study. *Journal of Clinical Psychology in Medical Settings, 10*(3), 201-208. doi: 10.1023/a:1025414913130

Herzog, A. R., & Markus, H. R. (1999). The self-concept in life span and aging research. In V. L. Bengtson & K. W. Schaie (Eds.), *Handbook of theories of aging* (pp. 227-252). New York, NY: Springer.

Hingson, R. W., Heeren, T., & Winter, M. R. (2006). Age at drinking onset and alcohol dependence: Age at onset, duration, and severity. *Archives of Pediatrics & Adolescent Medicine,* 160(7), 739-746. doi: 10.1001/archpedi.160.7.739

Hodgins, D. C., Maticka-Tyndale, E., El-Guebaly, N., & West, M. (1993). The CAST-6: Development of a short-form of the children of alcoholics screening test. *Addictive Behaviors, 18*(3), 337-345. doi: 10.1016/0306-4603(93)90035-8

Hooker, K. (1992). Possible selves and perceived health in older adults and college students. *Journals of Gerontology, 47*(2), P85-P95.

Hooker, K., & Kaus, C. R. (1992). Possible selves and health behaviors in later life. *Journal of Aging and Health, 4*(3), 390-411. doi: 10.1177/089826439200400304

Hooker, K., & Kaus, C. R. (1994). Health-related possible selves in young and middle adulthood. *Psychology and Aging, 9*(1), 126-133. doi: 10.1037/0882-7974.9.1.126

Hopwood, C. J., Newman, D. A., Donnellan, M. B., Markowitz, J. C., Grilo, C. M., Sanislow, C. A., . . . Morey, L. C. (2009). The stability of personality traits in individuals with borderline personality disorder. *The Journal of Abnormal Psychology,* 118(4), 806-815.

Huurre, T., Lintonen, T., Kaprio, J., Pelkonen, M., Marttunen, M., & Aro, H. (2010). Adolescent risk factors for excessive alcohol use at age 32 years. A 16-year prospective follow-up study. *Social Psychiatry & Psychiatric Epidemiology, 45*(1), 125-134.

Johnston, L. D., O'Malley, P. M., Bachman, J. G., & Schulenberg, J. E. (2012). *Monitoring the future national results on adolescent drug use: Overview of key findings, 2011*. Ann Arbor: Institute for Social Research, The University of Michigan.

Jordan, L. C., & Lewis, M. L. (2005). Paternal relationship quality as a protective factor: Preventing alcohol use among African American adolescents. *Journal of Black Psychology, 31*(2), 152-171. doi: 10.1177/0095798405274881

Kliewer, W., & Murrelle, L. (2007). Risk and protective factors for adolescent substance use: Findings from a study in selected central American countries. *Journal of Adolescent Health,* 40(5), 448-455. doi: 10.1016/j.jadohealth.2006.11.148

Knox, M., Funk, J., Elliott, R., & Bush, E. G. (2000). Gender differences in adolescents' possible selves. *Youth & Society, 31*(3), 287-309. doi: 10.1177/0044118x00031003002

Krank, M., Stewart, S. H., O'Connor, R., Woicik, P. B., Wall, A.-M., & Conrod, P. J. (2011). Structural, concurrent, and predictive validity of the Substance Use Risk Profile Scale in early adolescence. *Addictive Behaviors, 36*(1/2), 37-46. doi: 10.1016/j.addbeh.2010.08.010

Krosnick, J. A. (1989). Attitude importance and attitude accessibility. *Personality and Social Psychology Bulletin, 15*(3), 297-308. doi: 10.1177/0146167289153002

Markus, H. (1977). Self-schemata and processing information about the self. *Journal of Personality and Social Psychology, 35*(2), 63-78. doi: 10.1037/0022-3514.35.2.63

Markus, H., & Nurius, P. (1986). Possible selves. *American Psychologist, 41*(9), 954-969. doi: 10.1037/0003-066x.41.9.954

Markus, H., & Ruvolo, A. (1989). Possible selves: Personalized representation of goals. In L. A. Pervin (Ed.), *Goal concepts in personality and social psychology* (pp. 211-241). Hillsdale, NJ: L. Erlbaum.

Marsiglia, F. F., Kulis, S., Parsai, M., Villar, P., & Garcia, C. (2009). Cohesion and conflict: Family influences on adolescent alcohol use in immigrant Latino families. *Journal of Ethnicity in Substance Abuse, 8*(4), 400-412. doi: 10.1080/15332640903327526

McGue, M., & Iacono, W. G. (2005). The association of early adolescent problem behavior with adult psychopathology. *American Journal of Psychiatry, 162*(6), 1118-1124. doi: 10.1176/appi.ajp.162.6.1118

Miller, P. M., Smith, G. T., & Goldman, M. S. (1990). Emergence of alcohol expectancies in childhood: A possible critical period. *Journal of Studies on Alcohol,* 51(4), 343-349.

Nash, S. G., McQueen, A., & Bray, J. H. (2005). Pathways to adolescent alcohol use: Family environment, peer influence, and parental expectations. *Journal of Adolescent Health, 37*(1), 19-28. doi: 10.1016/j.jadohealth.2004.06.004

National Institute on Alcohol Abuse and Alcoholism (NIAAA). (2009a). A developmental perspective on underage alcohol use. *Alcohol Alert.* Retrieved from http://pubs.niaaa.nih.gov/publications/AA78/AA78.htm

National Institute on Alcohol Abuse and Alcoholism (NIAAA). (2009b). *Underage Drinking.* Retrieved 04/05/2013, from http://www.niaaa.nih.gov/alcohol-health/special-populations-co-occurring-disorders/underage-drinking

Newberry, A. L., & Duncan, R. D. (2001). Roles of boredom and life goals in juvenile delinquency. *Journal of Applied Social Psychology, 31*(3), 527-541. doi: 10.1111/j.1559-1816.2001.tb02054.x

Olson, D. H. (1982). *Family inventories: Inventories used in a national survey of families across the family life cycle*. St. Paul, MN: Family Social Science, University of Minnesota.

Olson, D. H. (1991). Commentary: Three-dimensional (3-D) circumplex model and revised scoring of FACES III. *Family Process Family Process, 30*(1), 74-79.

Olson, D. H., & Gorall, D. M. (2003). Circumplex model of marital and family systems. In F. Walsh (Ed.), *Normal family processes: Growing diversity and complexity* (pp. 514-544). New York, NY: Guilford Press.

Oyserman, D. (1993). Adolescent identity and delinquency in interpersonal context. *Child psychiatry and human development, 23*(3), 203-214.

Oyserman, D., Bybee, D., & Terry, K. (2006). Possible selves and academic outcomes: How and when possible selves impel action. *Journal of Personality and Social Psychology, 91*(1), 188-204. doi: 10.1037/0022-3514.91.1.188

Oyserman, D., Bybee, D., Terry, K., & Hart-Johnson, T. (2004). Possible selves as roadmaps. *Journal of Research in Personality, 38*(2), 130-149. doi: 10.1016/s0092-6566(03)00057-6

Oyserman, D., Gant, L., & Ager, J. (1995). A socially contextualized model of African American identity: Possible selves and school persistence. *Journal of Personality and Social Psychology, 69*(6), 1216-1232. doi: 10.1037/0022-3514.69.6.1216

Oyserman, D., & James, L. (2009). Possible selves: From content to process. In K. D. Markman, W. M. Klein, & J. A. Suhr (Eds.), *Handbook of imagination and mental simulation* (pp. 373-394). New York, NY: Psychology Press.

Oyserman, D., & Markus, H. (1990a). Possible selves and delinquency. *Journal of Personality and Social Psychology, 59*(1), 112-125. doi: 10.1037/0022-3514.59.1.112

Oyserman, D., & Markus, H. (1990b). Possible selves in balance: Implications for delinquency. *Journal of Social Issues, 46*(2), 141-157.

Quinlan, S. L., Jaccard, J., & Blanton, H. (2006). A decision theoretic and prototype conceptualization of possible selves: Implications for the prediction of risk behavior. *Journal of Personality, 74*(2), 599-630. doi: 10.1111/j.1467-6494.2006.00386.x

Scheier, L. M., & Botvin, G. J. (1997). Expectancies as mediators of the effects of social influences and alcohol knowledge on adolescent alcohol use: A prospective analysis. *Psychology of Addictive Behaviors, 11*(1), 48-64.

Scheier, L. M., Botvin, G. J., & Baker, E. (1997). Risk and protective factors as predictors of adolescent alcohol involvement and transitions in alcohol use: A prospective analysis. *Journal of Studies on Alcohol, 58*(6), 652-667.

Scheier, L. M., & Newcomb, M. D. (1991). Differentiation of early adolescent predictors of drug use versus abuse: A developmental risk-factor model. *Journal of Substance Abuse, 3*(3), 277-299.

Schulenberg, J., Bachman, J. G., O'Malley, P. M., & Johnston, L. D. (1994). High school educational success and subsequent substance use: A panel analysis following adolescents into young adulthood. *Journal of Health and Social Behavior, 35*(1), 45-62.

Shope, J. T., Copeland, L. A., & Dielman, T. E. (1994). Measurement of alcohol use and misuse in a cohort of students followed from grade 6 through grade 12. *Alcoholism, clinical and experimental research, 18*(3), 726-733.

Simons-Morton, B. (2004). Prospective association of peer influence, school engagement, drinking expectancies, and parent expectations with drinking initiation among sixth graders. *Addictive Behaviors, 29*(2), 299-309. doi: 10.1016/j.addbeh.2003.08.005

Smart, L. S., Chibucos, T. R., & Didier, L. A. (1990). Adolescent substance use and perceived family functioning. *Journal of Family Issues, 11*(2), 208-227.

Staley, D., & El-Guebaly, N. (1991). Psychometric evaluation of the Children of Alcoholics Screening-Test (CAST) in a psychiatric sample. *International Journal of the Addictions, 26*(6), 657-668.

Stein, K. F., & Hedger, K. M. (1997). Body weight and shape self-cognitions, emotional distress, and disordered eating in middle adolescent girls. *Archives of Psychiatric Nursing, 11*(5), 264-275.

Stein, K. F., Roeser, R., & Markus, H. (1998). Self-schemas and possible selves as predictors and outcomes of risky behaviors in adolescents. *Nursing Research, 47*(2), 96-106. doi: 10.1097/00006199-199803000-00008

Tapert, S. F., & Schweinsburg, A. D. (2005). The human adolescent brain and alcohol use disorders. *Recent Developments in Alcoholism,* 17, 177-189.

Towse, J. N., Cowan, N., Hitch, G. J., & Horton, N. J. (2008). The recall of information from working memory: Insights from behavioural and chronometric perspectives. *Experimental Psychology, 55*(6), 371-383. doi: 10.1027/1618-3169.55.6.371

Trim, R. S., Meehan, B. T., King, K. M., & Chassin, L. (2007). The relation between adolescent substance use and young adult internalizing symptoms: Findings from a high-risk longitudinal sample. *Psychology of Addictive Behaviors, 21*(1), 97-107. doi: 10.1037/0893-164x.21.1.97

vanDellen, M. R., & Hoyle, R. H. (2008). Possible selves as behavioral standards in self-regulation. *Self & Identity, 7*(3), 295-304.

Windle, M. (2000). Parental, sibling, and peer influences on adolescent substance use and alcohol problems. *Applied Developmental Science, 4*(2), 98-110.

Zajonc, R. B. (1960). The process of cognitive tuning in communication. *Journal of Abnormal and Social Psychology, 61*(2), 159-167. doi: 10.1037/h0047987

Zamboanga, B. L., Schwartz, S. J., Ham, L. S., Hernandez Jarvis, L., & Olthuis, J. V. (2009). Do alcohol expectancy outcomes and valuations mediate peer influences and lifetime alcohol use among early adolescents? *The Journal of Genetic Psychology: Research and Theory on Human Development, 170*(4), 359-376. doi: 10.1111/j.1467-9280.2007.01882.x

TABLE I

ALCOHOL CONSUMPTION AND ALCOHOL PROBLEMS

Alcohol Consumption/Problems	Total		Boys		Girls	
	Mean±SD	Range	Mean±SD	Range	Mean±SD	Range
8th grade level of alcohol consumption (drinks/week)	1.3±4.1	0.0–25.6	1.1±4.2	0.0–25.6	1.5±4.1	0.0–20.3
8th grade alcohol problems score*	12.0±3.6	9–23	11.2±3.0	9–23	12.8±4.0	9–23
9th grade level of alcohol consumption (drinks/week)	3.8±10.0	0.0–80.6	3.6±13.0	0.0–80.6	4.0±7.0	0.0–36.9
9th grade alcohol problems score*	13.0±5.0	9–32	11.8±4.7	9–32	14.1±5.0	9–31

Note: The level of alcohol consumption and alcohol problems score are only for those adolescents who reported drinking. $^{*}p < 0.05$ gender differences in 9th grade

TABLE II

POSSIBLE SELF PROPERTIES IN 8TH GRADE

Possible Self Properties	Total		Boys		Girls	
	Mean±SD	Range	Mean±SD	Range	Mean±SD	Range
Number of hoped-for possible selves	3.32±0.9	1–7	3.25±0.6	1–5	3.39±1.1	1–7
Number of feared possible selves	3.36±1.0	0–7	3.32±0.9	0–6	3.39±1.1	1–7
Number of expected possible selves	3.47±1.1	0–10	3.37±0.9	2–6	3.58±1.3	0–10
Number of balanced pairs	1.01±0.8	0–3	0.96±0.9	0–3	1.07±0.8	0–3
	N	%	N	%	N	%
Feared drinker possible self	8	5.8	2	2.9	6	8.7
Expected drinker possible self	15	10.9	6	8.8	9	13.0
Most important hoped-for possible self related to academics	44	32.1	20	29.4	24	34.8
Most important feared possible self related to academics	35	25.5	20	29.4	15	21.7
Most important expected possible self related to academics	60	44.1	27	39.7	33	48.5

TABLE III

SOCIAL DETERMINANTS IN 8TH GRADE

Social Determinants	Total		Boys		Girls	
	N	%	N	%	N	%
Family structure						
Single-parent family	50	36.5	23	33.8	27	39.1
Two-parent family	87	63.5	45	66.2	42	60.9
Family cohesion						
Ineffective	69	50.4	31	45.6	38	55.1
Effective	68	49.6	37	54.4	31	44.9
	Mean±SD	Range	Mean±SD	Range	Mean±SD	Range
Parental alcohol problems	0.86±1.3	0–5	0.73±1.2	0–5	0.99±1.4	0–4
Perceived friends' influence**	3.62±1.2	1–5	3.31±1.2	1–5	3.91±1.1	1–5

** $p < 0.01$ between boys and girls

TABLE IV

CORRELATIONS AMONG POSSIBLE SELF PROPERTIES AND SOCIAL DETERMINANTS IN 8TH GRADE

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9	10.	11.	12.
1. Number of hoped-for possible selves	1.000											
2. Number of feared possible selves	0.306**	1.000										
3. Number of expected possible selves	0.260**	0.372**	1.000									
4. Number of balanced possible selves pairs	0.262**	0.261**	0.026	1.000								
5. Feared drinker possible self	0.153	0.470**	0.145	0.071	1.000							
6. Expected drinker possible self	0.082	0.061	0.081	0.078	0.112	1.000						
7. Most important hoped-for self related to academics	-0.020	0.004	-0.110	0.252**	0.029	-0.091	1.000					
8. Most important feared self related to academics	-0.190*	-0.092	-0.099	0.111	-0.075	-0.152	0.099	1.000				
9. Most important expected self related to academics	0.012	0.111	0.020	0.020	0.094	0.020	0.181*	0.090	1.000			
10. Family structure	0.116	0.168*	0.166	-0.050	0.135	-0.023	0.031	0.043	0.156	1.000		
11. Family cohesion	0.078	0.019	0.108	0.017	-0.064	0.208*	-0.005	-0.222**	-0.006	0.085	1.000	
12. Parental alcohol problems	0.071	0.001	0.174*	0.069	0.003	0.038	-0.049	-0.157	0.150	0.104	0.245**	1.000
13. Perceived friends' influence	-0.018	0.070	0.130	0.250**	-0.079	0.035	0.038	-0.081	0.050	-0.090	0.093	0.146

Note: Spearman's Rho coefficient was used for two ordinal variables, phi coefficient was used for two dichotomous variables, and point-biserial coefficient was used for one dichotomous variable with one continuous variable. $^{*}p < 0.05$; $^{**}p < 0.01$

TABLE V

MULTIPLE GAMMA REGRESSION FOR SOCIAL DETERMINANTS AND POSSIBLE SELF PROPERTIES IN 8TH GRADE PREDICTED 9TH GRADE LEVEL OF ALCOHOL CONSUMPTION

8th Grade Predictors	9th Grade Level of Alcohol Consumption			
	Exp (*b*)	Z	95% CI	*p*
Social determinants				
Family structure (1 = Single-parent, 0 = Two-parent)	5.44	4.47	2.59–11.4	< 0.001
Family cohesion (1 = Ineffective, 0 = Effective)	1.53	0.92	0.62–3.77	0.355
Parental alcohol problems	1.13	0.90	0.86–1.49	0.366
Perceived friends' influence	1.09	0.52	0.78–1.54	0.602
Possible self properties				
Number of hoped-for possible selves	0.57	-3.05	0.39–0.82	0.002
Number of feared possible selves	1.31	1.20	0.84–2.04	0.232
Number of expected possible selves	1.08	0.34	0.69–1.70	0.734
Number of balanced pairs of possible selves	1.18	0.57	0.66–2.12	0.568
Feared drinker possible self (1 = Yes, 0 = No)	0.18	-2.57	0.05–0.67	0.010
Expected drinker possible self (1 = Yes, 0 = No)	3.05	2.60	1.32–7.08	0.009
Most important hoped-for possible self related to academics (1 = Yes, 0 = No)	0.15	-4.00	0.06–0.38	< 0.001
Most important feared possible self related to academics (1 = Yes, 0 = No)	1.07	0.11	0.32–3.56	0.914
Most important expected possible self related to academics (1 = Yes, 0 = No)	0.46	-1.58	0.17–1.21	0.114
Gender (1 = Girls, 0 = Boys)	5.46	4.12	2.43–12.23	< 0.001
Alcohol consumption	1.19	2.74	1.05–1.35	0.006
χ^2 (*df*)			138.15 (*15*)	
Prob > χ^2			< 0.001	

Note: Exp (*b*) = Exponentiated coefficients; Z test = Square root of the Wald χ^2 test; CI = Confidence interval

TABLE VI

MULTIPLE GAMMA REGRESSION FOR SOCIAL DETERMINANTS AND POSSIBLE SELF PROPERTIES IN 8TH GRADE PREDICTED 9TH GRADE DEGREE OF ALCOHOL PROBLEMS

8th Grade Predictors	9th Grade Degree of Alcohol Problems			
	Exp (*b*)	Z	95% CI	*p*
Social determinants				
Family structure (1 = Single-parent, 0 = Two-parent)	1.10	2.36	1.02–1.19	0.018
Family cohesion (1 = Ineffective, 0 = Effective)	1.00	0.09	0.93–1.09	0.928
Parental alcohol problems	1.00	-0.18	0.97–1.03	0.858
Perceived friends' influence	1.01	0.81	0.98–1.05	0.419
Possible self properties				
Number of hoped-for possible selves	0.99	-0.31	0.95–1.04	0.758
Number of feared possible selves	1.02	0.65	0.97–1.07	0.513
Number of expected possible selves	0.99	-0.43	0.95–1.03	0.669
Number of balanced pairs of possible selves	1.03	1.14	0.98–1.09	0.256
Feared drinker possible self (1 = Yes, 0 = No)	1.02	0.16	0.84–1.24	0.871
Expected drinker possible self (1 = Yes, 0 = No)	1.23	2.43	1.04–1.46	0.015
Most important hoped-for possible self related to academics (1 = Yes, 0 = No)	0.92	-2.23	0.85–0.99	0.026
Most important feared possible self related to academics (1 = Yes, 0 = No)	0.91	-2.21	0.84–0.99	0.027
Most important expected possible self related to academics (1 = Yes, 0 = No)	1.01	0.17	0.93–1.08	0.868
Gender (1 = Girls, 0 = Boys)	1.12	3.07	1.04–1.20	0.002
Alcohol problems	1.05	7.92	1.04–1.07	< 0.001
χ^2 (*df*)			248.29 (*15*)	
Prob > χ^2			< 0.001	

Note: Exp (*b*) = Exponentiated coefficients; Z test = Square root of the Wald χ^2 test; CI = Confidence interval

III. DRINKING POSSIBLE SELF: PROSPECTIVE PREDICTOR OF TOBACCO USE IN ADOLESCENTS

A. Introduction

Adolescent tobacco use is a serious public health problem inasmuch as it sets the stage for long-term tobacco use. Studies have shown that adolescent tobacco use predicts the later development of nicotine dependence (DiFranza et al., 2000; Killen et al., 2001; McGue & Iacono, 2005; Prokhorov, Hudmon, Cinciripini, & Marani, 2005, U.S. Department of Health and Human Services [USDHHS], 2004) even among those who had lower levels of tobacco use (USDHHS, 2010). Compared to the later initiation of tobacco use, initiation of tobacco use before 16 years of age has been shown to be associated with lower likelihood of smoking cessation (Khuder, Dayal, & Mutgi, 1999), making early tobacco use particularly problematic. National prevalence estimates showed a considerable increase in tobacco use during the transition to high school, suggesting that this is a critical period of vulnerability (Centers for Disease Control and Prevention [CDC], 2012; Johnston, O'Malley, Bachman, & Schulenberg, 2012; USDHHS, 2012). When data for the current study were collected, the prevalence rate for ever smoking in 8th graders was 45.2% (Johnston et al., 2012) and in 9th graders was 62.8% (CDC, 1995). Therefore, identifying which adolescents are most vulnerable for engaging in tobacco use across the transition to high school is essential.

Tobacco use and alcohol consumption are highly correlated behaviors in adolescence (Donovan & Jessor, 1985; Lotrean, Kremers, Ionut, & de Vries, 2009). Researchers have shown that adolescents who report consuming alcohol are more likely to have experimented with smoking and vice versa (Faeh, Viswanathan, Chiolero, Warren, & Bovet, 2006; Lotrean et al., 2009; Wetzels, Kremers, Vitória, & de Vries, 2003). Moreover, the co-occurrence of drinking and smoking may decrease the possibility of successful smoking cessation during adolescence and maintaining abstinence of smoking until adulthood (Dierker, Avenevoli, Goldberg, & Glantz, 2004; Van Zundert, Kuntsche, & Engels, 2012).

Given the co-occurrence of alcohol and tobacco use in adolescents, finding *modifiable* factors that account for *both* behaviors is important for reducing the health and social consequences of these addictive behaviors. In adult smokers who were not heavy drinkers, Doebrick and Todman (2003) found that the efficient information processing consistent with a cognition about the self as a smoker (called a smoker self-schema) predicted alcohol as well as tobacco use. Given that self-schemas are elaborated cognitive structures that bias attention, lead to more efficient processing of schema-consistent information, and motivate behavior in the domain, the authors theorized that the efficient processing of smoking-related information derived from personal experience with smoking may also facilitate the processing of information associated with drinking. In other words, a smoker self-schema may promote increased vulnerability to drinking-related information. Other researchers have shown that a *future-oriented* cognition about the self related to alcohol (called a drinking possible self) was associated with binge drinking in college students (Quinlan, Jaccard, & Blanton, 2006) and ever drinking in preadolescents (Corte & Szalacha, 2010). Moreover, in the present sample, Lee, Corte, Stein, Park, Finnegan, and McCreary (2013) found that having a drinking possible self prospectively predicted both alcohol consumption and alcohol problems. Given the cross-substance facilitation of information processing associated with a smoker self-schema in the Doebrick and Todman's study, it is plausible that presence of a drinking possible self explains the co-occurrence of tobacco use and alcohol use in adolescents.

1. Study purpose

The purpose of the present study is to determine whether the presence of a drinking possible self predicts tobacco use in adolescents during the transition to high school, and whether the effect persists even after controlling for the level of concurrent alcohol consumption. Known family, parent, and peer predictors of tobacco use will be control variables.

2. Possible selves

Possible selves are functional cognitive structures about the self in a future state (Markus & Nurius, 1986). Researchers have shown that having a possible self in a specific content domain predicts behavior in the domain. For example, Oyserman and colleagues have demonstrated in 8th grade adolescents that having an academic possible self was associated with better academic outcomes (e.g., grades, class activities involvement) (Oyserman, Bybee, Terry, & Hart-Johnson, 2004). Similarly, researchers have shown that having a drinking possible self is associated with alcohol use (Corte & Szalacha, 2010; Quinlan et al., 2006) and that college student smokers who had a long-term possible self as a smoker (10–20 years in the future) had more defensive reactions to anti-smoking messages than smokers who did not have a long-term possible self as a smoker (Freeman, Hennessy, & Marzullo, 2001). Unlike beliefs about the effect of a substance on people in general (called expectancies), possible selves are much more highly personalized, and thus, may be stronger motivators of behavior as well as better intervention targets.

3. Family, parent, and peer risk factors

Risk factors from various domains have been shown to influence adolescent tobacco use. In the domain of family, researchers have shown that family structure and family functioning are associated with tobacco use. O'Loughlin, Karp, Koulis, Paradis, and DiFranza (2009) found that adolescents lived in single-parent families associated with a higher rate of their initiation of cigarette smoking than others. McVicar (2011) have shown that adolescents who lived in two-parent families had less likelihood of current tobacco use. Hill, Hawkins, Catalano, Abbott, and Guo (2005) found that higher level of family conflict and poor family bonding predicted higher risk of daily smoking initiation, especially during the early years of high school. Parental alcohol problems have also been shown to predict tobacco use as well as alcohol use. In a nationwide U.S. survey of adults aged 15 to 54, Cuijpers and Smit (2002) found that regular tobacco use was strongly related to having an alcoholic parent. Also, adult children of

alcoholics had a higher risk of developing nicotine dependence compare to others among the adults who regularly used tobacco. Clark, Kirisci, and Moss (1998) demonstrated that preadolescent (aged 10–12) boys of fathers having substance (e.g., drug, alcohol) use disorders had higher likelihood of having tried tobacco and interim used tobacco in the 2-year period since the initial assessment compared to others.

Influence from peers/friends is another important determinant of adolescent tobacco use. Researchers have demonstrated that having many friends who smoke and perceiving that friends have positive attitudes toward tobacco use predicts initiation and maintenance/escalation of smoking behaviors in adolescence. Scal, Ireland, and Borowsky (2003) identified that peer influence of being exposed to a higher prevalence of smoking at school and having friends who smoke increased the likelihood for transitioning to smoking. Dierker et al. (2004) found that smoking friends predicted the progression to regular smoking from both a nonsmoking and experimental smoking status. Researchers of several cross-sectional and longitudinal studies have demonstrated that perceived friends' smoking and number of friends smoking were strongly increased the likelihood of current tobacco use (McVicar, 2011; Piko, Luszczynska, Gibbons, & Teközel, 2005; Villanti, Boulay, & Juon, 2011). Tomar and Giovino (1998) found that regular use smokeless tobacco was predicted by the perceived friends' approval or not caring about their using smokeless tobacco. Gritz et al. (2003) showed that peer influences (friends who smoke or friends' approval of smoking) were important predictors of ever smoking. Another longitudinal study also found reciprocal associations of adolescent smoking with their peers' smoking (Tucker, Martínez, Ellickson, & Edelen, 2008).

Though family, parent, and peer factors have been shown to predict tobacco and alcohol use in adolescents, researchers have argued that cognitions are likely to be a proximal factor that drives individual differences in engaging in risky behaviors (USDHHS, 2012). As such, the following hypotheses were tested:

Hypothesis 1: Having a drinking possible self in 8th grade predicts 9th grade tobacco use, controlling for family structure, family cohesion, parental alcohol problems, friend influence, gender, and tobacco use in 8th grade.

Hypothesis 2: Having a drinking possible self in 8th grade continues to predict 9th grade tobacco use even after controlling for 9th grade level of alcohol consumption and the other control variables.

B. Method

A secondary data analysis of an existing longitudinal data of self-cognitions and a wide range of behaviors in adolescents across the transition from 8th to 9th grade was used (Stein, Roeser, & Markus, 1998). Data were initially collected in the spring semesters of both 8th (1992) and 9th grades (1993) in a single public junior high school in a suburban community. Possible selves and perceived influence of friends were measured by an individual interview during the school day in a designated room at the school in both 8th and 9th grade. After three weeks, an in-class group administration of self-report questionnaires was used to measure tobacco use, alcohol consumption, family structure, family cohesion, parental alcohol problems, demographics, and other measures not reported in this analysis.

1. Participants

A total of 160 adolescents were enrolled in the original study. A total of 137 completed measures in both 8th and 9th grade and were included in the present analysis. The majority of adolescents were Caucasian (84.4%), followed by African Americans (12.6%) and others (3.0%). The average age of adolescents was 13.5±0.6 years in the 8th grade and 14.5±0.6 years in the 9th grade. Around 50% (n = 69) of the analytic sample were girls.

2. Measures

a. Tobacco use

Tobacco use in both 8th and 9th grades was measured with two questions derived from the Smoking Behaviors Questionnaire, which was developed by Young and Rogers (1986). The first question

focused on cigarette use and had seven response options: “(1) never smoked,” “(2) used to smoke, but don’t anymore,” “(3) smoke now and then, but not every day,” “(4) less than half a pack a day,” “(5) half to one pack a day,” “(6) one to two packs a day,” and “(7) more than two packs a day.” The second question focused on smokeless tobacco use and had five response options reflecting the number of times used per day: “(1) never,” “(2) used to use smokeless tobacco, but don’t anymore,” “(3) one to five times a day,” “(4) six to ten times a day,” and “(5) more than 10 times a day.” For the level of tobacco-use variables, we coded smokeless tobacco according to the equivalent number of cigarettes. Given that 8–10 chews or pinches of smokeless tobacco is the equivalent amount of nicotine in 30–40 cigarettes (USDHHS, 1986), we coded smokeless tobacco use one to five times a day as half to one pack a day, six to ten times per day as one to two packs per day, and more than 10 times a day as more than two packs a day. Because any tobacco use is risky in middle adolescence, a dichotomous variable was used to distinguish those adolescents who ever used tobacco (from “used to smoke, but don’t any more” to “more than two packs a day”) from those who did not (never smoked). Ninth-grade tobacco use was the outcome variable and 8th grade tobacco use was used as a control variable.

b. <u>Drinking possible self</u>

The drinking possible self was measured with a single item from a closed-ended possible selves questionnaire (Markus & Nurius, 1986). The Possible Selves questionnaire consists of 37 items that measure the selves the adolescents expected to become in the future, e.g., good student, get into fights, have an interesting job, out of shape. Responses are on a five-point Likert scale. For the drinking possible self, adolescents indicate the likelihood that “*DRINK TOO MUCH ALCOHOL*” would describe them in the future (not at all, a little, somewhat, quite a bit, or very much). Consistent with Corte and Szalacha (2010), any endorsement was considered evidence of having a possible self related to alcohol. As such, responses were dichotomized to reflect presence (a little, somewhat, quite a bit, or very much) or absence (not at all) of a drinking possible self.

c. 9th grade alcohol consumption

The level of alcohol consumption in 9th grade was measured by three questions about frequency of use (beer, wine, and hard liquor separately) and three questions about quantity of use of beer, wine, and hard liquor (separately) in the previous 12 months (Shope, Copeland, & Dielman, 1994). The frequency questions, e.g., "How often did you drink beer (wine, hard liquor) in the past 12 months?" included the following response categories: haven't had a drink in the past 12 months, a few times a year or less, about once a month, about once a week, three or four days a week, every day. The quantity questions, e.g., "When you drank beer (wine, hard liquor) during the past 12 months, how many cans or bottles (glasses or shots) did you usually have at one time?" included the following response categories: haven't had a drink in the past 12 months, less than one, one, two, three or four, five or six, or seven or more. Quantity and weekly frequency were multiplied to reflect the average number of drinks per week in the previous 12 months for beer, wine, and hard liquor (separately). Then, the number of drinks per week for each beverage type was summed to reflect the level of total alcohol consumption (number of drinks per week) in the previous 12 months.

d. Control variables: Family, parent, and peer influences

Family, parent, and peer influences on tobacco and alcohol use in 8th grade that were included as control variables were family structure, family cohesion, parental alcohol problems, and perceived friends influence. Gender and baseline (8th grade) tobacco use were also included as controls.

1) Family structure

Participants responded to a multiple-choice question: "Who do you live with?" The response options were included: Mother, father, stepparent, grandparent, other adult, and someone else. Based on their answers, family structure was dichotomized into "two-parent family" and "single-parent family." In order to interpret the variable in terms of the risk factor, family structure was coded as two-parent family (0) and single-parent family (1).

2) Family cohesion

Family cohesion was measured with a 16-item self-report subscale of Family Adaptability and Cohesion Scales (FACES II) (Olson, 1982). Participants responded to each statement on a five-point scale ranging from “almost never” to “almost always.” Adequate reliability and validity of FACES II has been documented (Marsiglia, Kulis, Parsai, Villar, & Garcia, 2009; Olson, 1982). In the present study, Cronbach's alpha coefficient for family cohesion was 0.86. Moderate cohesion reflects optimal family functioning and the extremes of either high or low cohesion reflect poor family functioning (Green, Harris, Forte, & Robinson, 1991; Olson, 1982). Consistent with this literature, a dichotomous variable was computed with effective family cohesion reflecting midrange cohesion and ineffective family cohesion representing the extremes. In order to interpret the variable in terms of greater risk, the variable was coded as ineffective family cohesion (1) and effective family cohesion (0).

3) Parental alcohol problems

Adolescents’ perceptions of parental alcohol problems were measured by the short form of Children of Alcoholics Screening Test (CAST) (Hodgins, Maticka-Tyndale, El-Guebaly, & West, 1993). A yes/no format of five items addressed the experiences and attitudes related to a parent's alcohol problems (e.g., “Did you ever wish that a parent would stop drinking?”). All “yes” answers were summed to obtain a total score for each adolescent (range 0–5) with high scores reflecting more (perceived) parental alcohol problems. Studies have shown that the CAST is consistent with the close family member’s responses of parental alcohol problems (Staley & El-Guebaly, 1991). Cronbach's alpha coefficient for the CAST was 0.77 in this study.

4) Perceived influence of friends

Perceived social influence of friends was measured with an item from the Social Influence Questionnaire (Oyserman, 1993). In response to the question, “How important do you think your friends

were in making you the way you are now?" Participants responded on a five-point Likert scale that ranged from "not at all" to "very." Higher scores reflected higher perceived social influence from friends.

3. Statistical analysis

Frequencies were computed for the dichotomous variables and means (SD) were computed for the ordinal and continuous variables. To test the relationship between the drinking possible self and tobacco use, a series of three logistic regressions were conducted. First, a bivariate logistic regression was used to evaluate the unadjusted relationship between drinking possible self and 9th grade tobacco use. Then, a multiple logistic regression analyses was done in order to test the hypothesis that a drinking possible self predicts tobacco use controlling for family structure, family cohesion, parental alcohol problems, perceived social influence from friends, gender, and 8th grade tobacco use. Finally, a third multiple logistic regression analysis was conducted to determine whether the effect persists even after 9th grade alcohol consumption was added as a predictor.

C. Results

1. Tobacco use and alcohol consumption in 9th grade

Table I shows the descriptive statistics for adolescent tobacco use and alcohol consumption in 9th grade. Nearly one third of the adolescents (n = 43) reported having ever used tobacco, with half of those (n = 22) reporting current tobacco use and the other half (n = 21) reporting tobacco use in the past. Twenty of the 22 current tobacco users reported smoking cigarettes only. Of the remaining two, one reported only using smokeless tobacco and another reported using both cigarettes and smokeless tobacco. Girls were more likely to report using tobacco currently or in the past than boys, χ^2 (*1*) = 5.49 ($p < 0.05$). Sixty-eight percent of the adolescents (n = 91) reported alcohol consumption in 9th grade. For those who reported drinking, the mean number of drinks per week in the last 12 months was 3.78±10.0, with exception of one boy who reported very high alcohol consumption (80.6 drinks/week). Among the current and ever tobacco users, 93% (n = 40) of adolescents were also alcohol users.

2. Drinking possible self

Eleven percent (n = 15) of the sample showed evidence of a drinking possible self. Most of these adolescents (13 of the 15) responded "a little" to the item, *how likely will DRINK TOO MUCH ALCOHOL describe you in the future?* One adolescent reported "somewhat," one adolescent reported "quite a bit," and none reported "very likely." The other 122 adolescents (89%) reported "not at all" and thus, were considered not to have a drinking possible self. Among adolescents who had drinking possible self, 79% have used tobacco and 93% reported having alcohol consumption.

3. Family, parent, and peer control variables

More than one third of the sample (36%) lived in single parent families. Half the sample (50%) reported poor family cohesion. The majority of those with poor family cohesion (93%, n = 64) reported very low levels of cohesion (i.e., family members were disengaged), whereas a small portion (7%, n = 5) reported very high levels of cohesion (i.e., family members were enmeshed). Parental alcohol problems scores varied ranging from a low of 0 (none) to 5 (yes responses to all 5 items). The mean parental alcohol problems score was 0.86 (SD = 1.3). Perceived influence of friends ranged from 1 (no influence at all) to 5 (very much influence). The mean perceived influence of friends was 3.62 (SD = 1.2). The only gender difference in these variables was for perceived friend influence with girls perceiving a higher influence (3.91±1.1) than boys (3.31±1.2), $p < 0.01$.

4. Drinking possible self to predict tobacco use

Table II shows the results of three logistic regression models to predict tobacco use in 9th grade. Model 1 shows the results of a bivariate logistic regression model using the drinking possible self in the 8th grade to predict tobacco use in the 9th grade. Adolescents who had a drinking possible self in 8th grade were 10.2 times more likely to report having ever used tobacco in 9th grade than those who did not have a drinking possible self in 8th grade. In Model 2, all of the control variables were entered into the model except for concurrent (9th grade) alcohol consumption. The model was significant (Model 2: χ^2

(*7*) = 75.47, $p < 0.001$, Pseudo $R^2 = 0.47$). Adolescents who reported having a drinking possible self in 8th grade were 18.9 times more likely to report having ever used tobacco in 9th grade compared to those who did not have a drinking possible self, controlling for family structure, family cohesion, parental alcohol problems, friend influence, gender, and 8th grade tobacco use. Not surprisingly, adolescents who had higher parental alcohol problem scores (OR = 1.87, 95% CI = 1.3–2.8) and perceived greater influence from friends (OR = 2.07, 95% CI = 1.2–3.7) were also more likely to have reported tobacco use in 9th grade. Family structure and family cohesion were not significant after controlling for other predictors. Although girls were more likely to report tobacco use than boys, gender was not a significant predictor in the model after controlling for other predictors.

Finally, 9th grade level of alcohol consumption was added as a predictor to the second model to test the hypothesis that the drinking possible self in 8th grade would continue to significantly predict tobacco use in 9th grade even after controlling for 9th grade alcohol consumption. The second hypothesis was supported. Results of this model (Model 3: χ^2 (*8*) = 82.27, $p < 0.001$, Pseudo $R^2 = 0.52$) showed that having a drinking possible self continued to be a significant predictor (OR = 10.53, 95% CI = 1.4–78.2) of 9th grade tobacco use even after controlling for 9th grade alcohol consumption and the other predictors. Though the size of the odds ratio decreased, adolescents who had a drinking possible self in 8th grade were still over 10 times more likely to report having ever used tobacco in 9th grade compared to those who did not have a possible self related to alcohol in 8th grade. As expected, the level of alcohol consumption in 9th grade was also significantly associated with having ever used tobacco (OR = 1.23, 95% CI = 1.1–1.4); an increase of one drink/week in 9th grade was associated with a 23% greater likelihood of reporting ever having used tobacco in 9th grade. The other predictors remained stable; having higher parental alcohol problem scores (OR = 2.00, 95% CI = 1.3–3.1) and perceiving greater influence from friends (OR = 2.29, 95% CI = 1.2–4.4) predicted greater likelihood of having ever used tobacco in 9th grade.

D. Discussion

In this study, we tested the hypotheses that having a drinking possible self in the 8th grade would predict tobacco use in 9th grade controlling for other known predictors, and that this effect would persist even after controlling for current alcohol consumption. Both hypotheses were supported suggesting that having a drinking possible self is a powerful motivator of not only alcohol use, but also of tobacco use. This is important because it suggests that the drinking possible self may be an important explanatory mechanism underlying the relationship between alcohol and tobacco use in adolescents. Moreover, it has important implications for interventions to prevent alcohol and tobacco use in adolescents.

Other studies have shown that having a cognition about the self as a drinker is a powerful motivator of alcohol use. Studies have focused on the influence of a current self-cognition related to drinking, called a drinking self-schema (Corte & Stein, 2007) and on the influence of a future-oriented cognition related to drinking, i.e., a drinking possible self (Corte & Szalacha, 2010; Lee et al., 2013; Quinlan et al, 2006). But to our knowledge, this is the first study to determine that a drinking possible self predicts tobacco use over and above the effect of the level of current alcohol consumption in adolescents. Our findings are partially consistent with those of Doebrick and Todman (2003), who found a pattern of information processing (perception of stimuli, encoding, and retrieval of information) biased in favor of drinking in a sample of adult smokers who were light drinkers, not heavy drinkers. The authors argue that cross-substance facilitation of information processing may be a shared cognitive vulnerability for both smoking and drinking.

Only 11% of our sample had a drinking possible self, yet 93% reported alcohol consumption in the 8th grade and 79% reported tobacco use in 8th grade. Moreover, among those who did have a drinking possible self, most endorsed the likelihood that *DRINK TOO MUCH IN THE FUTURE* would describe them in the future as “a little.” This might suggest that the drinking possible self is not very

well-elaborated, or that adolescents may have been hesitant to acknowledge it. But given that many of these adolescents acknowledged actual alcohol consumption and tobacco use, we feel that the latter explanation is unlikely. Despite the low prevalence, the predictive power of the drinking possible self suggests that it may in fact distinguish those adolescents who are at the highest risk.

The prospective influence of the drinking possible self on tobacco use one year later persisted but decreased after adjusting for alcohol consumption. This suggests that the drinking possible self adds unique variance and is not simply a proxy for alcohol consumption. It should be noted, however, that the confidence interval around the odds ratio for the drinking possible self was quite large in the logistic regression models indicating low precision of our estimate. This is likely due to the fact that only 15 participants had a drinking possible self. Future studies with larger sample sizes will increase the precision of the estimate of the influence of the drinking possible self on tobacco use.

The genesis of the drinking possible self was not possible to determine in our study. Of the 15 adolescents who had a drinking possible self in the 8^{th} grade, 80% (n = 12) had initiated drinking and 40% (n = 6) had initiated smoking by that time. Therefore, we are unable to determine whether the drinking possible self was a cause or a consequence of alcohol consumption. Nonetheless, it is likely that alcohol consumption itself served to strengthen the drinking possible self, thus, making more chronically accessible in memory. Though there was a very weak relationship between parental alcohol problems and the drinking possible self in our study (r = 0.06), Corte and Szalacha (2010) found that the drinking possible self was associated with parental alcohol problems (r = 0.25) and conduct problems (r = 0.28) in 9–12 year old Black and Hispanic youth. Further studies are needed to determine factors that contribute to development of the drinking possible self.

Consistent with existing literature, in the present study, parental alcohol problems and friend influence predicted smoking behavior. Interestingly, our measure of perceived influence from friends in the present study did not focus on peer attitudes toward tobacco use or actual tobacco use among

peers–the type of peer influences that have been shown to be predictors in previous studies (McVicar, 2011; Piko et al., 2005; Tomar & Giovino, 1998; Villanti et al., 2011). Rather, in this dataset, the measure focused on the "perceived influence of friends in making you the way you are now." As such, high perceived influence from friends could reflect both positive and negative influences on the self. Nonetheless, it was a significant predictor of tobacco use. It is interesting that compared to boys, girls perceived that their friends had a stronger influence on them. It is possible that the gender difference in perceived influence from friends accounted for the gender difference in tobacco use given that gender was not a significant predictor of tobacco use and girls were more likely to use tobacco than boys in our sample. These gender-specific findings are similar to those of other researchers. Clayton (1991) found that girls were more susceptible to external influences than boys, and Scal et al. (2003) found that peer influences (e.g., exposed to a higher prevalence of smoking at school, having smoking friends) increased the likelihood of tobacco initation more for girls than boys. In contrast to other studies (Hill et al., 2005; O'Loughlin et al., 2009; USDHHS, 2012), neither family structure nor family cohesion were significant predictors of tobacco use in our study.

Given that possible selves are powerful motivators of behavior yet are modifiable, particularly in the formative years (Oyserman, Bybee, & Terry, 2006), this study has important implications for intervention. Taken together with our previous work (Lee et al., 2013), the findings of this study suggest that an intervention to prevent the development of a drinking possible self may prevent both tobacco and alcohol use in adolescents. While further studies are needed to determine factors that lead to the development of the drinking possible self, fostering expectations about the self in other more adaptive domains (e.g., academics, social relationships, sports, music) and highlighting the negative consequences of drinking on future aspirations may reduce both adolescent alcohol use and tobacco use.

Some limitations were encountered in this study. The relatively small sample size limited the ability to estimate the influences in different levels of tobacco use, though arguably, any level of tobacco

use is maladaptive, particularly in adolescents. Our sample was comprised of primarily of Caucasians from a working-class suburban community, which limits our ability to generalize these findings to other racial and ethnic groups and other social classes. Finally, more contemporary studies could be done to validate the findings, because the original study was completed in the 1990s.

E. Conclusion

To our knowledge, this is the first study to determine the influence of a possible self as a "drinker" on tobacco use one year later in adolescents. Though only 11% of our sample had a drinking possible self, our findings suggest that a drinking possible self in 8th grade predicts tobacco use in adolescents in 9th grade controlling for tobacco use in 8th grade and other variables that have been shown to predict tobacco use (family structure, family cohesion, parental alcohol problems, and friend influence). Moreover, the drinking possible self remained a significant predictor of tobacco use even after controlling for 9th grade alcohol consumption. Future studies are needed to determine factors that contribute to development of the drinking possible self. Identifying these factors will be helpful for the development of interventions to prevent the development of a drinking possible self.

F. References

Centers for Disease Control and Prevention (CDC). (1995). Youth risk behavior surveillance – United States, 1993 *Morbidity and Mortality Weekly Report* (Vol. 44, pp. 1-55). Atlanta, GA: Author.

Centers for Disease Control and Prevention (CDC). (2012). Youth risk behavior surveillance – United States, 2011. *Morbidity and Mortality Weekly Report* (Vol. 61, pp. 1-162). Atlanta, GA: Author.

Clark, D. B., Kirisci, L., & Moss, H. B. (1998). Early adolescent gateway drug use in sons of fathers with substance use disorders. *Addictive Behaviors, 23*(4), 561-566. doi: 10.1016/S0306-4603(98)00038-0

Clayton, S. (1991). Gender differences in psychosocial determinants of adolescent smoking. *Journal of School Health, 61*(3), 115-120.

Corte, C., & Stein, K. F. (2007). Self-cognitions in antisocial alcohol dependence and recovery. *Western Journal of Nursing Research, 29*(1), 80-99. doi: 10.1177/0193945906295480

Corte, C., & Szalacha, L. (2010). Self-cognitions, risk factors for alcohol problems, and drinking in preadolescent urban youths. *Journal of Child & Adolescent Substance Abuse, 19*(5), 406-423.

Cuijpers, P., & Smit, F. (2002). Nicotine dependence and regular nicotine use in adult children of alcoholics. *Addiction Research & Theory, 10*(1), 69-81.

Dierker, L., Avenevoli, S., Goldberg, A., & Glantz, M. (2004). Defining subgroups of adolescents at risk for experimental and regular smoking. *Prevention Science, 5*(3), 169-183. doi: 10.1023/B:PREV.0000037640.66607.6b

DiFranza, J. R., & Guerrera, M. P. (1990). Alcoholism and smoking. *Journal of Studies on Alcohol, 51*, 130-135.

DiFranza, J. R., Rigotti, N. A., McNeill, A. D., Ockene, J. K., Savageau, J. A., Cyr, D. S., & Coleman, M. (2000). Initial symptoms of nicotine dependence in adolescents. *Tobacco Control, 9*(3), 313-319. doi: 10.2307/20747546

Doebrick, C., & Todman, M. (2003). Schematic processing of cigarette smoking and drinking information: Separate or shared? *Addiction Research & Theory, 11*(5), 295-315.

Donovan, J. E., & Jessor, R. (1985). Structure of problem behavior in adolescence and young adulthood. *Journal of Consulting and Clinical Psychology, 53*(6), 890-904.

Faeh, D., Viswanathan, B., Chiolero, A., Warren, W., & Bovet, P. (2006). Clustering of smoking, alcohol drinking and cannabis use in adolescents in a rapidly developing country. *Bmc Public Health, 6*. doi: 10.1186/1471-2458-6-169

Freeman, M. A., Hennessy, E. V., & Marzullo, D. M. (2001). Defensive evaluation of antismoking messages among college-age smokers: The role of possible selves. *Health Psychology, 20*(6), 424-433. doi: 10.1037/0278-6133.20.6.424

Green, R. G., Harris, R. N., Jr., Forte, J. A., & Robinson, M. (1991). Evaluating FACES III and the circumplex model: 2,440 families. *Family Process, 30*(1), 55-73.

Gritz, E. R., Prokhorov, A. V., Hudmon, K. S., Jones, M. M., Rosenblum, C., Chung-Chi, C., . . . de Moor, C. (2003). Predictors of susceptibility to smoking and ever smoking: A longitudinal study in a triethnic sample of adolescents. *Nicotine & Tobacco Research, 5*(4), 493-506.

Hill, K. G., Hawkins, J. D., Catalano, R. F., Abbott, R. D., & Guo, J. (2005). Family influences on the risk of daily smoking initiation. *Journal of Adolescent Health, 37*(3), 202-210. doi: 10.1016/j.jadohealth.2004.08.014

Hodgins, D. C., Maticka-Tyndale, E., El-Guebaly, N., & West, M. (1993). The CAST-6: Development of a short-form of the children of alcoholics screening test. *Addictive Behaviors, 18*(3), 337-345. doi: 10.1016/0306-4603(93)90035-8

Hooker, K., & Kaus, C. R. (1992). Possible selves and health behaviors in later life. *Journal of Aging and Health, 4*(3), 390-411. doi: 10.1177/089826439200400304

Hooker, K., & Kaus, C. R. (1994). Health-related possible selves in young and middle adulthood. *Psychology and Aging, 9*(1), 126-133. doi: 10.1037/0882-7974.9.1.126

Johnston, L. D., O'Malley, P. M., Bachman, J. G., & Schulenberg, J. E. (2012). *Monitoring the future national results on adolescent drug use: Overview of key findings, 2011*. Ann Arbor: Institute for Social Research, University of Michigan.

Khuder, S. A., Dayal, H. H., & Mutgi, A. B. (1999). Age at smoking onset and its effect on smoking cessation. *Addictive Behaviors, 24*(5), 673-677. doi: 10.1016/S0306-4603(98)00113-0

Killen, J. D., Ammerman, S., Rojas, N., Varady, J., Haydel, F., & Robinson, T. N. (2001). Do adolescent smokers experience withdrawal effects when deprived of nicotine? *Experimental and Clinical Psychopharmacology, 9*(2), 176-182.

Lee, C. K., Corte, C., Stein, K., Park, C., Finnegan, L., & McCreary, L. (2013). Prospective effects of possible selves on alcohol consumption and alcohol problems in adolescents. Unpublished manuscript.

Lotrean, L. M., Kremers, S., Ionut, C., & de Vries, H. (2009). Gender differences regarding the alcohol-tobacco relationship among Romanian adolescents–A longitudinal study. *European Journal of Public Health, 19*(3), 285-289. doi: 10.1093/eurpub/ckp011

Markus, H., & Nurius, P. (1986). Possible selves. *American Psychologist, 41*(9), 954-969. doi: 10.1037/0003-066x.41.9.954

Marsiglia, F. F., Kulis, S., Parsai, M., Villar, P., & Garcia, C. (2009). Cohesion and conflict: Family influences on adolescent alcohol use in immigrant Latino families. *Journal of Ethnicity in Substance Abuse, 8*(4), 400-412. doi: 10.1080/15332640903327526

McGue, M., & Iacono, W. G. (2005). The association of early adolescent problem behavior with adult psychopathology. *American Journal of Psychiatry, 162*(6), 1118-1124. doi: 10.1176/appi.ajp.162.6.1118

McVicar, D. (2011). Estimates of peer effects in adolescent smoking across twenty-six European Countries. *Social Science & Medicine, 73*(8), 1186-1193. doi: 10.1016/j.socscimed.2011.08.006

O'Loughlin, J., Karp, I., Koulis, T., Paradis, G., & DiFranza, J. (2009). Determinants of first puff and daily cigarette smoking in adolescents. *American Journal of Epidemiology, 170*(5), 585-597. doi: 10.1093/aje/kwp179

Olson, D. H. (1982). *Family inventories: Inventories used in a national survey of families across the family life cycle*. St. Paul, MN: Family Social Science, University of Minnesota.

Oyserman, D. (1993). Adolescent identity and delinquency in interpersonal context. *Child psychiatry and human development, 23*(3), 203-214.

Oyserman, D., Bybee, D., & Terry, K. (2006). Possible selves and academic outcomes: How and when possible selves impel action. *Journal of Personality and Social Psychology, 91*(1), 188-204. doi: 10.1037/0022-3514.91.1.188

Oyserman, D., Bybee, D., Terry, K., & Hart-Johnson, T. (2004). Possible selves as roadmaps. *Journal of Research in Personality, 38*(2), 130-149. doi: 10.1016/s0092-6566(03)00057-6

Piko, B. F., Luszczynska, A., Gibbons, F. X., & Teközel, M. (2005). A culture-based study of personal and social influences of adolescent smoking. *European Journal of Public Health, 15*(4), 393-398. doi: 10.1093/eurpub/cki008

Prokhorov, A. V., Hudmon, K. S., Cinciripini, P., & Marani, S. (2005). "Withdrawal symptoms" in adolescents: A comparison of former smokers and never-smokers. *Nicotine & Tobacco Research, 7*(6), 909-913.

Quinlan, S. L., Jaccard, J., & Blanton, H. (2006). A decision theoretic and prototype conceptualization of possible selves: Implications for the prediction of risk behavior. *Journal of Personality, 74*(2), 599-630. doi: 10.1111/j.1467-6494.2006.00386.x

Scal, P., Ireland, M., & Borowsky, I. W. (2003). Smoking among American adolescents: A risk and protective factor analysis. *Journal of Community Health, 28*(2), 79-97.

Shope, J. T., Copeland, L. A., & Dielman, T. E. (1994). Measurement of alcohol use and misuse in a cohort of students followed from grade 6 through grade 12. *Alcoholism, clinical and experimental research, 18*(3), 726-733.

Staley, D., & El-Guebaly, N. (1991). Psychometric evaluation of the Children of Alcoholics Screening-Test (CAST) in a psychiatric sample. *International Journal of the Addictions, 26*(6), 657-668.

Stein, K. F., Roeser, R., & Markus, H. (1998). Self-schemas and possible selves as predictors and outcomes of risky behaviors in adolescents. *Nursing Research, 47*(2), 96-106. doi: 10.1097/00006199-199803000-00008

Tomar, S. L., & Giovino, G. A. (1998). Incidence and predictors of smokeless tobacco use among US youth. *American Journal of Public Health, 88*(1), 20-26.

Tucker, J. S., Martínez, J. F., Ellickson, P. L., & Edelen, M. O. (2008). Temporal associations of cigarette smoking with social influences, academic performance, and delinquency: A four-wave longitudinal study from ages 13-23. *Psychology of Addictive Behaviors, 22*(1), 1-11. doi: 10.1037/0012-1649.32.4.744

U.S. Department of Health and Human Services (USDHHS). (1986). The health consequences of using smokeless tobacco: A report of the Advisory Committee to the Surgeon General. Bethesda, MD: U.S. Department of Health and Human Services, Public Health Service.

U.S. Department of Health and Human Services (USDHHS). (2010). How tobacco smoke causes disease—The biology and behavioral basis for tobacco-attributable disease: A report of the surgeon general. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.

U.S. Department of Health and Human Services (USDHHS). (2012). Preventing tobacco use among youth and young adults: A report of the surgeon general. Rockville, MD: U.S. Department of Health and Human Services, Public Health Services, Office of the Surgeon General.

U.S. Department of Health and Human Services (USDHHS). (2004). The health consequences of smoking: A report of the surgeon general. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.

Van Zundert, R. M. P., Kuntsche, E., & Engels, R. C. M. E. (2012). In the heat of the moment: Alcohol consumption and smoking lapse and relapse among adolescents who have quit smoking. *Drug and Alcohol Dependence, 126*(1–2), 200-205. doi: 10.1016/j.drugalcdep.2012.05.016

Villanti, A., Boulay, M., & Juon, H.-S. (2011). Peer, parent and media influences on adolescent smoking by developmental stage. *Addictive Behaviors, 36*(1–2), 133-136. doi: 10.1016/j.addbeh.2010.08.018

Wetzels, J. J. L., Kremers, S. P. J., Vitória, P. D., & de Vries, H. (2003). The alcohol-tobacco relationship: a prospective study among adolescents in six European countries. *Addiction, 98*(12), 1755-1763.

Young, T. L., & Rogers, K. D. (1986). School performance characteristics preceding onset of smoking in high school students. *American Journal of Diseases of Children, 140*(3), 257-259.

TABLE VII

ADOLESCENT RISKY BEHAVIORS IN 9TH GRADE

9th Grade Risky Behaviors	Total		Boys		Girls	
	N	%	N	%	N	%
Level of tobacco use*						
Never used tobacco	92	68.2	52	77.6	40	58.8
Used to, but not anymore	21	15.6	10	14.9	11	16.2
Now and then, but not everyday	7	5.2	2	3.0	5	7.4
Less than half a pack a day	7	5.2	0	0.0	7	10.3
Half to one pack a day	7	5.2	2	3.0	5	7.4
One to two packs a day	0	0.0	0	0.0	0	0.0
More than two packs a day	1	0.7	1	1.5	0	0.0
Tobacco use*						
Never used tobacco	92	68.2	52	77.6	40	58.8
Have ever used tobacco	43	31.8	15	22.4	28	41.2
	Mean±SD	Range	Mean±SD	Range	Mean±SD	Range
Level of alcohol consumption (drinks/week)	3.78±10.0	0.0-80.6	3.55±13.0	0.0-80.6	3.96±7.0	0.0-36.9

Note: The level of alcohol consumption is only for those adolescents who reported drinking. *$p < 0.05$ Gender differences in 9th grade

TABLE VIII

LOGISTIC REGRESSIONS FOR DRINKING POSSIBLE SELF IN 8TH GRADE PREDICTING TOBACCO USE IN 9TH GRADE

Predictors	9th Grade Tobacco Use											
	Model 1				Model 2				Model 3			
	OR	Z	95% CI	*P*	OR	Z	95% CI	*P*	OR	Z	95% CI	*P*
Drinking possible self	10.20	3.40	2.7–38.9	0.001	18.92	3.18	3.1–116.0	0.001	10.53	2.30	1.4–78.2	0.021
Social determinants												
Family structure												
Single-parent family (1)					0.66	-0.71	0.2–2.1	0.478	0.50	-1.08	0.1–1.8	0.280
Two-parent family (0)					1.00				1.00			
Family cohesion												
Ineffective cohesion (1)					0.54	-0.98	0.2–1.8	0.327	0.39	-1.34	0.1–1.5	0.181
Effective cohesion (0)					1.00				1.00			
Parental alcohol problems					1.87	3.16	1.3–2.8	0.002	2.00	3.22	1.3–3.1	0.001
Perceived friends' influence					2.07	2.46	1.2–3.7	0.014	2.29	2.53	1.2–4.4	0.011
Gender												
Girl (1)					2.26	1.27	0.7–7.0	0.203	1.37	0.47	0.4–5.0	0.638
Boy (0)					1.00				1.00			
8th grade tobacco use					56.73	4.69	10.5–306.8	< 0.001	54.77	4.25	8.6–347.5	< 0.001
9th grade alcohol consumption									1.23	2.62	1.1–1.4	0.009
LR χ^2 (*df*)	14.61 (*1*)				75.47 (*7*)				82.27 (*8*)			
Prob > χ^2	0.001				< 0.001				< 0.001			
Pseudo R^2	0.09				0.47				0.52			

Note: OR = odds ratio; CI = confidence interval; Z test: square root of the Wald χ^2 test; LR = likelihood ratio test

APPENDICES

Appendix A

UNIVERSITY OF ILLINOIS
AT CHICAGO

Office for the Protection of Research Subjects (OPRS)
Office of the Vice Chancellor for Research (MC 672)
203 Administrative Office Building
1737 West Polk Street
Chicago, Illinois 60612-7227

Determination Notice
Research Activity Does Not Involve "Human Subjects"

May 25, 2012

Chia-Kuei Lee, MS
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Phone: (312) 996-2081 / Fax: (312) 996-8945

RE: Research Protocol # 2012-0457
"Possible Selves in Adolescents: Social Determinants and Behavioral Outcomes"

Dear Chi-Kuei Lee:

The above proposal was reviewed on May 25, 2012 by OPRS staff/members of IRB #2. From the information you have provided, the proposal does not appear to involve "human subjects" as defined in 45 CFR 46. 102(f).

The specific definition of human subject under 45 CFR 46.102(f) is:

> *Human subject* means a living individual about whom an investigator (whether professional or student) conducting research obtains
>
> (1) data through intervention or interaction with the individual, or
> (2) identifiable private information.
>
> *Intervention* includes both physical procedures by which data are gathered (for example, venipuncture) and manipulations of the subject or the subject's environment that are performed for research purposes. *Interaction* includes communication or interpersonal contact between investigator and subject. *Private information* includes information about behavior that occurs in a context in which an individual can reasonably expect that no observation or recording is taking place, and information which has been provided for specific purposes by an individual and which the individual can reasonably expect will not be made public (for example, a medical record). Private information must be individually identifiable (i.e., the identity of the subject is or may readily be ascertained by the investigator or associated with the information) in order for obtaining the information to constitute research involving human subjects.

All the documents associated with this proposal will be kept on file in the OPRS and a copy of this letter is being provided to your Department Head for the department's research files.

If you have any questions or need further help, please contact the OPRS office at (312) 996-1711 or me at (312) 355-2908. Please send any correspondence about this protocol to OPRS at 203 AOB, M/C 672.

Sincerely,

Charles W. Hoehne, B.S., C.I.P.
Assistant Director, IRB # 2
Office for the Protection of Research Subjects

cc: Arlene Miller, Health Systems Science, M/C 802
Colleen Corte, Health Systems Science, M/C 802

VITA

Chia-Kuei Lee

EDUCATIONAL BACKGROUND

PhD	2009 – Present	College of Nursing, University of Illinois at Chicago, USA
MS	2000 – 2002	Department of Public Health, College of Medicine, National Cheng Kung University, Taiwan, R.O.C.
BSN	1996 – 2000	School of Nursing, National Taiwan University, Taiwan, R.O.C.

TRAINING PROGRAM

2008	Special Study: Oncology Clinical Care (Sep1 - Nov 30) Global Health Leadership Office, College of Nursing, University of Illinois at Chicago, USA.
2007	Oncology Case Management Training Program (97 hours) Koo Foundation Sun Yat-Sen Cancer Center, Taiwan, R.O.C.
2004	Guidance and Counseling (200 hours) Foundation of Teacher-Cheng, Taiwan, R.O.C.
2003 – 2004	Introduction of Genetic Counseling (2 credit of graduate program) Department of Nursing, National Cheng Kung University, Taiwan, R.O.C.
2003	Training Course for Nursing Leaders (March 23-24) Taiwan Nurses Association, Taiwan, R.O.C.

PROFESSIONAL EXPERIENCES

2012 Fall	Part time Teaching Assistant: *Intermediate statistics (Masters course)*, College of Nursing, University of Illinois at Chicago, USA
2012 Summer	Part time Graduate Research Assistant: *UIC bridges to the doctorate program*, College of Nursing, University of Illinois at Chicago, USA
2010 – Present	Part time Graduate Assistant, Global Health Leadership Office, College of Nursing, University of Illinois at Chicago, USA
2006 – 2009	Case Manager/Nurse, Nursing Department, National Cheng Kung University Hospital, Taiwan, R.O.C.
2005	Full time Grant Administration Staff, Community Health Division of Bureau of Health Promotion, Department of Health, Taiwan, R.O.C.
2002 – 2005	Full time Research Assistant: *Study on genetic education, information providing, counselor-patient relationship and social impact - Impact of parents on newborn screening (I-III),* Department of Nursing, National Cheng Kung University, Taiwan, R.O.C.

2001 Part time Research Assistant: *Establishment of a reporting system of adolescent pregnancy in Tainan, and a study of its risk factors, and prevention methods,* Department of Public Health, College of Medicine, National Cheng Kung University, Taiwan, R.O.C.

2000 – 2001 Part time Research Assistant: *A new method for measuring interior consistence of multi-item instrument,* Department of Public Health, College of Medicine, National Cheng Kung University, Taiwan, R.O.C.

HONORS AND AWARDS

1. 2013 Virginia M. Ohlson International Studies Endowed Scholarship Award (2013/04/04). Funded by UIC College of Nursing, USA.
2. 2012 Chieko Onoda International Students Scholarship Award (2012/04/24). Funded by UIC College of Nursing, USA.
3. The Graduate Student Presenter Awards (2011/06/17). Funded by UIC Graduate College, USA.
4. 2011 Virginia M. Ohlson International Studies Endowed Scholarship Award (2011/04/20). Funded by UIC College of Nursing, USA.
5. 2010 Chieko Onoda International Students Scholarship Award (2010/04/28). Funded by UIC College of Nursing, USA.
6. Contribution in Conducting Clinical Researches Award (2008/11/01). Funded by Department of Health, Taiwan, R.O.C.
7. Nursing Research Award (2008/05). Funded by Department of Nursing, National Cheng-Kung University Hospital, Taiwan, R.O.C.

FUNDED RESEARCH PROJECTS

2009.01 - 2009.12 Co-primary investigator
The project of providing services to cancer patients in 2009
Funded by Bureau of Health Promotion, Department of Health, Taiwan, R.O.C.

2009.01 - 2009.12 Co-primary investigator
Setting up the indicators for evaluating the case management of cancer patient
Funded by National Cheng Kung University Hospital, Taiwan, R.O.C.

2008.04 - 2008.12 Co-primary investigator
Evaluation for information system of cancer case management
Funded by Nursing Department, National Cheng Kung University Hospital, Taiwan, R.O.C.

2008.01 - 2008.12 Co-primary investigator
The project of providing services to cancer patients in 2008
Funded by Bureau of Health Promotion, Department of Health, Taiwan, R.O.C.

2007.06 - 2008.05 Co-primary investigator
Exploring and developing the self-rated scale of symptom distress for the patients with cancer
Funded by Nursing Department, National Cheng Kung University Hospital, Taiwan, R.O.C.

2007.01 - 2007.12 Researcher
Enhance the oncology quality of nursing care in Southern Taiwan
Funded by Bureau of Health Promotion, Department of Health, Taiwan, R.O.C.

2007.01 - 2007.12 Primary investigator
Participatory action research for developing the support groups of the patients with cancer - colorectal cancer and lung cancer
Funded by National Cheng Kung University Hospital, Taiwan, R.O.C.

2006.01 - 2007.12 Researcher
Collecting and applying the tissue, blood, and clinical information for people with colorectal cancer or in high risk group
Funded by Industrial Technology Research Institute, Taiwan, R.O.C.

2004.05 - 2005.04 Researcher
The information provision and professional-client communication in genetic health services
Funded by Bureau of Health Promotion, Department of Health, Taiwan, R.O.C.

PUBLICATIONS

Refereed Papers

1. Lu, I. C., Lee, C. K., & Huang, M. C. (2006). The new frontiers of genetic nursing. *Chang Gung Nursing, 17*(3), 325-331. Taipei. NSC92-3112-H-006-001.
2. Huang, M. C., Lee, C. K., Lin, S. J., & Lu, I. C. (2005). A survey of parental consent process for newborn screening in Taiwan. *Acta Paediatric Taiwanica, 46*(6), 361-369. Taipei. NSC92-3112-H-006-001.
3. Huang, M. C., Lee, C. K., Lin, S. J., & Lu, I. C. (2005). Parental consent on newborn screening in southern Taiwan. *Journal of Medical Ethics, 31*(11), 621-624. London. NSC91-3112-H-006-006. SSCI.
4. Huang, M. C., Wang, Y. H., Lu, I. C., Lee, C. K., & Lin, S. J. (2005). Informed consent and result disclosure for genetic testing: newborn screening and amniocentesis. *Bioethical Issues in Genetic Counseling and Education,* 81-103. Tainan. NSC91-3112-H-006-006, NSC92-3112-H-006-001.
5. Huang, M. C., Wang, Y. H., Lu, I. C., & Lee, C. K. (2004). Informed consent for genetic testing - newborn screening vs. amniocentesis. Conference Proceedings published from presentation at *The Fourth International Conference of Bioethics: Biotechnology, Family and Community*, 2, I1-I12. Taipei. NSC91-3112-H-006-006.
6. Lee, C. K., Lu, I. C., Lin, S. J., & Huang, M. C. (2004). Exploring the information provision and in-service training of newborn screening in Tainan. *Tzu Chi Medical Journal*, *16*(1), 43-50. Hualien. Funded by: NSC91-3112-H-006-006.

7. Wang, S. T., & Lee, C. K. (2002). Length of time to promotion as a professor in the departments of clinical and basic science at a medical school and its associated factors. *Journal of Medical Education*, *6*(1), 39-52. Taipei.

Conference Presentations

1. Lee, C. K., Corte, C., & Stein, K. (2013, June). Prospective effects of possible selves on alcohol consumption and alcohol problems in adolescents. *36th Annual Research Society on Alcoholism Scientific Meeting.* Chicago, USA.
2. Lee, C. K., Corte, C., Stein, K., Park, C., Finnegan, L., & McCreary, L. (2013, March). Possible selves related to academics are protective against alcohol use in adolescents. *2013 MNRS Annual Research Conference.* Chicago, USA.
3. Eldeirawi, K., Lee, C. K., & Greco, S. (2011, June). Association of serum 25-hydroxyvitamin D and serum C-peptide in a nationally representative sample of adults in the United States. *3rd North American Congress of Epidemiology.* Montreal, Canada.
4. Lee, C. K., Wang, S. T., Choi, H., & Corte, C. (2011, April). Behavioral problems among school-aged children born to adolescent mothers and adult mothers. *2011 Student Research Forum.* Chicago, USA.
5. Lee, C. K., Wang, S. T., Choi, H., & Corte, C. (2011, March). Behavioral problems among school-aged children born to adolescent mothers and adult mothers. *2011 MNRS Annual Research Conference.* Columbus, USA.
6. Lee, C. K., Yeh, L. L., & Wu, Y. L. (2009, September). Participatory action research for developing the support groups of the patients with cancer - colorectal cancer and lung cancer. *25th Annual Nursing Research Conference.* Kaohsiung, Taiwan.
7. Wu, Y. L., Lee, C. K., & Wu, C. M. (2008, May). Evaluation for information system of cancer case management. *2008 Nursing Informatics Symposium in Taiwan.* Taipei, Taiwan.
8. Lin, Y. J., Lee, C. K., Lin, P. W., & Chou, T. C. (2007, October). Surgical treatment of metastatic colon cancer. *Post-ASCO Meeting of Colorectal cancer.* Tainan, Taiwan.
9. Lee, C. K. (2007, September). The role of case manager in the medical team for colorectal cancer. *The 11th Congress of Asian Federation of Coloproctology.* Tokyo. Japan.
10. Liou, C. S., & Lee, C. K. (2007, September). Using the ordinary dress hook to refit the belt of ostomy appliance: do it yourself. *The 11th Congress of Asian Federation of Coloproctology.* Tokyo. Japan.
11. Lee, C. K., & Wang, S. T. (2006, December). Intelligence, behavioral development and academic performance among the first graders and second graders born to adolescent mothers. *Nursing Research Conference.* Tainan, Taiwan.
12. Huang, M. C., Lee, C. K., Lin, S. J., & Lu, I. C. (2005, January).Parental consent process on newborn screening in Taiwan. *Taiwan Nurses Association 21th Conference.* Taipei. Taiwan. Funded by: NSC92-3112-H-006-001.
13. Lu, I. C., Huang, M. C., Lee, C. K., & Lin, S. J. (2005, January). Ethical concerns on newborn screening policy in Taiwan. *Taiwan Nurses Association 21th Conference.* Taipei. Taiwan. Funded by: NSC91-3112-H-006-006.

14. Huang, M. C., Wang, Y. H., Lu, I. C., Lee, C. K., & Lin, S. J. (2005, January). Informed consent and result disclosure for genetic testing: newborn screening and amniocentesis. *Bioethical Issues in Genetic Counseling and Education.* Tainan, Taiwan. Funded by: NSC91-3112-H-006-006, NSC92-3112-H-006-001.

15. Lee, C. K., Huang, M. C., & Lu, I. C. (2004, October). Current practices and parental demands of result disclosure for newborn screening in Taiwan. *International Society of Nurses in Genetics 17th Annual International Conference.* Toronto. Canada. Funded by: NSC91-3112-H-006-006.

16. Huang, M. C., Lu, I. C., & Lee, C. K. (2004, October). Impacts of positive result disclosure to parents on newborn screening in Taiwan. *International Society of Nurses in Genetics 17th Annual International Conference.* Toronto. Canada. Funded by: NSC91-3112-H-006-006.

17. Lu, I. C., Huang, M. C., & Lee, C. K. (2004, October). Ethical considerations on informed consent and result disclosure of newborn screening in Taiwan. *International Society of Nurses in Genetics 17th Annual International Conference.* Toronto. Canada. Funded by: NSC91-3112-H-006-006.

18. Tsai, M. Y., Huang, M. C., & Lee, C. K. (2004, October). The parents' frequently asked questions after positive result disclosure of newborn screening for congenital hypothyroidism in Taiwan. *International Society of Nurses in Genetics 17th Annual International Conference.* Toronto. Canada. Funded by: NSC92-3112-H-006-001.

19. Lee, C. K., Huang, M. C., & Lu, I. C. (2004, September). A surveillance of parental consent on newborn screening in Taiwan. *5th Asia Pacific Regional Meeting of International Society for Neonatal Screening.* Shanghai. China. Funded by: NSC92-3112-H-006-001.

20. Huang, M. C., Lu, I. C., & Lee, C. K. (2004, September). Information provision and in-service training on newborn screening in Taiwan. *5th Asia Pacific Regional Meeting of International Society for Neonatal Screening.* Shanghai. China. Funded by: NSC92-3112-H-006-001.

21. Huang, M. C., Wang, Y. H., Lu, I. C., & Lee, C. K. (2004, June) Informed consent for genetic testing - newborn screening vs. amniocentesis. *The Fourth International Conference of Bioethics: Biotechnology, Family and Community.* Taipei. Taiwan. Funded by: NSC91-3112-H-006-006.

22. Lu, I. C., Huang, M. C., Lee, C. K., & Lin, S. J. (2004, February). Information provision on newborn screening. *Taiwan Nurses Association 20th Conference.* Taipei. Taiwan. NSC91-3112-H-006-006.

23. Lee, C. K., Huang, M. C., & Lu, I. C. (2003, November). A surveillance of parental informed consent on newborn screening in southern Taiwan. *The 53rd Annual Meeting of the American Society of Human Genetics.* Los Angeles. USA. Funded by: NSC91-3112-H-006-006.

24. Huang, M. C., Lu, I. C., & Lee, C. K. (2003, November). Exploring the information provision and in-service training on newborn screening in southern Taiwan. *The 53rd Annual Meeting of the American Society of Human Genetics.* Los Angeles. USA. Funded by: NSC91-3112-H-006-006.

25. Huang, M. C., Lu, I. C., & Lee, C. K. (2003, November). Newborn screening in Taiwan: Should explicit parental consent be required? *International Society of Nurses in Genetics 16th Annual International Conference.* Los Angeles. USA. Funded by: NSC91-3112-H-006-006.

26. Lee, C. K., & Wang, S. T. (2002, October) Intelligence, behavioral development and academic performance of the first and second-year elementary students born to adolescent mothers. *2002 International Symposium on Health Promotion of Adolescents.* Taipei. Taiwan.

PROFESSIONAL SERVICE

1. Representative of Health Professions Student Council for Nursing Graduate Student Organization in UIC College of Nursing, USA (2010/08-2011/10)
2. Member of Community Health Committee, Department of Nursing, National Cheng Kung University Hospital, Taiwan, R.O.C. (2008/09-2009/05)

PROFESSIONAL MEMBERSHIPS

1. Research Society on Alcoholism, USA, May. 2013 – Present
2. Sigma Theta Tau International, Alpha Lambda Chapter, USA, Sep. 2011 – Present
3. Midwest Nursing Research Society, USA, Sep. 2010 – Present

CERTIFICATIONS

1. Registered Professional Nurse License, issued by Department of Health, Taiwan, R.O.C., No. 081994, July, 2000