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Early Maturing Out of Problematic Alcohol Use

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EARLY MATURING OUT OF PROBLEMATIC ALCOHOL USE

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DISSERTATION
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A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy in the
College of Arts and Sciences
at the University of Kentucky

By
Sarah Jane Peterson
Lexington, Kentucky
Director: Dr. Gregory T. Smith, Professor of Psychology
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ABSTRACT OF DISSERTATION

EARLY MATURING OUT OF PROBLEMATIC ALCHOL USE

Most research suggests that alcohol use peaks in the college years then declines into the mid-thirties (Jochman & Fromme, 2010). However, there is evidence that some individuals mature out earlier: downward trends for some individuals begin in college, with as many as one third of students decreasing their drinking (Baer et al., 2001). It is crucial to identify factors that differentiate those who decrease their drinking early from those who persist in high levels of consumption; doing so would clarify risk for college-related alcohol problems and perhaps subsequent alcohol use disorder, and aid in earlier targeted prevention and intervention. This study emphasizes two possibilities: 1) perhaps those who mature out early have adult-like responsibilities such as paying for their educations (i.e. financial burden) and/or 2) perhaps those who persist have higher levels of personality (i.e. urgency or sensation seeking) and learning-based (i.e. alcohol expectancies) risk factors. A sample of 591 college students were assessed four times across two years. Five trajectories of drinking frequency were identified. Three displayed stable drinking patterns across the two year period at low/infrequent, moderate and high levels. A fourth group displayed an increase at wave 4, and a fifth group decreased their drinking at wave 4. The latter two groups could be differentiated by sensation seeking and positive social expectancies, but not urgency or financial burden, before their patterns diverged. These results emphasize heterogeneity in alcohol use development across emerging adulthood, as well as the integration of contextual and individual difference risk factors.

KEYWORDS: Alcohol Use, College Students, Trajectories, Contextual Risk, Individual Differences, Personality

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08/16/2021
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DEDICATION

To Wendy, rest in peace.

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CHAPTER 1. INTRODCUTION

Young adults, in general, and college students, more specifically, consume alcohol at high rates, placing them at risk for negative outcomes related to physical and mental health, academic performance, and social well-being (Brown et al., 2009; Hedden, 2015). Drinking during the college years is associated with public health harms, including safety risks, sexual and physical assault, and even death (Hingson et al., 2005; 2009). Full-time college students appear more likely to engage in risky drinking. Compared to peers not attending college, students are more likely to be current drinkers and consume larger amounts of alcohol (Hedden, 2015). Approximately 60% of college students report drinking alcohol at least once a month, and two out of three of these individuals binge drink at least once a month (Hedden, 2015). This may be the result of a widespread and normative culture of binge drinking on college campuses (Sher et al., 2001; Slutske, 2005). In addition, the collegiate years are a time of great change for some individuals, involving increased freedom from parental control, increased autonomy, and increased availability of alcohol, resulting, for many, in experimentation with the unfamiliar behavior of heavy drinking (Arnett, 2005).

Trends in alcohol consumption documented in the literature demonstrate this college drinking phenomenon, suggesting a population-wide peak in alcohol use during the college years followed by decreases into the mid-thirties, often referred to as maturing out of heavy drinking (Jochman & Fromme, 2010). A common explanation for this decline is that individuals take on adult responsibilities, such as full-time employment, marriage, and parenthood, which are less compatible with heavy drinking (Yamaguchi & Kandel, 1985). Although the maturing out literature notes that many people decrease their

drinking in the years following graduation (Bachman et al., 2013), it is true that 1) many harms have been experienced prior to that point, as mentioned above (Brown et al., 2009), and 2) some do not decrease their drinking and develop adult alcohol use disorders (Jackson & Sher, 2005).

It is clear from the above that drinking during college is of clinical and public health significance. Thus, a crucial line of research and a public health priority is identifying risk factors that differentiate young adults who persist in their problematic drinking from young adults who desist. Not only would these efforts elucidate and expand maturing out theory, but such identification would also make it possible to implement prevention and intervention efforts before, or shortly after, problem drinking behavior has begun or worsens.

Prior models have focused on contextual and individual difference factors to explain both college drinking increases and later desistance. Indeed, contextual factors have been used to explain not only the peak in alcohol use during the college years, but also the declines observed into adulthood. Bachman and colleagues (2013) emphasized the new freedoms experienced upon entering college to explain college drinking increases and then the new responsibilities faced post-college, such as full-time employment, marriage, and parenthood, to explain normative reductions in drinking behavior in those years. Many individual difference models have also been examined, emphasizing personality traits (Gates et al., 2016; Jackson & Sher, 2005; Littlefield et al., 2009; Rutledge & Sher, 2001), drinking motives (Cooper et al., 2008), and expectancies (Rutledge & Sher, 2001; Jackson & Sher, 2005; Littlefield et al., 2009; 2013).

There exists, however, an under-appreciated reality with respect to drinking desistance. To date, much of the focus has been on a population-wide decrease in heavy drinking, beginning a few years post-college and continuing into adulthood (Jochman & Fromme, 2010). What is under-appreciated is that developmentally sensitive trajectory models of college drinking appear to identify heterogeneity in drinking trajectories, including a group of students who report steady declines in their drinking behavior much earlier, even as early as the first two years of their undergraduate careers (Baer, 2001; Schulenberg & Maggs, 2002; Windle et al., 2005). Ranges of the percentage of emerging adults that fall into this group in trajectory analysis studies ranges are from 10% to 33%, with similar rates between men and women (Derefinko et al., 2016; Greenbaum et al., 2005; Maggs & Schulenberg, 2004; Schulenberg et al., 1996). To fully understand what differentiates those whose drinking declines from those who continue to drink heavily, it is important to understand this group of students who mature out early.

This study emphasizes two possible explanations for early maturing out. First, a second under-appreciated reality is that many college students do face "adult" responsibilities during the college years, such as the need to work to pay for their own educations or to send money home (i.e., financial burdens). Students from families with low incomes often have a range of challenges other students do not face (Walpole, 2003). It is possible that, compared to students who continue to drink, those who mature out early are more likely to have more responsibility for paying for their college educations, are more likely to send money home to their families, and come from families of lower income. Thus, the incompatibility between adult roles and heavy drinking described in

the traditional maturing out literature may also prove to be present among college students with certain financial burdens and predict early maturing out.

Second, research examining population wide trends in the context of maturing out of alcohol use has typically used large-scale longitudinal designs that last for multiple years, even decades (e.g. Monitoring the Future, NESARC). This research has been foundational in examining risk factors for persistence in problematic drinking behaviors, but due to necessary design constraints, most studies of this nature have been unable to incorporate more novel and emergent models of risk for alcohol involvement. Many advances in understanding of individual difference risk have taken place since most long-term longitudinal studies used to examine maturing out began. One such advancement is the acquired preparedness (AP) model of risk (Davis et al. in press; Smith & Anderson, 2001), which has gathered empirical support for multiple forms of addictive behavior in longitudinal studies across multiple labs (Corbin et al., 2011; Doran et al., 2013; Peterson et al., 2018; Settles et al., 2010; Wardell et al., 2012).

The AP model expands upon the basic science literature of person-environment transaction theory, which holds that variation in personality can lead different people to experience objectively similar events differently (Caspi, 1993). This model proposes further that, as a result of this differential experience, two individuals can learn different things and form different expectancies from similar events due to differences in their personalities. With respect to problem drinking, high-risk personality traits can contribute to the formation of high-risk expectancies about the reinforcing effects of alcohol, thus increasing risk for future problematic drinking.

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One version of the AP model that appears relevant to problematic drinking involves the trait of urgency. Urgency reflects the tendency to act rashly when highly emotional and is thought to predict increased expectancies for social facilitation from drinking, which in turn predict subsequent drinking behavior in both youth (Settles et al., 2014) and college students (Settles et al., 2010). In a prior trajectory analysis study of adolescents, groups characterized by earlier onset and heavier drinking could be differentiated from other groups using the urgency AP model (Peterson et al., 2018).

The increased likelihood of learning that social relationships are facilitated by drinking as a result of elevations in urgency may operate through more than one mechanism. For example, socializing facilitates positive moods (Watson et al., 1992). In social settings, individuals high in urgency may act rashly, such as by drinking, to alleviate a negative mood or enhance a positive mood. They may find a rash behavior such as drinking reinforcing socially, thus strengthening their expectancies that drinking facilitates positive social experiences. Second, individuals high in urgency may be more disposed than others to notice evidence that rash or risky behaviors such as drinking are reinforcing. Because they notice such evidence, they may be more likely to associate drinking with positive, reinforcing social experiences and thus, more likely to drink.

Another version of the AP model involves the trait of sensation seeking. Sensation seeking is the tendency to seek out novel and thrilling stimuli and, individuals high in sensation seeking appear more likely to engage in risky behaviors including problematic drinking (Cyders et al., 2009; Doran et al., 2013; Zapolski et al., 2010). Given this, individuals high in this trait might be prone to seek out social situations where risky drinking is occurring (i.e. underage drinking, binge drinking, drinking games, etc.)

and may be more predisposed to drink in excess to experience the stimulating effects of alcohol (Scott & Corbin, 2014). Similar to highly urgent individuals, this might make them more prone to learn that drinking is socially rewarding, leading to increased risk for heavy drinking. Evidence for an acquired preparedness model involving sensation seeking has also accrued over the past decade (Corbin et al., 2011; 2015; Gunn & Smith, 2010).

Importantly, the relationship between the AP risk variables and drinking behavior has been shown to be reciprocal in nature, such that elevations in one lead to increases in the other which lead to further increases in the first. There exist multiple positive feedback loops in this model that likely build risk for problematic alcohol involvement over time. Highly urgent individuals are more likely to consume alcohol which in turn increases their urgent dispositions (Riley et al., 2016; Peterson et al., 2018). This same pattern holds true for individuals with greater expectancies about the reinforcing effects of alcohol (Settles et al., 2014; Smith et al., 1995; Peterson et al., 2018), and those high in sensation seeking (Horvath et al., 2004; Peterson et al., 2018). In the absence of intervention, this reciprocal risk process appears to increase risk and drinking behavior over time.

Urgency, sensation seeking, and the AP model of risk have not yet been examined in the maturing out literature. It is therefore important to conduct research that examines this model as one contributor to persistence, rather than desistance, in heavy drinking during and following the collegiate years. Further, it is important to determine whether the AP model has incremental validity in distinguishing between those who continue to

drink and those who reduce their drinking beyond financial burden contextual factors as highlighted above.

1.1   The Current Study

Using a four-wave longitudinal design, I examined the drinking behaviors, individual difference risk factors, and personal context factors in a sample of first-year college students across two years. This study had several key aims. First, I sought to confirm prior trajectory models identifying separate classifications of college-aged individuals based on drinking frequency. I anticipated that, in addition to a never drinking group, there will be a group that decreases drinking during the first two years of college as well as groups that increase or maintain their drinking over those years.

Second, once I had identified trajectories reflecting different patterns of drinking behavior across the first two years of college, I sought to test the first of two proposed explanations for early maturing out explained above, whether the decreasing group can be differentiated from other groups due to their having a more significant financial burden during the first two years of college (paying for college, sending money home, family of origin income). Third, I tested the second proposed explanation, whether the AP process could differentiate between trajectory groups prior to their divergence. I hypothesized that the decreasing group would display lower levels of urgency, sensation seeking, and expectancies for reinforcement from drinking than maintaining or increasing groups.

CHAPTER 2. METHODS

2.1   Participants

Participants were 591 college students at a large state university who were 18 years old and in their freshman year at the time of Wave 1 data collection. The sample was comprised of 469 (79.4%) women, 117 (19.8%) men, 4 (0.7%) non-binary individuals, and 1 (0.2%) person who did not specify their gender. The racial breakdown of the sample was as follows: 82.5% white, 7.2 % Black, 2.6% Asian, 0.3% Pacific Islander, 0.2% American Indian/Native American, 4.3 % bi- or multi-racial, and 2.4% other racial groups. In terms of ethnicity, 6.2% of the sample indicated they were Hispanic. Three (0.5%) did not indicate their race/ethnic identity.

2.2   Measures

2.2.1   Demographic and background questionnaire.

Participants reported demographic information such as participant age, gender, race, marital/relationship status, education, occupational status, personal income, and family of origin income. From this, I created a measure of financial burden as the sum of standardized values on three variables: degree to which one is paying for one's tuition, room, and board; whether one sends money home to one's family; family of origin income.

2.2.2   UPPS-P Impulsive Behavior Scale (Lynam et al., 2007).

Urgency and sensation seeking were assessed using the UPPS-P, a 59-item measure that assesses five impulsigenic traits (negative urgency, positive urgency, sensation seeking, lack of perseverance, and lack of planning). Relevant item examples include, for sensation seeking, "I generally seek new and exciting experiences and

sensations," and for urgency, "When I feel bad, I will often do things I later regret in order to make myself feel better now." Item responses are on a four-point Likert-type scale, ranging from "disagree strongly" to "agree strongly." Scale scores were calculated as the mean item response. Internal consistencies for urgency by wave were .95, .95, .94, .95; and for sensation seeking, .85, .84, .84, .84.

Positive and negative urgency are facets of an overall urgency domain (Cyders & Smith, 2007). Following the recommendation to model facets separately only when they produce different results (Strauss & Smith, 2009), we ran preliminary analyses that indicated that all predictive effects were the same for the two facets, and the traits were highly correlated (rs ranged from .72 - .77 at each wave). We thus concluded there was no basis for studying the facets separately, so we combined them and used overall urgency.

2.2.3   Alcohol Use Disorders Identification Task (AUDIT; Babor & Grant, 1989).

This 10-item measure assesses drinking frequency, quantity, and problems associated with alcohol consumption. I used one item to assess drinking frequency, "How often do you have a drink containing alcohol?" Response choices ranged from 0 ("Never") to 4 ("4+ times per week"). The AUDIT has been shown to be reliable and valid and is commonly used in research and clinical practice as a measure of hazardous drinking behavior. I chose to measure self-reported drinking frequency as it is the best marker of concurrent alcohol-related problems in adolescents (Chung et al., 2012). Given that members of the sample were 18 years old at the time of wave 1 data collection and thus, younger than the legal drinking age, use of this metric can be seen as appropriate.

2.2.4   Alcohol Expectancy Questionnaire – Adolescent version (AEQ-A; Brown et al., 1987).

This measure assesses multiple domains of expectations that adolescents may have regarding alcohol use. I used the social behavior subscale to assess expectancies for social reinforcement from alcohol consumption. The scale begins with the stem, "Drinking alcohol makes people _____." Participants then read items that complete the stem (e.g., "enjoy parties more," "less fun") and then circle one of four responses: "never," "sometimes," "usually," or "always." Thus, items are scored on a Likert-type scale. Internal consistencies by wave were as follows: .77, .70, .65, .62.

2.3   Procedure

Subjects were recruited from the university psychology research subject pool where they enrolled to participate in this study (or other available studies). They were told that they need to be at least 18 years of age to participate and that they would be asked to complete a series of questionnaires through a secure online survey website. Following enrollment, they received an e-mail with instructions and a link to complete the survey. Before beginning the survey, participants were asked to read through an electronic informed consent and accept or decline to participate further in the study. They were informed that they will not be penalized if they choose not to participate in the study and will be told that they can choose to discontinue the survey and withdraw participation at any time. Participants were assured that their responses and information will be kept confidential. The questionnaires took no longer than 50 minutes to complete. Participants were asked to provide their e-mail address and mobile phone number as a means of contact to complete waves 2-4.

Wave 1 occurred at the midpoint of the Fall 2019 semester. Participants were emailed a link to complete surveys online at their convenience after signing up through the online pool site. They received 1 research credit towards the PSY100 research requirement for completion of the Wave 1 assessment period. Wave 2 occurred at the midpoint of the spring 2020 semester, which encompassed the onset of the coronavirus pandemic in the United States and subsequent campus shut -downs and the implementation of public health safety measures. Wave 3 occurred at the midpoint of the following fall semester, and Wave 4 at the midpoint of the following spring semester. The same battery of questionnaires was administered at each wave, with the exception of the addition of a coronavirus experiences and response questionnaire which was added for Waves 3 and 4.

Retention efforts were extensive. Beginning for wave 2, participants received daily e-mail reminders from Qualtrics containing a form email reintroducing them to the study and describing the payment procedures. In addition, each participant was contacted by a member of the study team once per week by text message. Content of the messages contained the link to their survey and reminders about payment. Message content was varied from week to week to encourage responses. These contacts were continued for the entirety of the data collection period for each of the last three waves.

Participants received credit for research participation at wave 1 and received payment ($10) for waves 2-4. In waves 3 and 4, payments were increased to $20 in the last weeks of data collection of those waves to reflect the increased hardship of completing the study measures in the midst of final exams and when the semester was no longer in session.

2.4   Data analytic method

Model variables were first assessed for missing data (evaluating randomness of missing data), normality of distributions, absence of outliers, multicollinearity and singularity, and independence of errors. Descriptives, frequencies, and correlations of key study variables were also obtained.

For the first aim of this study, I examined trajectories of drinking frequency across the four waves of the study. Two common approaches to examining trajectories over time are growth mixture modeling (GMM: Muthen & Shedden, 1999) and group-based trajectory modeling (GBTM: Nagin, 2005). GMM involves the identification of multiple growth curve models within a sample, which allows for the consideration of variability among individuals within a given growth curve model. In this sense, GMM is a highly person-centered data analytic approach. One possible limitation of this approach is that the inclusion of random effects in a group-based model, which allows for within-group variability, often leads to the identification of fewer distinct trajectory groups than does the alternative approach of GBTM (Nagin & Odgers, 2010). The GBTM approach does not allow for the modeling of within-group variability, instead viewing the trajectory group solution as a useful device for summarizing trajectories that differ from one another. One advantage of not allowing for within-group variability is the likelihood of identifying more trajectory groups and in that sense providing a richer characterization of differences in patterns of change over time (Nagin & Odgers, 2010). The same feature is a limitation of this approach: although GBTM is understood to be a person-centered approach, it is perhaps less so than GMM, because it does not model variability within groups.

With these considerations in mind and with the goal of identifying as full a range of trajectory patterns as possible, I used GBTM. I modeled trajectories as a function of measurement wave with SAS Version 9.4 PROC TRAJ. I used censored normal (CNORM) modeling because participant responses on the drinking frequency item were normally distributed. Briefly, longitudinal data are used to identify the number of groups that best fits the data and to describe the shape of the trajectory for each group. One can then calculate the probability of each individual belonging to each of the groups that make up the model; individuals can then be assigned to the group to which the probability of their belonging is highest.

Several fit indices are used to determine the optimal number of groups and the validity of the grouping result. The Bayesian Information Criterion (BIC) and the Akaike Information Criterion (AIC) become increasingly less negative with improvements in the fit of the group structure. Those statistics can be supplemented by additional statistics and guidelines for selecting the best trajectory solution. When the average probability of group membership is greater than .70 for each group (Nagin, 2005), the identified group structure is thought to fit well. One also avoids group structures with extremely small group sizes, out of concern for the stability of the structure (Nagin, 2005).

The analysis proceeded as follows. I first specified two groups and then tested a series of models in which I increased the number of groups and used the BIC, the AIC, the average probability of group membership, and the group size to evaluate model fit (Nagin, 2005). The model with the least negative BIC and AIC, highest group membership probabilities, and most stable group size was selected.

To address the second and third aims of this study, I conducted analyses using binary logistic regression with the trajectory groups of interest representing a dichotomous outcome; either "decreasers" or "increasers." Specifically, I tested whether financial burden, urgency, sensation seeking, and social alcohol expectancies had predictive power in differentiating between two trajectory groups, one of which decreased their drinking and the other of which increased their drinking over the course of the study. Because, as described below, these two groups diverged between waves 3 and 4, in order to test the AP model specifically, I tested whether wave 2 urgency, or sensation seeking, predicts increases in wave 3 social alcohol expectancies, which in turn differentiates between the groups, controlling for wave 1 drinking frequency. To test the mediation hypothesis, I used Mplus (Muthen & Muthen, 2004-2010). I tested mediation by using a bias-corrected bootstrapping method. This method does not impose the assumption of normality of data and increases statistical power. This procedure generated 1,000 bootstrapped samples to empirically approximate the true sampling distribution because the assumption of a normal sampling distribution is not likely to be accurate (Muthen & Muthen, 2004-2010). In addition to testing the viability of the mediation hypotheses, I assessed overall model fit using two relative fit indices, the comparative fit index (CFI) and the Tucker-Lewis index (TFI), and two absolute fit indices, the root mean square error of approximation (RMSEA) and the standardized root mean square residual (SRMR). Guidelines for these indices vary. Using the most stringent guidelines, CFI and TFI values of .95 or higher are described as representing good fit. RMSEA values less than .05 indicate a close fit and SRMR values of .09 or lower tend to indicate good fit (Hu & Bentler, 1999) Additionally, I reported the model chi-square.

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CHAPTER 3. RESULTS

3.1   Retention

Retention from one wave to the next ranged from 69.2% to 93.3%, for an overall

retention rate of 54.1% over four waves. Those who participated in all waves of the study

did not differ from those who participated in fewer waves on any demographic, criterion,

or trait variable. Therefore, I inferred that data were missing at random. Missing data

were imputed using the expectation maximization (EM) procedure, which has been

shown to produce more accurate estimates of population parameters than do other

methods, such as deletion of missing cases or mean substitution (Enders & Peugh, 2004).

As a result, I was able to make full use of the entire sample of $n = 591$.

3.2   Descriptives

Table 1 presents frequencies and descriptive data for urgency, sensation seeking,

expectancies, financial burden, and drinking frequency. Table 2 presents a correlation

matrix of these variables at each wave of the study. Most key study variables were

significantly correlated within and across time points. In general, urgency, sensation

seeking and expectancies positively correlated with drinking frequency within and across

waves. Two findings were noteworthy with respect to financial burden. First, the variable

was remarkably stable across wave. Second, it was negatively correlated with drinking

frequency within and across waves: heavier financial burden was associated with less

frequent alcohol consumption.

3.3   Trajectory Identification and Characterization

I used Nagin's (2005) procedure to determine (a) whether individual differences in trajectories of drinking frequency could be characterized in terms of subgroups and (b) what the number and shapes of the drinking frequency trajectory groups were. I conducted the analyses on four waves to model the trajectories as a function of measurement wave. For each solution, I assigned participants to the group for which that person had the highest probability of belonging.

For this analysis, BIC and AIC values became progressively less negative from the three-group solution to the five-group solution. The six-group solutions produced BIC and AIC values that were more negative, and they included groups with very small samples sizes and did not involve groups with substantively different trajectories from those apparent in the five-group solutions. I therefore adopted five-group trajectory solutions for drinking frequency. The five-group solution had average group membership probabilities from .82 to .90. Thus, there was clear, straightforward assignment of individuals to trajectory groups.

As shown in Figure 1, 92 (15.6%) of participants reported essentially no drinking at each of the four data collections from fall of their freshman year to spring of their sophomore year (non-drinkers group). A second group, $n = 146$ (24.7%) reported steady, mild drinking across the four waves (mild stable drinkers), and a third group, $n = 234$ (40.0%) reported steady, moderate drinking across all four waves (moderate steady drinkers). A fourth group of 53 (9.0%) participants reported moderate drinking throughout the first three waves, with a sharp increase in the spring of their sophomore year (increasers). The final group, consisting of 66 individuals (11.2%), endorsed mild to

moderate drinking for the first three waves, with a sharp decrease in the spring of their

sophomore year (decreasers/maturing out group).

3.4   Prediction of trajectory group membership

I focused our predictive tests on differentiating among the increasing trajectory

group and the decreasing or maturing out group. That is, I tested whether financial burden

and/or the AP model could differentiate among these groups before they diverged.

Because financial burden can fluctuate from semester to semester, I tested whether

financial burden at any wave could differentiate between the two groups. The AP model I

tested had the following characteristics: (1) controlling for drinking frequency in the fall

of freshman year (wave 1), (2) urgency or sensation seeking in the spring of freshman

year (wave 2) predicted expectancies for social facilitation from drinking in fall of

sophomore year (wave 3) levels; and (2) fall of sophomore year (wave 3) social

facilitation expectancies predicted membership in trajectory group. I tested these models

in a series of binary logistic regressions where trajectory group membership was the

outcome variable. To do so, I created a dummy variable where membership in the

increasing group = 1 and membership in the decreasing group = 0. Table 3 presents the

results of each longitudinal prediction.

3.4.1   Financial Burden.

To conduct predictive tests involving financial burden, I entered wave 1 drinking

frequency at step 1 and wave 1 financial burden at step 2. Parallel analyses were

conducted for financial burden at each wave. For each analysis, financial burden did not

predict trajectory group membership above and beyond wave 1 drinking frequency.

Individuals with more financial burden were no more likely to be in either the decreasing or increasing group.

3.4.2 Urgency.

To conduct predictive tests involving urgency, I entered drinking frequency from wave 1 at step 1, urgency at wave 2 at step 2, and positive social expectancies at wave 3 at step 3. At each step of the model, wave 1 drinking frequency was significant, such that individuals who reported more frequent drinking were more likely to belong to the increasing group. At step 2, wave 2 urgency did not significantly differentiate the two groups. At step 3, wave 2 urgency remained nonsignificant, but wave 3 expectancies were significant, such that individuals reporting higher levels of expectancies were more likely to belong to the increasing group.

3.4.3 Sensation Seeking.

To conduct predictive tests involving sensation seeking, I entered drinking frequency from wave 1 at step 1, sensation seeking at wave 2 at step 2, and positive social expectancies at wave 3 at step 3. As noted above, at step 1, individuals who reported more frequent drinking at wave 1 were more likely to belong to the increasing group. At step 2, wave 1 drinking frequency remained significant and wave 2 sensation seeking was also significant, such that individuals with higher levels of sensation seeking were more likely to belong to the increasing group. At step 3, wave 1 drinking frequency and wave 2 sensation seeking remained significant, and wave 3 expectancies were also significant, such that individuals reporting higher levels of expectancies were more likely to belong to the increasing group.

I tested two structural models, one involving an indirect effect from urgency

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through social facilitation expectancies to membership in either the increasing or decreasing trajectory group, and the other replacing urgency with sensation seeking. The model included the following predictions: (1) Wave 3 social facilitation expectancies predicted by wave 2 social facilitation expectancies and wave 2 urgency, or sensation seeking; (2) Group membership predicted by wave 3 social facilitation expectancies, wave 2 urgency, or sensation seeking, and wave 1 drinking frequency. The test of the AP model with urgency found no evidence that wave 2 urgency predicted wave 3 social facilitation expectancies, thus precluding an indirect or mediated effect. That model was not considered further.

As depicted in Figure 2, the sensation seeking model fit the data well: X^2 (df=2) = 2.18, p =.36; RMSEA = .03 (90% CI .00 to .19); CFI = 1.0; TLI = .99, SRMR = .02. Wave 2 social expectancies predicted wave 3 social expectancies ($b = .49, p < .001$), however wave 2 sensation seeking did not predict wave 3 expectancies beyond wave 2 expectancies ($b = .12, p = .08$). Group membership was predicted by wave 3 social expectancies ($b = .23, p < .01$); wave 2 sensation seeking ($b = .25, p = .001$); and initial drinking frequency ($b = .39, p < .001$). Thus, each variable had incremental validity over the other two in predicting trajectory group membership. There was no evidence of the indirect effect from sensation seeking through expectancies to group membership. The beta weight for that effect was $b = .03$, but z = 1.26, $p = .10$.

Table 1. Descriptives and frequencies of key study variables at all four waves, N=591.

Variable (Range)	Wave 1	Wave 2	Wave 3	Wave 4
Drinking frequency (0-4)	1.55 (1.07)	1.52 (1.01)	1.63 (1.04)	1.66 (1.29)
Urgency (1-4)	2.05 (.58)	1.95 (.58)	1.98 (.54)	2.04 (.63)
Sensation Seeking (1-4)	2.76 (.58)	2.72 (.54)	2.75 (.55)	2.74 (.60)
Alcohol Expectancies (1-4)	2.57 (.41)	2.63 (.35)	2.64 (.36)	2.66 (.37)
Financial Burden (0-24)	6.68 (5.38)	6.90 (4.97)	7.00 (4.86)	7.03 (4.88)

Drinking Frequency	Wave 1	Wave 2	Wave 3	Wave 4
0 - Never	121 (20.5%)	103 (17.4%)	98 (16.6%)	142 (24.0%)
1 – Monthly or Less	167 (28.3%)	189 (32.0%)	163 (27.6%)	144 (24.4%)
2 – 2-4 times per month	166 (28.1%)	195 (33.0%)	199 (33.7%)	135 (22.8%)
3 – 2-3 times per week	133 (22.5%)	94 (15.9%)	121 (20.5%)	115 (19.4%)
4 – 4+ times per week	4 (0.7%)	10 (1.7%)	10 (1.7%)	55 (9.3%)

Table 2. Correlation matrix of key study variables across all four waves, N=591.

|	AE1	AE2	AE3	AE4	U1	U2	U3	U4	SS1	SS2	SS3	SS4	DF1	DF2	DF3	DF4	FB1	FB2	FB3	FB4
AE2	**.53**	-																		
AE3	**.49**	**.61**	-																	
AE4	**.46**	**.50**	**.56**	-																
U1	**.20**	**.26**	**.19**	**.09**	-															
U2	**.17**	**.17**	**.16**	**.09**	**.47**	-														
U3	**.18**	**.22**	**.26**	**.10**	**.56**	**.51**	-													
U4	.07	**.15**	**.10**	**-.18**	**.48**	**.47**	**.61**	-												
SS1	**.30**	**.27**	**.19**	**.19**	**.28**	.06	**.12**	.05	-											
SS2	**.30**	**.31**	**.26**	**.26**	**.14**	**.15**	**.25**	**.09**	**.69**	-										
SS3	**.25**	**.27**	**.24**	**.20**	**.13**	.09	**.20**	.01	**.62**	**.74**	-									
SS4	**.30**	**.27**	**.24**	**.44**	.06	-.01	.04	**-.23**	**.58**	**.65**	**.69**	-								
DF1	**.47**	**.38**	**.26**	**.32**	**.20**	**.13**	**.20**	**.11**	**.23**	**.20**	**.15**	**.19**	-							
DF2	**.38**	**.44**	**.35**	**.36**	**.25**	**.15**	**.22**	**.20**	**.25**	**.28**	**.23**	**.23**	**.68**	-						
DF3	**.34**	**.41**	**.40**	**.35**	**.19**	**.15**	**.20**	**.13**	**.15**	**.21**	**.24**	**.22**	**.58**	**.65**	-					
DF4	**.33**	**.30**	**.31**	**.61**	**.11**	.05	**.13**	**-.18**	**.24**	**.28**	**.22**	**.49**	**.52**	**.52**	**.52**	-				
FB1	**-.12**	**-.09**	-.06	-.07	-.04	.01	-.03	-.06	**-.11**	**-.08**	-.08	-.05	**-.27**	**-.14**	**-.19**	**-.10**	-			
FB2	**-.12**	-.07	-.06	**-.09**	-.03	-.01	-.03	-.08	**-.10**	-.06	-.06	-.03	**-.25**	**-.20**	**-.26**	**-.11**	**.75**	-		
FB3	**-.11**	**-.09**	-.05	**-.09**	-.06	-.07	-.06	**-.13**	**-.13**	**-.08**	-.04	-.02	**-.25**	**-.17**	**-.20**	**-.09**	**.77**	**.88**	-	
FB4	**-.10**	**-.08**	-.07	**-.10**	-.06	-.06	**-.09**	**-.14**	**-.11**	**-.10**	-.04	-.04	**-.25**	**-.19**	**-.20**	**-.12**	**.76**	**.88**	**.92**	-

Note. Bold text indicates p <.05. AE = alcohol expectancy, U = urgency, SS = sensation seeking, DF = drinking frequency, FB = financial burden. Numbers correspond to the wave of data collection.

Table 3. Binary logistic regression results predicting trajectory group membership, n=119.

AP Model

Variable	B	S.E.	Wald t	p	OR
(Constant)	-7.29	1.89	14.84	<.001	.001
W1 Drinking Frequency	1.23	.27	21.50	<.001	3.43
W2 Urgency	-.68	.42	2.56	.11	.51
W3 Expectancies	2.32	.68	11.69	.001	10.14
(Constant)	-10.82	2.22	23.68	<.001	.000
W1 Drinking Frequency	1.14	.27	17.36	<.001	3.12
W2 Sensation Seeking	1.46	.52	8.07	.005	4.32
W3 Expectancies	1.67	.68	6.08	.014	5.30

Financial Burden

Variable	B	S.E.	Wald t	p	OR
(Constant)	-3.29	.73	20.15	<.001	.04
W1 Drinking Frequency	1.43	.29	25.02	<.001	4.18
W1 Financial Burden	.07	.04	2.08	.08	1.08
(Constant)	-3.21	.77	17.49	<.001	.04
W1 Drinking Frequency	1.38	.28	24.20	<.001	3.99
W2 Financial Burden	.07	.05	2.03	.16	1.08
(Constant)	-3.47	.78	19.92	<.001	.03
W1 Drinking Frequency	1.44	.29	25.15	<.001	4.24
W3 Financial Burden	.10	.05	3.75	.05	1.10
(Constant)	-3.02	.73	17.21	<.001	.05
W1 Drinking Frequency	1.34	.27	24.00	<.001	3.83
W4 Financial Burden	.06	.05	1.36	.24	1.06

Note. Only the final step of the regression model is reported for clarity.

Figure 1. Drinking Frequency Trajectories, *N* = 591.
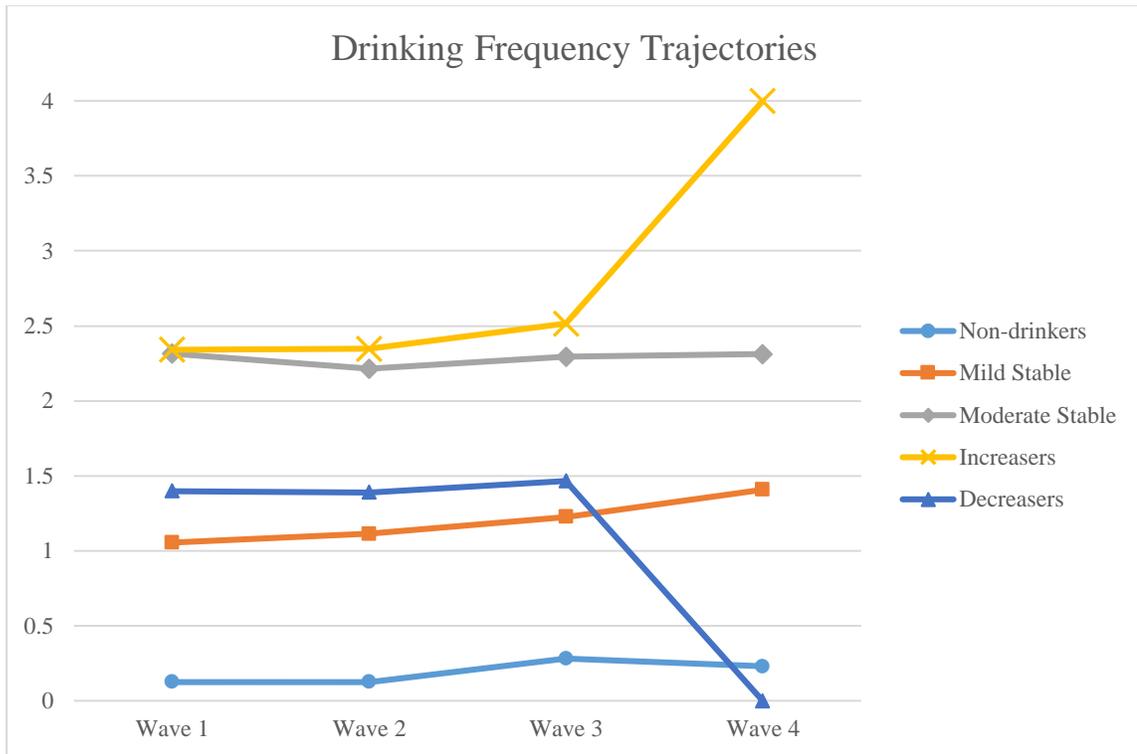
Note. AIC = -3270.07, BIC = -3309.51. These lines represent the smoothed curves for each group's change over time. On the *x*-axis, waves 1-4 refer to biannual data collections, which occurred in every 6 months beginning in the fall of freshman year (1) through the spring of sophomore year (4). Non-drinkers, *n* = 92 (15.6%); Mild Stable, *n* = 146 (24.7%); Moderate Stable, *n* = 234 (40.0%); Increasers, *n* = 53 (9.0%); and Decreasers, *n* = 66 (11.2%). Average probabilities for membership in each group are as follows, respectively; .89, .90, .89, .90, .82. Drinking Frequency was assessed with the item "How often do you have a drink of alcohol?" on the following scale; 0 = "Never," 1 = "Monthly or less," 2 = "2-4 times per month," 3 = "2-3 times per week," and 4 = "4+ times per week."

Figure 2. Acquired Preparedness Model test of trajectory group membership, n=119.
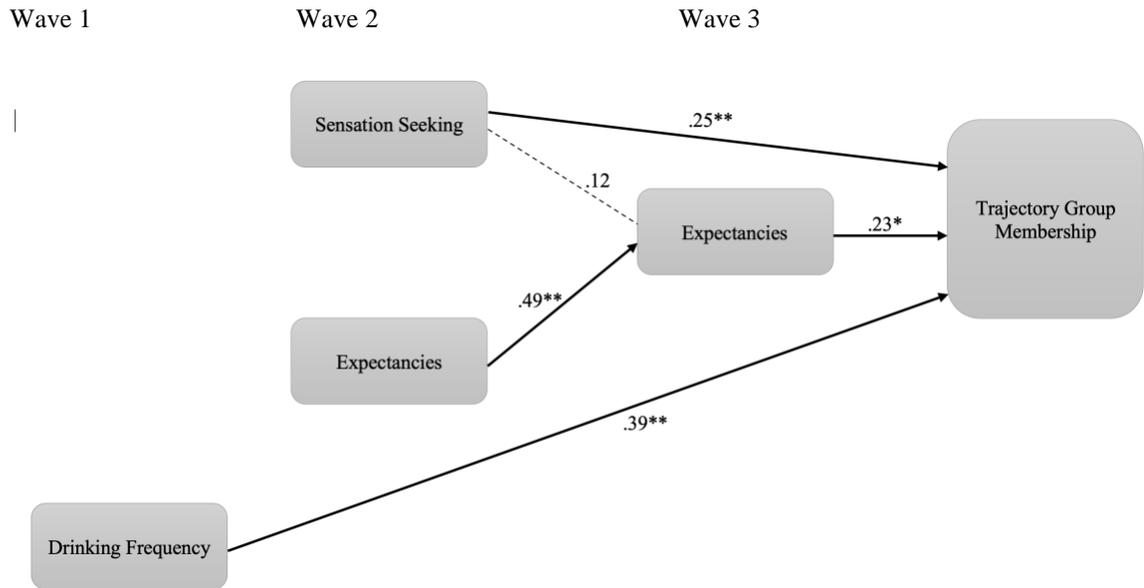
Note. *p < .01, **p < .001. X^2 (df=2) = 2.18, p =.36; RMSEA = .03 (90% CI: .00 - .19); CFI = 1.0; TLI = .99, SRMR = .02.

CHAPTER 4. DISCUSSION

This work is an important expansion of prior research into developmental drinking trajectories utilizing a sample of college students across their first two years of university. This study builds upon the work of others in the establishment and characterization of developmental trajectories of drinking behavior (Chassin et al., 2002; Derefinko et al., 2016; Peterson et al. 2018; Schulenberg et al., 1996). I focused on trajectories of drinking frequency as it serves as a marker of concurrent and future dysfunction (Chung et al., 2012; DeWit et al., 2000; Grant & Dawson, 1997; Guttmannova et al., 2012; Jessor, 1987). I identified five developmental trajectory pathways for drinking frequency similar to the trajectories established and characterized by others for samples of different ages or for trajectories of binge drinking (Chassin et al., 2002; Hill et al., 2000; Derefinko et al., in 2016; Schulenberg et al., 1996; Warner et al., 2007). Importantly, these findings indicate that there exists considerable heterogeneity in drinking behavior among underage college students. Thus, one implication of these findings is that research utilizing non-trajectory analytic methods (i.e. regression, structural equation modeling, etc.) is perhaps better understood as research into general trends of the sample that collapse across meaningful variability among college students.

As hypothesized, a trajectory group of individuals who decreased their drinking behavior was identified. This group, comprising just over 10% of the total sample, could be conceptualized as an "early maturing out" group. Albeit small, these numbers are consistent with other studies that find between 10%-33% of college students decrease their drinking across their time at university, even absent intervention (Baer et al., 2001; Greenbaum et al., 2005; Maggs & Schulenberg, 2004; Schulenberg et al., 1996). The

existence of this group, along with the non-drinking group, is notable as it contradicts widespread beliefs about a ubiquitous binge-drinking culture that exists on college campuses. It seems that there are indeed a subset of college students who decrease their drinking or do not engage in drinking despite theorized pressures of a drinking culture.

Further, the decreasing and increasing groups could be differentiated by sensation seeking and social facilitation alcohol expectancies assessed prior to their divergence. The tendency to seek out novel and thrilling experiences and the expectation that alcohol facilitates social interactions predicted a higher likelihood of belonging to the increasing group, rather than the decreasing group, suggestive of an additive model of risk. These effects were present above and beyond those from prior reported drinking frequency. These findings are congruent with previous work examining sensation seeking and alcohol expectancies (Cyders et al., 2009; Doran et al., 2013; Gunn & Smith, 2010; Peterson et al., 2018; Zapolski et al., 2010). Given evidence that expectancies and sensation seeking can be targets for reductions in drinking (Conrod et al., 2008; Scott-Sheldon et al., 2012), these findings may be useful to interventionists and college administrators.

However, I did not find evidence consistent with an AP mediation process reflecting an indirect effect from sensation seeking through social facilitation expectancies to trajectory group membership. This result is inconsistent with some prior work (Corbin et al., 2011; 2015). I do note that the observed beta weight for the indirect effect is of similar magnitude to that observed in prior studies with larger sample sizes that did find significant mediation. It is thus important to consider the possibility that with a sample size larger than that provided by the two trajectory groups, the AP-

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hypothesized mediation may be observed. This possibility highlights one of the key tradeoffs in trajectory analysis work. Although a more accurate depiction of drinking development is modeled, any comparison of trajectory groups involves lessened statistical power due to group size. As such, it is important to conduct future similar studies with large enough samples so that even small groups in the trajectory solution are large enough to find existing effects.

Counter to our hypotheses, I did not find evidence for differentiation between these groups by urgency. Individuals with the disposition to engage in rash action when in a heightened emotional state were not more likely to belong to the increasing group rather than the decreasing group. That urgency was not predictive was surprising given the evidence base linking it to higher levels of drinking frequency and problematic drinking in general. Perhaps these groups displayed comparable levels of urgency, but one group displayed higher sensation seeking. It is possible there is a mechanism that might lead those who are urgent, but not thrill seekers to decrease their drinking, while their urgent and thrill-seeking peers increase. Future work should explore this potential mechanism.

Finally, I found no evidence that financial burden could differentiate between groups. The degree for which one is responsible for their college tuition, whether one sends money home to one's family, and family of origin income did not appear to increase the likelihood of belonging to one group over another. There are several explanations for this finding. First, perhaps financial responsibility is not the key "adult-like" responsibility that college students face. More potent responsibilities that are incompatible with heavy drinking may exist that were not assessed in this study, such as

caretaker status. Second, it may be that this responsibility is felt in different ways for different students. For example, even if a student has taken out loans to finance their education, they are not responsible for paying those loans back until after their graduation, thus, putting this burden farther from one's mind. Third, the assessment of financial burden might have been inadequate. Given the constraints on study design, participants indicated their financial burden via online questionnaire, rather than an interview format. It is possible that this led to less clarity in reporting of the indicators of financial burden utilized in this study, whereas an interviewer from the study team could ask clarifying questions to obtain a cleaner, more accurate assessment of financial responsibility.

There is an additional, and perhaps more likely, explanation for the finding that financial burden did not predict trajectory group membership. The financial burden variable was remarkably stable. Further, at every wave, greater financial burden did correlate with lower frequency of drinking. Perhaps it is the case that the effect of having a heavy financial burden on drinking behavior was manifest prior to the start of college. If so, there is perhaps less reason to think it would influence change in drinking behavior across college. Those with a high financial burden were consistently drinking less across all four waves; thus, the concept of maturing out due to financial responsibilities may not accurately capture the experience of those individuals.

It is important to note that these data were collected in the midst of the COVID-19 global pandemic and resulting campus shutdowns and social distancing orders. The first wave of data were collected in October through December of 2019, giving us an unexpected baseline assessments of behaviors and risk factors pre-pandemic. The second

wave began in early March 2020 and the university campus shut down in mid-March, just two weeks later. Dormitories were shut down, courses moved to an online format, many students moved home to live with their families while others continued to live in their off-campus apartments. This change in setting, and the variability in the nature of the change, could easily have impacted the drinking behaviors of our participants due to changes in alcohol availability, acceptability of underage drinking by parents, and the frequency of social gatherings with peers where alcohol is typically consumed (i.e. parties; Dumas et al., 2020). Multiple studies have shown decreases in drinking metrics in college students following campus shutdowns (Bonar et al., 2021; Graupensperger et al., 2021; Ryerson et al., 2021). However, other work has found increases in drinking among students following the pandemic onset, particularly for groups with higher levels of depression and anxiety, and lower perceived social support (Lechner et al., 2020). As the pandemic continues to wane, we can hope to see more clarity regarding its impacts on drinking behaviors in college students. Any evaluation of drinking risk should take the context of the pandemic into account and future work should seek to identify how traditional models of risk may be integrated into the context of the COVID-19 pandemic and its aftermath.

This study had other limitations. First, I did not model variability among individuals who are members of the same trajectory group. The GBTM trajectory solution I report is as a useful device for characterizing different patterns of drinking change over time, but it does collapse across variability among individuals placed in the same group. Second, though every effort was made to obtain a high retention rate, I cannot know whether the results would have differed with higher retention. Third, I

developed trajectory models for drinking frequency, but not other metrics of alcohol involvement. I did so because of the role drinking frequency plays in assessing risk among adolescents and the underage nature of our sample, but the possibility of important trajectory differences in other metrics, such as drinking quantity, binge drinking, and drinking-related problems, is possible. Fourth, as previously mentioned, all risk factor and drinking behavior reporting was assessed by questionnaire and not supplemented by interview data. Thus, there was no opportunity to clarify responses. Fifth, our sample was predominately comprised of white female individuals, thus, it is less clear how well this model may predict for more racially and gender diverse populations. Future work must include larger samples of groups historically excluded from psychological research.

In sum, the present findings provide clear support for different developmental trajectories of drinking frequency in underage college students across their first two years of university. Groups included stable, increasing, and decreasing patterns, suggesting that a widespread normative drinking culture may not be as ubiquitous as lore alludes to. The increasing and decreasing groups could be differentiated by sensation seeking and alcohol expectancies, but not urgency or financial burden prior to their divergence. These findings can be used to inform researchers, clinicians, and college administrators about the different ways in which students engage in alcohol consumption and what factors may place them at a risk of continued high levels of drinking, which may inform prevention and intervention efforts.

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    measurement of dispositions to rash action in children. *Assessment*, *17*(1), 116-

    125

VITA

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EDUCATION

In Progress
Expected 2022
Doctor of Philosophy, Clinical Psychology
University of Kentucky, Lexington, KY
Dissertation: *Early Maturing Out of Problematic Alcohol Use*
Advisor: Gregory T. Smith, Ph.D.

In Progress
Predoctoral Internship, Clinical Psychology
VA Ann Arbor Healthcare System, Ann Arbor, MI
Training Director: Minden B. Sexton, Ph.D.

2017
Master of Science, Clinical Psychology
University of Kentucky, Lexington, KY
Thesis: *Personality and Learning Predictors of Adolescent Alcohol Consumption Trajectories*
Advisor: Gregory T. Smith, Ph.D.

2015
Bachelor of Arts, Psychology, *magna cum laude*
Hope College, Holland, MI
Minor: Women's and Gender Studies
Honors Thesis: *The Benefits of Self-Forgiveness on Mental Health: Evidence from Correlational and Experimental Research*
Chair: Daryl R. Van Tongeren, Ph.D.

CLINICAL EXPERIENCE

2021 –
Predoctoral Intern
VA Ann Arbor Health Care System, Ann Arbor, MI
Substance Use Disorders Clinic, Mental Health Clinic

2020
Graduate Student Therapist
Torture Recovery Services, Kentucky Refugee Ministries, Lexington, KY

2019 – 2020
Practicum Student Therapist
Lexington VA Health Care Center, Lexington, KY
Mental Health Residential Recovery Treatment Program (MHRRTP)

2018 – 2019
Doctoral Student Therapist
Behavioral Wellness Clinic, Louisville, KY

2018, 2019	**Achievement Assessment Practicum Student**
	The Lexington School, Lexington, KY

2017 – 2018 **Clinic Coordinator**
Jesse G. Harris, Jr. Psychological Services Center; Lexington, KY

2016 – 2019 **Graduate Student Therapist**
Jesse G. Harris, Jr. Psychological Services Center; Lexington, KY

2016 – 2017 **Teaching Assistant**
Department of Psychology, University of Kentucky, Lexington, KY

2016 – 2017 **Practicum Student Therapist**
University of Kentucky Counseling Center; Lexington, KY

2015 – **Adolescent & Young Adult Risk Behavior Lab Research Assistant**
University of Kentucky, Lexington, KY

2014 – 2015 **Resident Aide**
Harbor House, Holland, MI

2014 – 2015 **Meaning, Religion, & Virtues Lab, Research Assistant**
Hope College, Holland, MI

HONORS AND AWARDS

2021 **Registration Award**, The Society of Addiction Psychology (SoAP), Division 50 of the American Psychological Association

2020-2021 **P.E.O. Scholar Award**

2020 **10 Under 10 Award Nominee,** Hope College

2020-2022 **F31 NIAAA Pre-doctoral Fellowship, Ruth L. Kirschstein National Research Service Award, AA027960:** *Early Maturing Out of Problematic Alcohol Use*

2019-2020 **T32 NIAAA Pre-doctoral Traineeship, AA027488:** *Interdisciplinary Training in Alcohol Research*

2019 **Excellent Clinical Performance Award Recognition,** University of Kentucky

2018-2019 **Presidential Fellowship**, University of Kentucky

2018	**Arts & Sciences Dean's Competitive Graduate Fellowship**, University of Kentucky
2017	**Enoch Gordis Award Finalist,** Research Society on Alcoholism
2015-2018	**Reedy Quality Achievement Fellowship**, University of Kentucky
2016-2017	**Robert Lipman Fellowship**, University of Kentucky
2015-2016	**Graduate School Academic Year Fellowship**, University of Kentucky
2011 – 2015	**Presidential Scholarship**, Hope College

PUBLICATIONS

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15. Atkinson, E.A., **Peterson, S.J.,** Riley, E.N., Davis, H.A., & Smith, G.T. (in press). How people experience and respond to their distress predicts problem drinking more than does the amount of distress. *Addictive Behaviors.*

14. **Peterson, S.J.,** Atkinson, E.A., Riley, E.N., Davis, H.A., & Smith, G.T. (in press). Affect-based problem drinking risk: The reciprocal relationship between affective lability and problem drinking. *Alcohol and Alcoholism.*

13. Ortiz, A. M. L., **Peterson, S. J.,** D'Agostino, A. R., & Smith, G. T. (2020). Expectancy Theory and Addictive Behaviors. In Advances in Psychology Research (pp. 1-33). New York: Nova Science Publishers, New York, NY.

12. **Peterson, S. J.,** & Smith, G. T. (2019). Impulsigenic personality: Is urgency an example of the jangle fallacy? *Psychological Assessment, 31*(9), 1135-1144.

11. D'Agostino, A. R., **Peterson, S. J.,** & Smith, G. T. (2019). A risk model for addictive behaviors in adolescents: interactions between personality and learning. *Addiction, 114*(7), (1283-1294).

10. Cole, H. A., **Peterson, S. J.**, & Smith, G. T. (2018). Elementary and middle school predictors of high school drinking problems and maladaptive coping. *Addictive behaviors*, 87, 177-182.

9. **Peterson, S. J.** & Smith, G. T. (2018). Impulsigenic personality traits: From the impulsive to the compulsive. Invited chapter in N. S. Columbus (Ed.), *Understanding impulsive behavior: Assessment, influences, and gender differences.* (pp.29-60). Nova Science Publishers, New York, NY.

8. **Peterson, S. J.,** Davis, H. A., & Smith, G. T. (2018). Personality and learning predictors of adolescent alcohol consumption trajectories. *Journal of Abnormal Psychology, 127*(5), 482-495.

7. Combs, J. L., Riley, E. N., **Peterson, S. J.,** Jordan, C. E., & Smith, G.T. (2018*)*. Pre-Assault Personality Predicts the Nature of Adverse Outcomes Among Sexual Assault Victims. *Journal of Studies on Alcohol and Drugs. 79*(2), 258-268

6. Smith, G. T. & **Peterson, S. J.** (2018). Considerations of socioeconomic status as separate from race: A commentary on Zenmore et al. (2018). *Journal of Studies on Alcohol and Drugs. 79(1), 24-25.*

5. **Peterson, S. J.** & Smith, G. T. (2017). Association between elementary school personality and high school smoking and drinking. *Addiction. 112*(11), 2043-2052.

4. Riley, E.N., **Peterson, S.J.,** & Smith, G.T. (2017). Towards a developmentally integrative model of personality change: A focus on three potential mechanisms. *Advances in Psychological Research. 124,* 63-84.

3. Davis, H. A., **Peterson, S. J.**, & Smith, G. T. (2017). Assessment. Invited chapter in A. E. Wenzel (Ed.), *The Sage Encyclopedia of Abnormal and Clinical Psychology*. (pp. 309-313). Sage Publications, Thousand Oaks, CA.

2. **Peterson, S. J.,** Van Tongeren, D. R., Womack, S. D., Hook, J. N., Davis, D. E., & Griffin, B. J. (2017). The benefits of self-forgiveness on mental health: Evidence from correlational and experimental research. *The Journal of Positive Psychology*, *12*(2), 159-168.

1. **Peterson, S. J.** & Smith, G. T. (2016). Application of the expectancy concept to substance use. Invited chapter in S. A. Brown and R. A. Zucker (Eds.), *Oxford Handbook of Adolescent Substance Abuse.* (pp. 373-386). Oxford University Press, New York, NY.