

Characterizing the Role of Avoidant Coping in the Development of Drinking to
Cope with Negative Emotions

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Abstract

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The present study integrates coping research into a current model of alcohol use disorders etiology, with the goal of better articulating the development of alcohol use disorders. Research has shown that an emotional and impulsive temperament may predispose a person to later risky drinking, and further that much of this risk is due to an increased likelihood of learning that alcohol is an effective means of reducing negative emotions (termed coping expectancies). The Acquired Preparedness (AP; Anderson & Smith, 2001) model formalizes this idea into a testable mediational model; however, the mechanisms which connect personality to the development of coping expectancies is not well-understood.

Aim 1 of the was to extend the AP model to include coping constructs, particularly avoidant coping, providing an important test of the longitudinal mechanisms by which early-

appearing temperament characteristics convey risk for outcomes in adulthood. Aim 2 of the current dissertation was to understand the relations of avoidant coping to the development of coping expectancies.

I hypothesized that 1) avoidant coping would predict coping expectancies, and that avoidant coping would be preceded by emotionality and impulsivity. I further hypothesized that 2) avoidant coping would predict trajectories of coping expectancies, and 3) individuals who have the most opportunities to learn the affect regulation function of alcohol – through their own drinking and through seeing peers drink – will have the strongest link between avoidant coping and coping expectancies.

I tested these hypotheses in a large longitudinal dataset (n=454) following adolescents from age 13 into their 30s. The Adult and Family Development Project (AFDP, PI: Chassin) was a comprehensive longitudinal evaluation of individual, contextual, and familial factors related to the development of alcohol use and beliefs. Approximately half of the children in the sample lived with a parent with a history of alcohol use disorder at the time of the first assessment.

In Aim 1 analyses, I did not find support for hypothesis 1. Although I found mixed evidence for emotionality and impulsivity predicting avoidant coping, avoidant coping was unrelated to later coping expectancies. In Aim 2 analyses, I found mixed support for hypothesis 2; avoidant coping predicted levels of coping expectancies, but not growth. In Aim 3 analyses, I did not find evidence for moderation of the avoidant coping-coping expectancy relation by peer use or age at first drink. However, peer use was a strong predictor of overall coping expectancies. In sum, avoidant coping was related to personality and to coping expectancies, but did not exhibit a mediated effect in direct tests of the extended AP model. Implications for the role of coping in the etiology of alcohol use disorders are discussed.

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Chapter 1. Introduction

Alcohol use disorders (AUDs) are highly prevalent, afflicting 29% of Americans in their lifetimes (NIAAA, 2017), and impose a heavy burden on individuals and society through morbidity, mortality, impaired productivity, and reduced quality of life (Briere et al., 2014; Grant et al., 2015; Rehm et al., 2014). Despite sustained research attention to the etiology of AUDs and their treatment, the personal and societal burden of AUDs remains high. Alcohol misuse cost the United States \$249 billion in 2010 alone, and an estimated 88,000 people die from alcohol-related causes each year (NIAAA, 2017). Moreover, many adults experience alcohol-related problems despite not meeting criteria for an AUD. Though evidence-based treatments for AUDs exist, only 20% of adults with AUDs ever receive treatment (Grant et al., 2015). AUD prevention efforts in adolescence and young adulthood have begun to demonstrate some effectiveness (Foxcroft et al., 2003; Smit et al., 2008), yet resources for such programs are limited and gaps exist in our ability to identify those who might be most at-risk for AUDs and alcohol-related problems. Understanding specific precursors to AUDs and how they develop can hone interventions and treatments to target the psychological factors most likely to reduce risk. Studies which model the developmental pathways by which personality, behaviors, and beliefs associated with alcohol develop and become problematic can inform more effective and targeted interventions. The current dissertation aimed to clarify the role of adolescent risk factors for alcohol misuse, to integrate a novel risk factor into current etiological models, and to evaluate the developmental course of their influence through late adolescence and into young adulthood.

1.1. Drinking to Cope with Negative Emotions

One of the psychological factors most consistently linked with alcohol-related problems (e.g., hangover, failing to meet work or school obligations, physical dependence on alcohol, and

social problems) is the belief that drinking alcohol will relieve negative emotions and the related desire to drink to cope (DTC) with those emotions (Cooper et al., 1988, 1995; Holahan et al., 2001; Kuntsche et al., 2006; Merrill et al., 2014; Piasecki et al., 2014). I conceptualized DTC cognitions (DTCC) as encompassing both expectancies and motives for drinking. DTC expectancies refer to the *belief* that one of the effects of drinking alcohol is to reduce tension or negative affect and relax the drinker (George et al., 1991; Goldman et al., 1999; Smith & Goldman, 1994). DTC motives refer to the *desire* to drink for the purpose of reducing negative affect (Cooper et al., 1995). DTC is also viewed as a maintaining factor in AUDs, as the behavior of drinking alcohol is hypothesized to become behaviorally reinforced precisely because it relieves negative affect. Further contributing to the cycle of DTC, excessive alcohol use produces negative affect via withdrawal symptoms, making drinking even more likely to occur once a pattern of drinking is established (Conger, 1956; Gottfredson & Hussong, 2013; Hussong et al., 2005; Koob, 2013). DTCC strongly and uniquely predict alcohol-related problems even controlling for other motives and expectancies (e.g., social or enhancement motives or power enhancement expectancies; Kuntsche & Cooper, 2010; Kuntsche et al., 2014; Kuntsche, Knibbe, Gmel, & Engels, 2005). Established links between DTCC and later problematic drinking suggest that the development of these beliefs may set an adolescent down a path toward problematic drinking. DTCC have been shown to be reliably measurable in childhood, and some research has linked early-developing DTCC to concurrent and later alcohol-related problems. However, the mechanisms by which DTC expectancies and motives develop are not yet well-understood.

1.2. Personality, Learning, and Alcohol Use Problems: The Acquired Preparedness Model

The Acquired Preparedness (AP) model asserts that certain temperament factors make children more likely to develop certain motives and expectancies for using alcohol, which in turn lead to alcohol-related problems (Smith & Anderson, 2001). A good deal of research has shown that temperament factors related to self-regulation, such as emotionality and impulsivity, are associated with more externalizing problems and alcohol problems later in life (Colder & Chassin, 1997; King et al., 2013; Zimmermann et al., 2003), and some studies have suggested that temperament predicts the development of DTCC (Kuntsche et al., 2005; Smith & Anderson, 2001). Temperament represents a critical source of heritable, early-emerging individual differences, and temperament facets describe consistent behavioral, physiological, and neurological tendencies that show substantial continuity from early childhood across the lifespan, and sets the stage for adult personality (Rothbart et al., 2006; Rothbart & Bates, 2006). Long-term risk for alcohol use disorders can be explained in part by temperament factors that show stability from a very young age (Caspi et al., 1995; Caspi et al., 1997).

The AP model describes a developmental process through which individuals with certain personality traits possess a latent tendency, or preparedness, to develop certain associations, often expressed as explicit beliefs, about alcohol (Smith & Anderson, 2001). These individuals then may acquire these beliefs via learning experiences, including direct experience, exposure to information, or vicarious learning. For example, an adolescent who tends to act impulsively when experiencing strong emotions might develop the belief that drinking alcohol on a stressful day helps to reduce those negative emotions, and based on this belief begin to drink more often over his early twenties. The AP model was originally proposed with a focus on alcohol use, but has been applied to other risky behaviors, including cannabis use, smoking, disordered eating, gambling, and even depression.

The AP model is an application of person-environment transaction theory (D. M. Buss, 1987; Caspi & Roberts, 2001) which emphasizes that individuals accumulate different learning experiences and learn differently from them as a function of their personalities. Caspi & Roberts (2001) describe three types of transactions between person and environment: 1) reactive transactions, where different individuals experience, interpret, and learn from the same situation in different ways, 2) evocative transactions, where individuals with different personalities evoke certain experiences or behaviors from individuals they interact with, and 3) proactive transactions, where individuals select environments (and thus experiences) based on their personalities. Thus, over the course of many years, individuals with different personalities may accumulate very different collections of experiences. As a result of these different experiences, and potential differences in how they learn from the same experiences, individuals develop different beliefs and associations between behaviors and outcomes (i.e., drinking makes me less nervous at parties; Bolles, 1972; Goldman, Del Boca, & Darkes, 1999). In the case of impulsive traits and alcohol use, AP posits that impulsive individuals experience both increased exposure to alcohol and biases in learning from the same alcohol-related experiences. These differences lead to stronger beliefs about alcohol, which in turn influence drinking behavior.

In conjunction with the empirical study I describe below, and to understand the extant literature on the AP model, I conducted a systematic review of published mediational research testing the AP model (Halvorson et al., in preparation). Nearly twenty years of research on the AP model supports a small but statistically significant mediated effect (mean effect size = .07) of impulsive traits on risky behaviors and their consequences via expectancies for risky behaviors. Approximately one-fourth of the impact of impulsive traits on risky behavior was accounted for by expectancies. The most consistent evidence was reported for impulsive personality traits

conveying risk for both levels of risky behavior and consequences of risky behavior through positive expectancies. Support was less strong, with fewer significant results and null results being more common, for tests involving conscientiousness and negative expectancies (i.e., that drinking alcohol might produce an undesired outcome). Though the bulk of research on AP has been conducted on alcohol and alcohol problems, studies of other risky behaviors have generally shown support for the AP process as well. For alcohol in particular, impulsive traits associated with positive affect and positive expectancies appear to be important during youth and adolescence, whereas a negative affect pathway begins to predict use and problems through expectancies similarly during the college years.

Impulsive traits that involved affect showed greater support for AP than impulsive traits reflecting cognitive control or "pure" inhibition. Indeed, affect appears to be central to both impulsive traits and expectancies. Regarding impulsive traits, this empirical review lends support to the focus on urgency traits recently endorsed by Davis, Riley, & Smith (2018). Furthermore, alcohol expectancies have been described explicitly as expectancies of affective response (Goldman et al., 1999), and research on motives for drinking (a construct related closely to expectancies) places desired affective states in a central position (Kuntsche et al., 2005). Interventions related to emotion regulation may hold particular relevance for youth and adults with impulsive traits and/or strong expectancies.

1.3. Characterizing the Role of Avoidant Coping in the Development of Drinking to Cope

Although it is not yet clear how temperament factors may influence the development of specific alcohol-related beliefs or problematic drinking styles, temperament and personality are closely linked to more general coping behaviors and styles, which reflect beliefs and expectancies about the effectiveness of different strategies for dealing with negative emotion

(Kuntsche et al., 2008; Stewart et al., 2001). Research on personality and coping consistently finds moderate correlations between personality and coping, and evidence supports the notion that coping styles can be accurately conceptualized as a mediator of the effects of personality on behavior (Carver & Connor-Smith, 2010). Thus, coping may be a missing link connecting temperament to DTCC (see Figure 1).

In the following dissertation, I propose that avoidant coping arises from early adolescent emotionality and impulsivity, and predicts DTCC in later adolescence and early adulthood by entrenching a generally avoidant style (see Figure 2). This generally avoidant style may develop into DTC behavior upon exposure to and experience with alcohol, as it functions as an escape from present negative emotions. Behavioral precursors of risky drinking such as avoidant coping may provide key additional information in predicting future alcohol problems.

Though many adolescents do not yet drink alcohol regularly, all adolescents have already begun to develop characteristic ways of coping with stress and negative emotions. Individuals with an avoidant coping style commonly avoid their problems through distraction, denial, or suppression, in contrast to individuals who tend to approach and deal directly with problems and their emotional consequences (Carver & Connor-Smith, 2010). Although an avoidant coping style can be effective in the short-term, it presents a longer-term risk factor for both internalizing and externalizing symptoms, including alcohol problems (Carver & Connor-Smith, 2010; Herman-Stabl et al., 1995). Avoidant coping and drinking problems are positively correlated in cross-sectional research, but there has been little prospective research on the topic to date. In the same way that avoiding one's problems leads to in-the-moment relief resulting from not having to address a problem, drinking alcohol appears to serve the same function for individuals with DTCC. Even more problematic, these coping behaviors are operantly reinforced because they

relieve distress by providing an escape from an emotion or stressful situation. Given this common behavioral mechanism, it may be that individuals who have learned to cope with their problems through avoidance may be especially prone to DTC. Some cross-sectional research has found evidence that avoidant coping predicts concurrent problematic drinking through DTCC, with findings consistent with a mediational pathway (Catanzaro & Laurent, 2004; Hasking et al., 2011; Stewart et al., 2002). This suggests that DTC may represent heterotypic continuity in avoidant coping in that it reflects a specific behavioral manifestation of a general coping style. However, it is not yet clear whether avoidance emerging prior to alcohol use would predict DTC prospectively. I aimed to test whether there is continuity between an avoidant coping style and DTCC. The proposed research examined heterotypic continuity in avoidance behavior, testing the relation between individual differences in avoidant coping and levels and trajectories of DTCC (see Figure 3).

I further hypothesized that an avoidant style would lead to DTCC as opportunities for alcohol-related learning become more common. Because alcohol use increases with age, it is possible that age alone drives the emergence of DTCC in a developmentally normative fashion. Social learning models suggest that adolescents and young adults' alcohol use behaviors are influenced by their perceptions of their peers' substance use behaviors (Gerrard et al., 2008), and as alcohol use becomes more normative over time, it may be that individuals who are prone to developing DTC do so regardless of their experience with or exposure to alcohol. On the other hand, several other theories suggest that DTC emerges due to negative reinforcement of alcohol use following negative emotions (Conger, 1956; Greeley & Oei, 1999.; Khantzian & Galanter, 1990; Koob, 2013; Sher & Grekin, 2013). That is, the relief function of alcohol becomes learned and internalized. If this is the case, it will be important to consider whether the association

between avoidant coping and DTC is stronger among individuals who have a learning history with alcohol. I conceptualized this learning history in two ways: length of exposure to alcohol (i.e., age of first drink), and total exposure to alcohol (i.e., quantity/frequency of self-reported and peer alcohol use). I modeled this exposure to alcohol both as a person-level factor and a time-varying covariate, hypothesizing that those who have the greatest exposure will have a stronger link between trait avoidant coping and growth in DTCC. The proposed research will examine whether exposure to alcohol moderates the relation between avoidant coping and DTCC.

Adolescent risk factors for alcohol use convey risk through a long-term developmental process, yet many evaluations of developmental models examine outcomes ending in young adulthood. Temperament and DTC have been shown to convey long-term risk for drinking in several longitudinal samples, as well as in cross-sectional mediational research, and the mediational pathways proposed by the AP model have received support in recent years (Adams et al., 2012; Anthenien et al., 2017; Corbin et al., 2011; Curcio & George, 2011; Doran et al., 2013; Regan Fried Settles et al., 2010; Staszko, 2013; Watkins et al., 2015). For example, negative urgency (a trait involving both emotionality and impulsivity) at the start of college predicted drinking quantity during the first year of college, and these effects were mediated by increased DTCC (Regan Fried Settles et al., 2010). The model has also been tested for other problems relevant to impulse control and learning, such as eating disorders and smoking (Doran et al., 2013; Grossman, 2015).

1.4. Innovation of the Current Study

The proposed study tested and extended the AP model by integrating avoidant coping to the model, and by following adolescents into early adulthood. More specifically, the current

study proposed that temperament first conveys risk through learning of general coping strategies, which in turn make learning DTCC more likely (see Figure 1). Though the AP model examines pre-alcohol use temperament traits, much of disordered drinking occurs during later developmental periods such as the later college years and in early adulthood. During these later developmental periods, problem alcohol use can be equally, if not more impairing. For example, role transitions (e.g., entering the workforce, marriage, and becoming a parent) are a critical part of young adulthood, and have been hypothesized as a key cause of desistance in problem drinking. Conversely, disruptions or delays in role transitions represent a key harm related to problem alcohol use in young adulthood (Arnett, 2001; Littlefield et al., 2009). Continuity in drinking behavior and motives from adolescence through college age, and into early adulthood, is important to understand and may inform the prevention of escalations in drinking as well as treatments for current alcohol problems. To date, however, the AP model has not yet been tested in longitudinal samples which span both adolescence and adulthood. The proposed research will test and extend the AP model in a longitudinal sample spanning adolescence and young adulthood, integrating measures of avoidant coping to mediational model with a first assessment at age 13 and a final assessment at age 30.

This project's broad innovation lies in its integration of avoidant coping behaviors into the AP model of DTC. Understanding these pathways of risk can inform future interventions for AUDs. Moreover, the longitudinal span of the model continues from ages 13 to 30, providing an important opportunity to test long-term developmental theories. This developmental span is ideal for testing our extension of the AP model as it captures temperament and coping prior to most alcohol use, and spans well into early adulthood where problematic drinking can impede normative development. The mechanisms by which early, heritable temperament influences the

development of alcohol motives and expectancies have to date been the subject of speculation. I proposed that one mechanism by which temperament influences future beliefs about alcohol is through the development of an avoidant coping style, and that an avoidant coping style may precipitate the development of DTC motives and expectancies specifically when adolescents/young adults gain exposure to or experience with alcohol. If avoidant coping emerges as an important developmental precursor to problematic alcohol beliefs and drinking problems, future research might explore whether coping-based interventions which don't explicitly mention substance use might show effectiveness in preventing AUDs. Moreover, by examining the links between learning history, age of first drink, and problematic drinking, the current work might add to a body of literature on the most opportune developmental timing for interventions.

1.5. The Current Study

The current secondary data analysis examined the links between temperament, avoidant coping, DTC motives, and drinking problems in a sample of 246 children of alcoholic parents and 208 matched controls. Participants were interviewed annually during adolescence (mean age 13, 14 and 15), and then at ages 20, 25 and 30, for a total of 6 assessments. This sample is characterized on a broad range of measures, with repeated measurement over a long time horizon, and thus is ideally suited to testing the heterotypic continuity hypothesis of avoidant coping and DTC. Using longitudinal structural equation modeling and latent growth curve modeling, I aimed 1) to test a multi-step mediated process in which adolescent temperament predicts increased use of avoidant coping, which in turn increases drinking expectancies and motives, accounting for the relation between personality and later drinking problems posited by the AP model; and 2) to examine heterotypic continuity between avoidant coping and DTC, and.

The integration of avoidant coping into etiological models of AUDs has the potential to clarify models of risk and targets of intervention by characterizing the relative effects of general coping strategies as compared to specific alcohol-related beliefs.

1.6. Study Aims and Hypotheses

1.6.1. Aim 1 Hypotheses.

Longitudinal SEMs were estimated to test and extend the AP model, and to describe the role of an avoidant coping style in the developmental chain from temperament through DTC to AUDs. SEM is appropriate for testing whether the covariance between constructs can be accurately reproduced with a mediational path; thus, it was a strong fit for the AP model, which proposes several such paths. In addition to testing the overall model, I specifically hypothesized that the bolded paths from Figure 2 would be positive and significantly different from zero. Of particular note is the role of avoidant coping in the proposed model, which I expected to mediate the effects of temperament on DTCC.

This Aim encompassed three hypotheses: **H1a:** Avoidant coping will be predicted by temperament and will predict later DTCC; **H1b:** The effect of avoidant coping on AUD symptoms will be mediated through DTCC; and **H1c:** Effects of temperament on adult AUD symptoms will be mediated through DTCC and avoidant coping.

1.6.2. Aim 2 Hypotheses.

I used latent growth curve models to examine stability and change in DTCC across adulthood, and investigated relations of trait avoidant coping to DTCC trajectories. Aim 2 was also comprised of three primary hypotheses: **H2a:** Individuals with higher levels of trait avoidant coping will show elevated levels and growth of DTC.

1.6.3. Aim 3 Hypotheses.

Models from Aim 2 were extended to include 3.1) an interaction between age of first drink and avoidant coping in predicting levels and change of DTCC, and 3.2) an interaction between alcohol exposure and avoidant coping in predicting change in DTCC. Aim 3 hypotheses are represented in Figure 3. This specification resulted in two hypotheses: **H3a**: The effect of avoidant coping on trajectories of DTCC will be moderated by age at first drink (individuals who have their first drink at an earlier age will have a higher intercept and slope of DTCC), and **H3b**: The effect of avoidant coping on trajectories of DTCC will be moderated by peer use (individuals whose peers drink more will have a higher intercept and slope of DTCC).

Chapter 2. Does Coping Explain the Relation between Personality and Alcohol Expectancies?

2.1. Aim 1 Method

2.1.1. Research Design and Sample.

Study data were provided by 454 adolescents who were assessed at 6 time points starting in adolescence (mean age = 12.7) and continuing into adulthood (mean age = 31.5) living in the Southwestern United States. The data were collected by the Adult and Family Development Project (AFDP), which was funded by National Institute on Drug Abuse (R01 DA05227) and the National Institute of Alcohol Abuse and Alcoholism (R01 AA016213) grants to Laurie Chassin. The AFDP is a comprehensive longitudinal evaluation of individual, social, familial, and contextual factors contributing to the development of alcohol use and beliefs of children living with an alcoholic parent (56% of the sample) and healthy controls. Though the current work does not involve questions of intergenerational transmission of AUDs, having youth in the sample who are at elevated risk (based on having a parent with an AUD) for later AUDs ensures greater variability in risk and maximizes power to detect individual differences in etiological processes. The adolescents (47% female) were first contacted between ages ranging from 10.5-15.5 (mean age=12.7 at T1), and adolescents were Caucasian (77%) and Hispanic (23%). After first contact, adolescents were assessed at one-year intervals at T2 and T3 (approximate mean ages 14 and 15). After T3, individuals were contacted at three 5-year follow-up intervals at T4, T5, and T6, at ages 20, 25, and 30. Retention rates were 98% by Wave 3, and averaged 90% at Waves 4 through 6 (N=410, 412, & 407). No differences were observed between T6 interviewees and

those who were lost to follow-up on ethnicity, gender, or parental alcoholism. The present work analyzed data from all six time points.

Families with a parent with a history of AUD were recruited using community telephone screening, DUI records, and HMO questionnaires. Healthy controls were demographically matched (on ethnicity, family structure, age, and socioeconomic status) individuals from the same neighborhood, and were recruited via telephone interviews. Interviews confirmed that participants recruited as healthy controls did not have a parent with a DSM-III diagnosis of lifetime alcohol abuse or dependence. One limitation of the sample is that those who refused participation were more likely to be Hispanic, thus it is important to interpret results with some caution.

2.1.2. Measures.

Adolescents were assessed at baseline using an in-lab questionnaire. At T1 through T3, adolescents mailed in questionnaires reporting on temperament, alcohol expectancies, coping, quantity and frequency of alcohol use, and alcohol problems. At T4 through T6, young adults again mailed in questionnaires reporting on temperament, alcohol expectancies and motives, coping, quantity and frequency of alcohol use, and alcohol problems. A comprehensive study codebook was compiled by study staff for all measures from T1 to T6, and a concerted effort was made to use the same measures at each time point when possible. Demographic information was available (age, gender, race/ethnicity) and used as covariates in all analyses. See Tables 1 and 2 for more information on measures and for measures of internal consistency.

Item Selection and Confirmation of Factor Structure. To address inconsistencies across measures used at different time points and to understand the behavior of scales that are not currently widely used, I applied confirmatory factor analysis (CFA) to verify factor structure of

scales before proceeding with analyses. Our sample size of 454 tends to be appropriately-powered for these types of CFA measurement analyses (Hogarty et al., 2005; MacCallum et al., 1999, 2001).

Due to the large number of latent constructs in each model, I followed a three-step approach to item selection. First, I fit a separate model for each measurement instrument at each time point with correlated factors for each subscale (e.g., DMQ coping motives correlated with DMQ enhancement motives). These initial models contained all scale items from original scale development efforts. I expected that scale structures might differ from their published counterparts, as some adult measures had been adapted for use with teens and vice versa. Second, I eliminated any item from initial confirmatory factor analyses which had a loading of $<.4$ on its primary factor. Elimination was conducted one item at a time in order to keep as many items as possible in scales (i.e., if elimination of one item increased the loading of another item). Third, I examined modification indices in order to make two potential changes to models: allow residual correlations within a scale, and drop highly cross-loading items. If a parameter had a modification index of $>10\%$ of the chi-square value of the model, I made the corresponding change to the model. Inclusion in the final item set was decided by whether the models supported inclusion at a majority of time points. Descriptive statistics for scales are shown in Table 1 and results of factor analyses are reported below and in Table 2.

After conducting confirmatory factor analyses on each scale at each time point and reducing items according to the analysis plan described above, the resulting scales were reduced from the full scales and displayed strong fit to the data (CFIs $>.90$, RMSEAs $\leq .05$, SRMRs $<.05$), with the exception of coping scales. After scale modification, confirmatory factor models showed only modest fit to the covariance between coping items (CFIs between $.75$ and $.90$,

RMSEAs between .05 and .10, SRMRs between .05 and .10). Because coping measures were integral to the main hypotheses of the study, I proceeded with planned analyses despite suboptimal measurement characteristics. I retained the majority of items in each scale: adolescent temperament (14/21), adult personality (31/36), adolescent coping (13/15), adult coping (15/15), alcohol expectancies (24/24), and drinking motives (17/17). I added approximately 2-4 residual covariances per scale according to the approach outlined in the Analysis Plan above. The resultant scales were used in Aim 1 structural equation models. See Table 2 for details. Because measures were repeated within-person, scale reliabilities are reported at the between-person (ω_b) and within-person levels (ω_w) for each scale across its available time points.

Temperament. Measures of emotionality and impulsivity were gathered at each time point. At T1-T3, the EASI (Extraversion, Activity, Sociability, Impulsivity; Buss & Plomin, 1975, 1986, 2014) was self-reported by children, and was also reported by parents. Emotionality was measured by the EASI's emotionality scale (9 items, e.g., *I frequently get distressed*). After item selection, the emotionality scale was reduced to 6 items; reliability was high at the between-person level and moderate at the within-person level ($\omega_b = .90$, $\omega_w = .61$). Impulsivity was measured by the impulsivity scale (12 items, e.g., *I usually can't stand waiting*) of the EASI. After item selection, the impulsivity scale was reduced to 8 items; reliability was moderate to high at the between-person level and low to moderate at the within-person level ($\omega_b = .79$, $\omega_w = .46$). Participants were asked to indicate how well each item described them; response options for EASI items ranged from *1=Very unlike me* to *5=Very like me* on a Likert scale.

Emotionality and impulsivity at T4-T6 were measured by the neuroticism (12 items, e.g., *Sometimes I feel completely worthless*) and conscientiousness (reverse-coded; 12 items, e.g., *I*

keep my belongings clean and neat) scales of the NEO-PI-R (Costa Jr & McCrae, 2008).

Participants were asked to indicate how well each item described them; response options for NEO-PI-R items ranged from *1=Very true of me* to *5=Not at all true of me*. After item selection, the emotionality scale consisted of 11 items. These 11 items showed relatively high reliability at both the between- and within-person levels ($\omega_b = .95$, $\omega_w = .76$). After item selection, the impulsivity scale consisted of 10 items, with relatively high reliability at both the between- and within-person levels ($\omega_b = .94$, $\omega_w = .78$). Although the Eysenck impulsivity scale was also available at T4 only, and the Eysenck impulsivity scale correlated more strongly with the T3 EASI impulsivity scale ($r = .35$) than the T4 NEO-PI-R conscientiousness scale ($r = .20$), I used the NEO-PI-R conscientiousness scale as a measure of impulsivity to prioritize continuity of measures.

Coping. AT T1-T3, coping was measured using the behavioral and cognitive coping subscales of Wills' behavior-based coping inventory (BBCI; Wills, 1986). Participants responded to the BBCI by indicating *what you do when you have a problem* on a scale of *1=Never* to *=Usually*. In this framework, behavioral coping (6 items; *I think about what information is necessary to solve it*) is conceptualized as active, whereas cognitive coping (7 items, e.g., *I try to put it out of my mind*) is considered avoidant. The active coping scale was kept intact and showed moderate reliability ($\omega_b = .91$, $\omega_w = .55$); the avoidant coping scale was also kept intact and showed moderate reliability ($\omega_b = .84$, $\omega_w = .52$).

At T4-T6, a measure called the COPE inventory developed by Carver, Scheier, and Weintraub (1989) was used to assess cognitive coping, active coping, and avoidant coping. The T4-T6 coping scales asked participants to indicate *what you usually do when you are under a lot of stress* on a Likert scale from *1=Usually don't do this at all* to *5=Usually do this a lot*).

Cognitive coping was made up of two subscales: reappraisal (2 items, e.g., *I look for something good in what is happening*; $\omega_b = .87$, $\omega_w = .68$) and acceptance (3 items, e.g., *I get used to the idea that it happened*; $\omega_b = .78$, $\omega_w = .69$). Notably, this cognitive coping scale was not similar in content to the cognitive coping scale in the BBCI, which focused on avoidant cognitive strategies. Active coping comprised 4 items assessing active problem-solving (e.g., *I do what has to be done, one step at a time*). Active coping items showed moderate reliability ($\omega_b = .87$, $\omega_w = .60$). The denial (3 items, e.g., *I refuse to believe that it has happened*) and mental disengagement (3 items, e.g., *I daydream about things other than this*) subscales were combined to assess avoidant coping, and were combined into a larger 6-item composite. Each of the two avoidant coping scales showed moderate to strong reliability (denial $\omega_b = .98$, $\omega_w = .73$; disengagement $\omega_b = .84$, $\omega_w = .70$).

Research has suggested that both general levels of coping strategy use and relative use of coping strategies are important predictors of outcomes (Forsythe & Compas, 1987; Keckeisen & Nyamathi, 1990; Pape & Arias, 1995). As such, we also tested coping as a ratio of avoidant to total coping. These coping ratio scores were calculated by calculating a mean total avoidant coping score and dividing it by the mean total coping score for each time point.

Alcohol Expectancies and Motives. Expectancies for drinking comprise an individual's expectations for the effects of alcohol. Drinking expectancies can be measured without any prior exposure to alcohol or drinking history. At all time points T1-T6, adolescents self-reported their expectancies for the tension reduction (7 items, e.g., *Drinking alcohol helps me forget my worries*) power (3 items, e.g., *Drinking alcohol helps me feel less fearful*), global positive (4 items, e.g., *Drinking alcohol makes the future seem brighter*), and social (3 items, e.g., *Drinking alcohol makes parties more fun*) functions of alcohol using Mann, Chassin & Sher's (1987)

adaptation of the Alcohol Expectancies Questionnaire (AEQ; Brown et al., 1987). The item stem for the AEQ asked participants to *answer according to your own personal thoughts, beliefs, and feelings* on a scale of *1=Strongly Agree to 5=Strongly Disagree*. All items were reverse-coded so that higher numbers indicated stronger agreement with the item in question. After item selection, these four subscales were divided into two types of expectancies: coping expectancies and social/enhancement expectancies. The final coping expectancies scale consisted of 10 items which showed high reliability at both the between- and within-person levels ($\omega_b = .98$, $\omega_w = .89$). The social expectancies scale consisted of 7 items and showed strong evidence of reliability ($\omega_b = .95$, $\omega_w = .92$).

At T4-T6, young adults reported on both alcohol expectancies (using the same items as T1-T3) and motives for alcohol use. Drinking motives are more explicitly linked to behavior than expectancies; they aim to capture an individual's self-reported reasons for drinking alcohol. As conceptualized by Cooper in the Drinking Motives Questionnaire (DMQ; Cooper, 1994; Cooper et al., 1992), individuals drink primarily to bring about a change in current affect. In this framework, self-reported reasons for drinking are organized along two dimensions: internal vs. external reasons and positively vs. negatively valenced emotions. DMQ items asked participants to indicate *How important is each one as a reason to drink alcohol?* for a number of potential reasons to drink. Response options ranged from *1=Very important* to *5=Not at all important*, and were again reverse-keyed so that higher numbers indicated greater importance. The motive to drink to regulate internal negative emotions was operationalized as a coping motive for drinking, and is measured with the coping motives scale (5 items, e.g., *To forget your worries*). All 5 items were retained for analyses; reliability of the scale was high ($\omega_b = .96$, $\omega_w = .88$). The motive to drink to (up)regulate positive emotions consists of social motives (7 items, e.g., *To be sociable*)

and enhancement motives (5 items, e.g., *Because it's fun*); these two subscales were combined because of their common focus on positive emotions. Each scale had strong measurement qualities on its own (social motives $\omega_b = .98$, $\omega_w = .90$, enhancement motives $\omega_b = .92$, $\omega_w = .89$), thus we left the scales intact and let them load on a higher-order positive expectancies scale. In T4-T6 analyses, motives and expectancy scales were combined to indicate a broader latent factor. We labeled these combined scores as motives in analyses because of the inclusion of explicit motives.

Alcohol Use. Alcohol use frequency and quantity were measured at each time point. At every time point T1-T6, participants reported a) their frequency of alcohol use in the past year and b) the quantity of alcoholic beverages drunk on a typical drinking night using measures adapted by the project staff in collaboration with Dr. Ken Sher (Mann et al., 1987). Drinking frequency items used an ordinal scale with the following response options: *1=Never, 2=1-2, 3=3-5, 4=less than once a month, 5=1-3 a month, 6=1-2 a week, 7=3-5 a week, 8=every day*. Responses were re-centered so that 0 indicated Never. Drinking quantity items used a binned count response format: *0-6=0-6, 7=7-8, 8=9 or more*.

Alcohol-Related Consequences. Alcohol-related consequences were measured at each time point T1-T6, and assessed using measures written by the project staff. Across all time points T1-T6, an 8-item scale was used including family complaints, friend complaint, trouble at work or school, arrests, missing school or work, accident or injury, physical fight, or property destruction. At T4-T6, 13 additional developmentally appropriate items were added to the battery. Example T4-T6 consequence items included items such as drunk driving, regretting sex, financial problems, injuring another person, and blackout. On all items, participants indicated whether the following had happened to them in several time frames: *Within the past 3 months, 1-*

2 years ago, 2-5 years ago, More than 5 years ago, or Never. Items were coded so that the time frame corresponded to the time since the prior assessment (1 year for T1-T3, 5 years for T4-T6). Scale scores at each time point were a count of the number of items endorsed. As we did not have information on the frequency of each individual consequence, these sums can be considered variety scores.

2.2. Aim 1 Analysis Plan

Aim 1 used structural equation modeling (SEM) to address study hypotheses. Model fit was assessed using an integration of multiple indicators. To test exact fit, chi-squared goodness of fit tests were conducted on each model. Additional relative fit indices were examined, including the comparative fit index (CFI), non-normed fit index (NNFI), Tucker-Lewis Index (TLI), standardized root mean squared residual (SRMR), and root-mean-square error of approximation (RMSEA), following the guidelines outlined by Hu and Bentler (1999; Marsh et al., 2004). To compare nested models, I used deviance-based criteria and tests, including AIC, BIC, and likelihood ratio tests. Data analysis was completed in R (R Core Team, 2013) using the tidyverse (Wickham et al., 2019) package for data management, ggplot2 (Wickham, 2016) for data visualization, and lavaan (Rosseel, 2012) and semTools (Jorgensen et al., 2016) for structural equation modeling.

The development and testing of Aim 1 hypotheses proceeded in 5 key steps. First, I examined factor structures for latent variables using confirmatory factor analysis in order to evaluate the appropriateness of measurement models. Second, I fit the SEM specified in Figure 2 to the full dataset. Third, residuals, modification indices, and model fit indices were examined to identify potential sources of model misfit. Fourth, in the case of a poorly-fitting model, exploratory analyses, re-specifications and potential paths would be explored. Exploratory analyses were reported as such, and interpreted with due caution. At this point, I interpreted model parameters in terms of relations between latent variables, and assessed whether mediational hypotheses were supported, either partially or fully.

To enhance rigor and reproducibility, the proposed analyses were pre-registered on the Open Science Framework website (<https://osf.io/vd4s9/>) and clearly distinguish between *a priori* and *post hoc* models.

2.2.1. Proposed Models.

Two primary SEMs (Model 1 and Model 2) were fit to test the 3 hypotheses of Aim 1. Model 1 was a serial mediation model in which each construct was measured at a single time point. Model 2 was a cross-lagged panel model aiming to test the same hypotheses. However, in Model 2, each construct was included in the model at each time point, with all hypothesized stability coefficients and cross-lags included. In preparation for fitting the primary SEMs, two models replicating the AP model were fit: one predicting T5 drinking (Model R1) and another predicting T6 drinking (Model R2). Finally, to address exploratory questions related to study aims, I fit three additional models which were not specified *a priori*: a model operationalizing avoidant coping as a ratio score (Model E1), and two models replacing expectancies with coping – a model predicting T5 drinking (Model E2), and a model predicting T6 drinking (Model E3). See Table 5 for an overview of Aim 1 models.

H1a – that avoidant coping will be predicted by temperament and will predict later DTCC – was tested by examining relations in Models 1 and 2. Specifically, the hypothesis would be tested by examining relations between temperament and avoidant coping, and between avoidant coping and alcohol expectancies and motives. H1b (the effect of avoidant coping on AUD symptoms will be mediated through DTCC) was tested by characterizing the mediated effect between avoidant coping, coping expectancies and motives, and drinking in Models 1 and 2. Finally, to test H3a regarding the serial mediation of the relation of temperament on adult AUD symptoms by DTCC and avoidant coping, I examined the magnitude and statistical significance

of each constituent path in Models 1 and 2. In particular, relations between temperament traits (emotionality and impulsivity) and avoidant coping, between avoidant coping and coping expectancies, and between coping expectancies and drinking comprised the primary test of H1a. Overall statistical significance of the mediated effect was assessed using the joint significance criterion (MacKinnon et al., 2002, 2007).

2.2.2. Estimation and Model Fit.

Model fit was assessed by integrating information from multiple indicators. To test exact fit, chi-squared goodness of fit tests were conducted on each model. Additional relative fit indices were also examined, including the comparative fit index (CFI), non-normed fit index (NNFI), Tucker-Lewis Index (TLI), standardized root mean squared residual (SRMR), and root-mean-square error of approximation (RMSEA), following the guidelines outlined by Hu and Bentler (Hu & Bentler, 1999; Marsh et al., 2004). All models controlled for parental alcoholism, as half the sample has a diagnosed parent. Models also controlled for gender, as rates of AUDs and related etiological factors have been found to differ across gender. Age and race/ethnicity were also entered as covariates. For each model, I allowed subscales from the same scale (e.g., emotionality and impulsivity) to correlate.

To estimate Model 2, several model parameters were constrained to be equal to make estimating the model feasible. Because T3-T6 were spaced apart by five years each, autoregressive effects were specified to be equal between T3, T4, T5, and T6. Covariate effects on the same construct at different time points (e.g., the relation of gender to T4 emotionality and T5 emotionality) were also specified to be equal.

2.2.3. Missing Data.

Missingness was examined and addressed using multiple imputation (MI). I considered and examined the missing at random assumption before beginning MI, and considered potential auxiliary variables to use in imputation. MI reduces bias associated with ad hoc missing data techniques such as pairwise or listwise deletion (Baraldi & Enders, 2010; Enders, 2017; Schafer & Graham, 2002). After examining correlations between A) missingness on key study variables and other observed variables, and B) observed values of key study variables with missingness and other variables, an inclusive imputation strategy was adopted; the most promising auxiliary variable was gender, which demonstrated a significant correlation both with missingness on key study variables ($r_s = .12$ to $.13$ with missingness on coping data) and with observed values on those variables ($r_s .11$ -. $.21$ with observed coping items). Imputation was performed using the multiple imputation by chained equations (mice; van Buuren & Groothuis-Oudshoorn, 2010) software package in R. Multiple imputation should account for clustering of measures within participants (i.e., repeated measurement over time); thus, we used the 2l.pan option to impute level-1 variables (which treated ordinal scales as continuous) and the 2lonly.pmm to impute level-2 variables (which were appropriately treated as categorical). Due to the large set of variables involved in Aim 1 models, I specified only fixed effects of imputation variables (with a random intercept) in the mice predictor matrix.

To assess convergence of the imputation procedure, I examined plots of each parameter's change across iterations of the imputation algorithm. Distributions of means and standard deviations of continuous variables were judged to be stationary across the later imputations, and reasonable values were obtained for categorical variables. Next, I assessed the appropriateness of imputation models by viewing the distributions of the imputed variables superimposed onto distributions of the observed variables. Imputations were judged to have performed

appropriately, as distributions showed comparable means and variances to the observed distributions. It should be noted that imputation does not necessarily impute values following an identical distribution as the observed data; rather, this check was performed to confirm that imputations had converged on realistic values.

In fitting the cross-lagged panel model (Model 2), I relied on full-information maximum likelihood (FIML) estimation for missing data handling instead, which has been shown to produce generally equivalent results to MI (Schafer & Graham, 2002). I chose not to impute data for the cross-lagged panel because of the use of an additional set of variables which were highly collinear – that is, the inclusion of each construct at each time. Multicollinearity can make convergence challenging for these models, and I did not believe it was appropriate to impute parcel values because of the assumption of unidimensionality that had already been made in using the parceling approach. In particular, imputing parcel scores would exacerbate any potential misspecification introduced by using item parcels. All models were tested in R using lavaan.

2.2.4. Power and Sample Size Considerations.

To estimate power for the current study, which relies on SEM for all three aims, I followed the suggestions for estimating the power to correctly reject a model in SEM, suggested by MacCallum, Browne, and Sugawara (Jackson, 2009; MacCallum et al., 1996). LGM is a special case of SEM, thus the below calculations apply to all proposed models. In this approach, the null hypothesis is that the proposed model is a “close fit” to the relations in the population, and the alternative hypothesis is that the proposed model represents an inadequate fit. Power is the ability to detect when the alternative hypothesis about model fit is false, and is calculated by comparing the RMSEA of the null ($< .05$) and alternative ($> .08$) models. With power $(1 - \beta) = .8$

and $\alpha = .05$, and with df in the proposed model ranging from 58 to 935, the minimum sample size needed to detect a false alternative hypothesis (i.e., the hypothesis that the proposed models have inadequate fit to the data) ranges from 34 to 191 (Rigdon, 1994). However, it is also known that larger sample sizes are required to estimate parameters with greater precision; with 454 participants, we expect adequate power and precision to detect the hypothesized effects.

2.2.5. Item Parcels.

In testing Model 2, a cross-lagged panel model, it became quickly apparent that a sample size of 454 was not sufficient to fit a model with a latent variable (and measurement model) for each construct at each time point. To address this problem, I applied a subset-item-parceling approach (Little et al., 2002; Matsunaga, 2008). This approach consists of grouping items from a given scale into three subsets, each of which is aggregated to a mean score. These three factors are then used as indicators for a latent variable in an eventual structural equation model. When scales are unidimensional, item parceling can enhance communality and reduce random error, normalize the construct distribution, and enhance the stability of complex statistical models. Following methodological guidance (Matsunaga, 2008) and other work in this domain (Cyders & Smith, 2007; Miller et al., 2003), I adopted a three-parcel-per-factor approach. Because the scales used in this paper followed a correlated-but-distinct pattern in original methodological work, and confirmatory factor analyses using established factor structures fit the data well (after modifications), I judged the parceling approach to be reasonable. I balanced shared method factors (i.e., reverse coded items, common wording) across parcels. One limitation of item parceling is that parceling can overestimate unidimensionality in scales, resulting in misspecification.

2.2.6. Robustness and Skewed Drinking Variables.

The three drinking outcome variables (alcohol use quantity, alcohol use frequency, and alcohol use consequences) were positively skewed and had excess zeroes. I explored the possibility of integrating a generalized linear model-based framework for modeling excess zeroes (either treating the variable as ordinal or using a Poisson distribution with a log-link), but ultimately decided to rely on robust standard errors to handle non-normality for several reasons. Firstly, the number of additional parameters which would be needed to fit an ordinal model to the drinking variables, which had many observed categories, would quickly overwhelm the number of observations, leading to an underidentified model. Secondly, robust standard errors have been shown to appropriately handle non-normality in both exogenous and endogenous predictors (Singer et al., 2003) . Finally, the complex nature of the analysis pipeline made it infeasible to use R for multiple imputation, exploratory analyses, and model fitting, and another commercial software package (such as Stata) to fit generalized SEMs. Because models fit with robust standard errors using the WLSMV estimator were underidentified, they were utilized as sensitivity analyses and are reported after model results.

For each model reported in the Aim 1 Results section, I ran an equivalent model using the WLSMV estimator (Asparouhov & Muthén, 2010) to obtain robust standard errors. We interpret results from models without the WLSMV estimator because models using the WLSMV estimator were underidentified. The robust standard error model for the cross-lagged panel model did not converge. In spite of problems with estimation, the pattern of statistical significance remained largely unchanged and the magnitude of standardized coefficients changed by a negligible amount in models with robust standard errors.

2.3. Aim 1 Results

2.3.1. Descriptive Statistics.

Zero-order correlations were inspected to gauge the comparability of the current sample and measures with prior research. Tables 3 and 4 contain zero-order correlations among all study scales. Zero-order correlations indicated weak relations between T1-T3 temperament and T1-T3 coping (all $r_s < .20$; see Table 4.1), but small to moderate correlations between T4-T6 personality and T4-T6 coping. At T4 and T5, neuroticism correlated positively with avoidant coping ($r_s .23, .33$) and negatively with active coping ($r_s -.29, -.24$). At T4 and T5, impulsivity correlated negatively with active coping ($r = -.37, -.49$). Notably, correlations between coping and expectancies/motives were small across all time points (all $r_s < .20$; see Table 4.4), as were correlations between coping and alcohol use (all $r_s < .20$; see Table 4.5). Alcohol expectancies and motives correlated positively with alcohol use and problems across T1-T5 ($r_s .16-.42$).

2.3.2. Primary Study Hypotheses.

Hypothesis 1a: Avoidant coping will be predicted by temperament and will predict later DTCC. In the serial mediation model (described in the following section; see Table 6 and Figure 4), neither impulsivity nor emotionality was a significant predictor of avoidant coping ($\beta_{imp} = .19, p_{imp} = .089$; $\beta_{emo} = -.05, p_{emo} = .603$). Avoidant coping was not predictive of coping expectancies/motives ($\beta = -.03, p = .726$).

In the cross-lagged panel model (also described in detail below; see Table 7 and Figure 5), I observed evidence of temperament traits predicting avoidant coping at the next time point. Age 15 impulsivity predicted higher levels of age 20 avoidant coping ($\beta = .15, p = .006$), and age 20 emotionality predicted higher levels of age 25 avoidant coping ($\beta = .17, p = .004$). However,

avoidant coping was not a statistically significant predictor of coping expectancies/motives at any time point.

Hypothesis 1b: The effect of avoidant coping on AUD symptoms will be mediated through DTCC. Based on the lack of association between avoidant coping and coping expectancies/motives, support was not observed for H1b.

Hypothesis 1c: Effects of temperament on adult AUD symptoms will be mediated through DTCC and avoidant coping. We did not observe evidence of serial mediation in either the serial mediation or cross-lagged panel model. As reported above, avoidant coping and coping expectancies/motives were not related in either model. Despite this lack of association earlier in the mediational chain, coping expectancies were related to a lower frequency of alcohol use ($\beta = -.24, p = .008$), and were unrelated to alcohol use quantity and consequences. Notably, the relation between coping expectancies/motives and alcohol use frequency was opposite the hypothesized direction.

2.3.3. Summary of Primary Models.

Serial Mediation Model. The hypothesized extension to the AP model, which tested coping as a serial mediator of the AP process, fit the data well ($X^2(1362) = 1869$, CFI = .92, RMSEA = .03, SRMR = .06). Serial mediation was not observed for any of the hypothesized paths. See Table 5 for summary of models tested.

A non-hypothesized mediated effect was observed among core constructs. Emotionality at age 15 predicted coping motives at age 20 ($\beta = .23$), which predicted lower drinking frequency at age 30 ($\beta = -.22$). Male sex predicted higher levels of social/enhancement drinking expectancies/motives ($\beta = .21$) and coping expectancies/motives ($\beta = .18$) at age 25. Social/enhancement drinking expectancies/motives predicted higher levels of age 30 drinking

frequency ($\beta = .52$), quantity ($\beta = .33$), and consequences ($\beta = .25$). Coping expectancies/motives for drinking at age 25 predicted lower levels of age 30 drinking frequency ($\beta = -.22$). See Table 6 and Figure 4 for full estimates.

Cross-Lagged Panel Model: The hypothesized extension to the AP model was also tested as a cross-lagged panel model. This model estimated stability of all constructs across ages 15 to 30, intercorrelations among predictors at age 15, and lagged effects in the hypothesized direction of mediation. This model showed modest fit to the observed data ($X^2(537) = 1474$, CFI = .86, RMSEA = .06, SRMR = .10).

Despite modest fit to the observed data, I describe the observed relations to evaluate evidence for the proposed extension to the AP model. Due to a lack of association (all β s < .08, all p s > .05) between coping constructs (avoidant and active coping) and expectancies/motives constructs (coping motives, social/expectancy motives), this model did not support any of the hypothesized mediated pathways. I observed prospective relations between age 15 impulsivity and age 20 avoidant coping ($\beta = .15$); between age 20 impulsivity and age 25 active coping ($\beta = -.29$); between age 15 enhancement motives and age 20 alcohol use quantity ($\beta = .22$) and consequences ($\beta = .16$); between age 20 enhancement expectancies/motives and age 25 drinking quantity ($\beta = .17$); and between age 25 enhancement expectancies/motives and drinking frequency ($\beta = .12$). See Table 7 and Figure 5 for full estimates.

2.3.4. Replication of Acquired Preparedness Model.

Prediction of Age 25 Drinking. The hypothesized replication of the AP model, which did not include coping measures, fit the data well ($X^2(703) = 1144$, CFI = .93, RMSEA = .04, SRMR = .05). Several mediated paths were observed in the data: age 15 emotionality predicted stronger age 20 coping expectancies/motives ($\beta = .25$), which in turn predicted lower levels of

age 25 drinking frequency ($\beta = -.27$) and lower levels of drinking quantity ($\beta = -.20$). The model also supported mediated effects of sex as described in the Serial Mediation Model (see Table 6). Contrary to prediction, age 15 impulsivity did not predict age 20 coping motives or enhancement motives. See Table 8 and Figure 6 for full estimates.

Prediction of Age 30 Drinking. To predict age 30 drinking, an identical model was fit to the data, replacing age 25 drinking with age 30 drinking. This model fit the data well ($X^2(703) = 1120$, CFI = .93, RMSEA = .04, SRMR = .05). Two mediated paths were again observed in the data: age 15 emotionality predicted stronger age 20 coping expectancies/motives ($\beta = .25$), which in turn predicted lower levels of age 30 drinking frequency ($\beta = -.21$) and lower levels of drinking quantity ($\beta = -.25$). See Table 8 and Figure 7 for full estimates.

2.3.5. Exploratory Models of Coping and Acquired Preparedness

Avoidant Coping as a Ratio Score. As a sensitivity analysis, we replaced the latent coping variables in the serial mediation model with a coping ratio score indexing the ratio of avoidant coping to total coping. Model fit was somewhat poorer than the serial mediator models ($X^2(738) = 1361$, CFI = .89, RMSEA = .04, SRMR = .06), but the coping ratio score was not a statistically significant predictor of either expectancy measure ($\beta_{se} = .00$, $\beta_c = .11$, $ps > .05$) in the full model. See Table 9 for full estimates.

Coping Replacing Expectancies. Another conceptualization of the role of coping in the AP process was to replace expectancies/motives with coping in the AP model. We tested models predicting both T5 drinking and T6 drinking. Each model fit the data well (T5 model $X^2(453) = 692$, CFI = .88, RMSEA = .03, SRMR = .05; T6 model $X^2(453) = 677$, CFI = .89, RMSEA = .03, SRMR = .05). We did not observe any evidence of the hypothesized mediated paths from temperament, through coping, to drinking outcomes (see Table 10).

2.4. Aim 1 Discussion

In a series of structural equation models, I did not find evidence that patterns of coping preceded and explained the development of alcohol expectancies/motives. Notably, zero-order correlations between avoidant coping and DTCC were small, and in models controlling for other AP constructs, paths between avoidant coping and DTCC were not statistically significant. In addition, impulsivity was unrelated to drinking motives in the current sample. I did find evidence of a mediated path from adolescent emotionality to young adult drinking through coping motives; however, the relation between coping motives and drinking was opposite the expected direction. Emotionality in adolescence predicted stronger coping expectancies/motives, which led to a lower quantity and frequency of alcohol use. All alcohol use measures were predicted by social and enhancement drinking expectancies/motives. Finally, male sex predicted drinking expectancies/motives over and above temperament and coping.

In all Aim 1 models, age 20 coping was unrelated to expectancy measures. Although theoretical models of reinforcement and learning (Bandura, 1971, 1999; Cox & Klinger, 1988; Greeley & Oei, 1999) suggest coping style might play a role in the development of drinking expectancies/motives, our data did not support this hypothesized role. This suggests that drinking expectancies/motives might be influenced by personality through a more direct process; indeed, in the serial mediation model, age 15 emotionality predicted age 25 coping expectancies/motives, controlling for age 20 coping. One possibility is that personality traits predispose individuals toward substance-specific reinforcement learning, rather than learning of general coping tendencies (Smith & Anderson, 2001; Wiers et al., 2002). Another possibility is that individuals with certain personality traits learn different expectancies from the same drinking experiences (Hendershot & Wardell, 2014; Wardell et al., 2015), independent of coping. This unexpected

finding might also be explained by several methodological factors. A five-year lag may be too broad a time frame to observe relations between a snapshot of coping and a snapshot of motives. It is also possible that the measures used in the current study did not capture the type of coping behavior that would be related to drinking motives.

One of the more stable finding across models was an unexpected one; youth with higher emotionality at age 15 developed stronger coping expectancies/motives at age 25, but these stronger coping expectancies/motives led to less drinking. Higher levels of coping expectancies/motives at age 25 were consistently associated with a lower quantity and frequency of drinking at age 30, controlling for social/enhancement expectancies/motives (among other covariates). This finding was also noted in models predicting age 25 drinking from age 20 expectancies/motives. Taken together with the observation that higher emotionality at age 15 predicted stronger coping motives, this led to a mediation finding in the direction opposite of what was hypothesized. Although the direction of this finding is opposite of that found in prior work, it may be that the focus on young adult (age 25-30) drinking led to this pattern of findings. Holding an awareness of coping motives for drinking at age 20 or age 25 might serve as a protective factor against drinking in excess. One possibility is that individuals who are aware of their own coping motives for drinking have already experienced consequences from DTC with negative emotions and seek to avoid doing so.

Social and enhancement motives for drinking were strongly related to alcohol use (quantity and frequency) and consequences in structural models. This finding serves as a strong reminder that the majority of drinking episodes are driven by a desire to improve social interactions or enhance mood and self-perception (Hussong et al., 2011; Sher et al., 2005). Much has been written on the challenge of prospectively predicting negative affect-linked, relief-based

drinking; this has been dubbed the internalizing pathway to drinking. Though methodological factors surely play a role, the fact remains that most individuals tend to associate drinking with a positive affect enhancement goal (Cooper et al., 1995).

Even controlling for temperament and coping, male sex was a statistically significant predictor both of coping motives and of social/enhancement motives. In terms of social context, women tend to perceive greater negative social consequences for drinking (Nolen-Hoeksema, 2004). In terms of biological context, men tend to have higher tolerance for alcohol than women, all else being equal (Baraona et al., 2001; Thomasson, 2002). This difference in tolerance may lead to different types of drinking behavior, which in turn leads to different learning. Women also tend to have lower levels of personality risk factors for drinking, and have reported lower rates of DTCC in some samples (Nolen-Hoeksema, 2004). Since the effect of sex was observed over and above the effect of personality, it is possible that it is accounted for by biological differences in reinforcement learning. However, since we did not measure social context (e.g., peer use) in Aim 1 analyses, many other factors might be influencing differences in the development of drinking motives.

Limitations to Aim 1 Analyses

Aim 1 analyses were heavily influenced by the availability and consistency of measures at each time point. Though the data were rich and encompassed a broad set of alcohol-related constructs, substantial re-scoring of measures was necessary to achieve strong reliability of measures. As such, it may be challenging to compare the present findings to other studies using different item sets. To address skewness in the alcohol use data, I used the WLSMV estimator to estimate robust standard errors. This was only one of several possible options; while I considered fitting generalized structural equation models using link function to accommodate skewness, I

was not able to do so due to software limitations. The lavaan software package in R does not support generalized SEM, though other software packages such as MPlus and Stata are able to do so. Lastly, impulsivity was measured as a unidimensional construct in the current study, which is inconsistent with current thinking on impulsive traits (Cyders & Smith, 2007; Sharma et al., 2013; Whiteside & Lynam, 2001).

Chapter 3. Does Avoidant Coping Predict Trajectories of Coping Expectancies?

3.1. Aims 2 and 3 Method

3.1.1. Research Design and Sample.

Study procedures and participants were identical to those presented in Section 2.1. See the Missing Data section of the Analysis Plan below for details on differences in the final analysis sample.

3.1.2. Measures.

Drinking to Cope Expectancies. To assess growth in DTCC across a 17-year time frame, I created a mean score of the five common AEQ (described in Section 2.1) items across each time point (*Drinking alcohol relaxes me, Drinking alcohol helps cheer me up when I am in a bad mood, Drinking alcohol helps me forget my worries, Drinking alcohol helps me when I am tense and nervous, Drinking alcohol helps me feel less fearful*). Scores on each item ranged from 1=*Strongly Agree* to 5=*Strongly Disagree*, though items were reverse coded so that higher scores indicated strong endorsement of the expectancy item. The mean score increased monotonically across time ($M_{T1}=1.91$, $M_{T6}=2.89$) and the SD of the coping expectancies score decreased monotonically across time ($SD_{T1} = 1.01$, $SD_{T6} = 0.77$). Though the coping expectancies score was initially positively skewed at T1 and T2, the skew was reduced at T3-T6. In analysis models the coping expectancies score was centered on its T1 mean; thus, estimates represented changes from initial levels of coping expectancies for a participant who started at the sample mean.

Trait Avoidant Coping. I created a trait avoidant coping variable by combining avoidant coping items across all six time points. At T1-T3, this consisted of two items from the BBCI

(described in Chapter 3); *I try to put it out of my mind* and *I go on as if nothing happened*, $r_s = .28-.41$) which correlated with T4-T6 avoidant coping more strongly than the full cognitive coping subscale. At T4-T6, I used the denial (3 items, e.g., *I refuse to believe that it has happened*) and disengagement (3 items, e.g., *I go to movies or watch TV, to think about it less*) subscales of the COPE (described in Section 2.1). The combined T4-T6 avoidant coping measure from the COPE showed moderate internal consistency ($\alpha = .51-.68$). Each avoidant coping score was then standardized within the given time point, and then summed to create a person-level score. Finally, this score was re-standardized so that each person had a standardized score representing their overall level of avoidant coping relative to the rest of the sample.

Exposure to Alcohol Use. Exposure to alcohol during the adolescent and young adult years was operationalized in two ways: age of drinking onset for the participant and level of peer drinking at each time point. **Age at First Drink.** Age at first drink was calculated with an approach previously used in analyses by King & Chassin (2007) with this dataset, based on a combination of participant answers to several questions across time points. At T2 and T3, participants were asked to report the month and year of their first alcohol drink (*more than just a few sips*). If participants had not yet reported drinking at T3, we coded their age at first drink to be their age when they first self-reported past-year drinking on a survey at T4, T5, and T6. Whereas King & Chassin (2007) dichotomized this year variable into an early-onset and later-onset variable, we entered the variable into analyses as a year. **Peer Use.** Peer alcohol use was measured at all six time points with a single-item measure: *How many of your friends would you estimate use alcohol regularly?* The item was answered on an ordinal scale: 1=None, 2=A few, 3=Some, 4=Many, 5=Most, 6=All. Peer use increased over time; whereas the median score at T1-T3 was 1=None, the median score at T4 was 2= A few and the median score at T5 and T6

was 3=*Some*. Participants used the full range of response options at each time point. I considered using a complementary item assessing the number of peers who *occasionally* used alcohol; however, this item was written such that it did not specify whether friends could be counted in both the regular use and occasional use categories. Due to this ambiguity, I did not combine the items into a scale or sum score. Because regular use amongst friends likely provides more opportunities for peer learning of alcohol expectancies than occasional use, I decided to use the regular use item only. This item was centered in multilevel models so that 2=*A few* became the zero point. The item was then partitioned into between-person (person-mean) and within-person (centered within-person) variance in peer use to properly investigate effects on levels and growth of DTC expectancies.

3.2. Aims 2 and 3 Analysis Plan.

I conducted a series of nested models, beginning with an unconditional, intercept-only model and culminating in the hypothesized models. The models were fit and compared in a hierarchical fashion in order to assess the appropriateness of the model specification at each step. At each step, AIC, BIC, and chi-squared tests for improvement in model fit were conducted. The initial intercept and coping expectancies was fixed at age 13. Although I initially hypothesized testing a parallel growth model involving both growth in avoidant coping and growth in coping expectancies, initial descriptive analyses revealed no common measures across time in avoidant coping. Based on this aspect of the data, I decided to reconceptualize avoidant coping as a trait measured across adolescence and early adulthood. Growth models were fit in a multilevel modeling framework using the nlme (Pinheiro et al., 2017) R package.

3.2.1. Proposed Models.

To test hypothesis 2a of Aim 2, I fit a growth model characterizing the role of trait avoidant coping on levels and growth of coping expectancies. After selecting the best-fitting unconditional growth model, I added trait avoidant coping as a predictor of levels and growth of coping expectancies. The relations between trait avoidant coping and levels and growth in coping expectancies represented primary tests of the hypothesis.

To test Aim 3 hypotheses, I fit models including peer use and age at first drink. These models addressed the potential moderating role of both peer use and age at first drink in the relation between avoidant coping and coping expectancies. Interactions between peer use and age at first drink and avoidant coping in predicting levels and growth in coping expectancies comprised the primary hypothesis tests. All models controlled for gender, parental AUD diagnosis, and race/ethnicity.

3.2.2. Estimation and Model Fit.

I began model specification by attempting to specify the best-fitting unconditional growth model. *A priori*, I planned to visually inspect growth trajectories and assess the fit of both a linear and quadratic time trend. Next, I added two covariates to the model: participant sex and parental AUD diagnosis. Aim 2 and Aim 3 hypotheses were evaluated by adding terms to this covariate model.

For Aim 2 models, I tested the relations between trait avoidant coping and the intercept, slope, and quadratic time trends of DTC cognitions. Each term was added to the model in turn, and improvement in model fit was assessed for each term. See Table 11 for an overview of Aim 2 growth models.

To fit Aim 3 models, I first tested the main effects of age at first drink and peer alcohol use on trajectories of coping expectancies (fixed effects on intercept and slope). Next, I added interactions between age at first drink and trait avoidant coping predicting trajectories of coping expectancies (fixed effects on intercept and slope). These terms are reported as interactions between trait avoidant coping and age at first drink in predicting the slope and intercept terms. Finally, I added a second set of interactions between peer use and trait avoidant coping predicting trajectories of coping expectancies (fixed effects on intercept and slope). See Table 12 for an overview of Aim 3 growth models.

To compare nested models, I used deviance-based criteria and tests, including AIC, BIC, and likelihood ratio tests. To assess absolute model fit for both Aim 2 and Aim 3 models, I calculated empirical Bayes estimates for each. Empirical Bayes estimates are a weighted average of OLS-based individual estimates and estimates from the population model (Singer et al., 2003). Next, these predicted values were plotted against the observed data. Though a numerical measure

of absolute model fit (analogous to R^2) is not available for multilevel models, we also report the magnitude of residual random effects as compared to other modeled random effects.

3.2.3. Missing Data.

I attempted to apply multiple imputation using the `mitml` (Grund et al., 2019), `pan` (Grund et al., 2016), and `lme4` (Bates et al., 2007, p. 4) packages to obtain final reported values, but was unable to attain convergence in predicting the age at first drink variable. The imputation model consisted of a multilevel model including fixed effects of all analysis variables (sex, parental AUD diagnosis, trait avoidant coping, age at first drink, and time) and a random intercept and random effect of time. Using a burn-in period of 500,000 iterations and a thinning period of 1,000 iterations, I observed a lack of convergence for relations between age at first drink and other variables. This modeling issue was first noted using a burn-in period of 1,000 iterations and a thinning period of 100 observations; increasing the burn-in period 500-fold and the thinning period 10-fold did not address the problem. Aside from practical challenges in applying multiple imputation, I also had to consider a theoretical concern regarding interactions. Aim 3 hypotheses concerned both within-level and cross-level interactions in study constructs, thus imputation models should include any hypothesized interactions. However, specifying interaction terms would assume that an interaction exists, whereas leaving them out would assume that no interaction exists. Either decision would bias results to a degree. In contrast, listwise deletion, though it may reduce power and introduce other bias, does not make either assumption about the available cases.

As a result, I used maximum likelihood to address missing data in the multilevel models. Maximum likelihood is able to accommodate unbalanced data; no matter the number of time points per individual, each individual who provided at least one time point of DTC data

contributed to the final model estimates. However, maximum likelihood missing data handling in multilevel models does not accommodate missing values in predictors; it instead conducts a complete-case analysis for the variables in the model. Final reported values are from complete-data analyses. Aim 2 models included 2534 out of 2573 (98%) observations (449 out of 454 participants, 99%), whereas Aim 3 models included 2388 out of 2573 (93%) observations (424 out of 454 participants, 93%).

3.3. Aims 2 and 3 Results

3.3.1. Unconditional Growth Trajectories of DTCC.

Prior to fitting hypothesized models, I plotted trajectories of coping expectancies over time (see Figure 8 and Figure 9). Visual inspection of trajectories suggested that participants tended to increase quickly between ages 13 and 15, and then more gradually from age 15 to age 30. However, there was not a strong common trend across all participants. As a result, both linear and quadratic growth terms were specified and tested. Model fit improvements at each step suggested that the data were best modeled with a fixed linear effect of time, a fixed quadratic effect of time, and random effects for the intercept, slope, and quadratic terms. All subsequent predictors were added to this specification.

The trend for a theoretical average participant was to increase at a rate of .12 points (.15 standard deviations) per year in coping expectancies score. This linear increase diminished over time (i.e., the growth flattened out in later years); at age 13 the instantaneous slope of coping expectancies was .12; at age 30 it was -.01. The average participant began with a score of 1.93, increasing rapidly and leveling off in later years at a rate of .004 points per year per year, for a final score of 2.86 (on a 1-5 scale). Random effects indicated that the growth factors of participants varied substantially from one another: intercepts varied from one another with a standard deviation of .67 points; slopes varied from one another with a standard deviation of .11 points per year; and quadratic effects varied from one another with a standard deviation of .004 points per year per year. Full results from the unconditional growth model are shown in Table 13.

3.3.2. Primary Study Hypotheses

H2a: Individuals with higher levels of trait avoidant coping will show elevated levels and growth of DTCC. Aim 2 of the current work concerned the relations between trait avoidant coping and trajectories of coping expectancies. In the specified growth model, trait avoidant coping was a statistically significant predictor of levels of coping expectancies at age 13 ($\beta = .154$, $B = .090$, $p = .010$). For each standard deviation increase in trait avoidant coping, initial levels of coping expectancies were observed to increase by .15 standard deviations. Trait avoidant coping was not a statistically significant predictor of change over time in coping expectancies ($\beta = -.006$, $B = -.005$, $p = .086$). Re-centering models at age 30, trait avoidant coping did not predict a difference in levels of coping expectancies at age 30 ($\beta = .005$, $B = .003$, $p = .932$). In Aim 3 models including exposure to alcohol use, the effect of avoidant coping on levels of coping expectancies and change over time were nearly identical to those observed in Aim 2 models.

Aim 2 models showed reliable convergence and no violations of model assumptions (i.e., heteroscedasticity, non-normality of residuals). X^2 tests of improvement in model fit, AIC, and BIC did not agree on which model best fit the data. I chose to interpret results from Model 2.6 because it provided direct tests of study hypotheses, and was favored by AIC. See Figure 10 for diagnostic plots of Model 2.6 and Figure 11 for a plot of model fit. Full model results are reported in Table 14 and Figure 12. Figure 13 shows the relation between avoidant coping and coping expectancies trajectories.

H3a: The effect of avoidant coping on trajectories of DTCC will be moderated by age at first drink. In Aim 3 models (see Table 14 and Figure 15), age at first drink did not moderate the association between trait avoidant coping and levels ($B = -.009$, $p = .204$) or growth ($B = .000$, $p = .928$) in coping expectancies. Age at first drink was also not a statistically

significant predictor of levels ($\beta = .011$, $B = .001$, $p = .928$) or growth ($\beta = .011$, $B = .001$, $p = .266$) in coping expectancies. Aim 3 models showed reliable convergence and no violations of model assumptions (i.e., heteroscedasticity, non-normality of residuals). Figure 11 shows the fit of model-predicted values to raw data; full model results are reported in Table 14 and Figure 15.

H3b: The effect of avoidant coping on trajectories of DTCC will be moderated by peer use. Peer alcohol use did not moderate the association between trait avoidant coping and levels ($B = .029$, $p = .522$) or growth ($B = .001$, $p = .776$) in coping expectancies; however both within-person variation and between-person variation in peer alcohol use (which was measured at each time point) were statistically significant predictors of coping expectancies levels ($\beta_w = .164$, $B = .111$, $p < .001$, $\beta_b = .343$, $B = .234$, $p < .001$). For each standard deviation increase in within-person peer alcohol use, coping expectancies was observed to increase by .16 standard deviations at the same time point. At the between-person level, a standard deviation increase in overall peer use across the 6 time points was associated with a .34 standard deviation increase in initial levels of coping expectancies. Between-person variability in peer use did not predict a difference in coping expectancies levels at age 30 ($\beta = .072$, $B = .049$, $p = .334$).

3.4. Aims 2 and 3 Discussion

Growth models provided mixed support for the role of avoidant coping in the development of DTCC. I found mixed support for Aim 2 hypotheses: higher trait avoidant coping predicted higher levels of DTCC at age 13, but not growth over time in DTCC. Regarding Aim 3 hypotheses, results supported a role of peer alcohol use in trajectories of DTCC such that participants with more peers who regularly drank alcohol had stronger DTCC; however, I did not find evidence that peer use moderated the relations between trait avoidant coping and trajectories of DTCC. Age at first drink was unrelated to levels or growth in DTCC, and did not moderate relations between avoidant coping and DTCC trajectories.

In spite of the Aim 1 finding of a lack of association between avoidant coping and DTCC, I found evidence in Aim 2 analyses of relations between avoidant coping and DTCC. Specifically, conceptualizing avoidant coping as a trait yielded associations between avoidant coping and DTCC. The literature on this association has been mixed, as Hasking & Oei discussed in a 2008 literature review. Whereas some have found that avoidant coping interacts with positive alcohol expectancies to predict alcohol-related problems (Cooper et al., 1988; Laurent et al., 1997), others have failed to find this association (Armeli et al., 2000). To the extent that avoidant coping does indicate risk for higher levels of DTCC, clinicians might assess for alcohol use in clients who tend to cope avoidantly; or vice versa, clinicians might focus treatment on more general avoidant coping strategies for clients who use alcohol for negative affect reduction. However, replication of this finding is needed before making any recommendations. Methodological features of the study may also have influenced this finding. Though avoidant coping measures were available at each time point, these measures differed at T1-T3 vs. T4-T6. Moreover, avoidant coping measures did not show strong internal consistency

at either time point. Thus, the primary benefit of aggregating the avoidant coping measures to a person-level trait may have been an increase in measurement reliability.

I also found strong evidence for a relation between peer alcohol use and DTCC, controlling for parental AUD diagnosis, age at first drink, sex, and avoidant coping. Although peer use did not moderate the relation between avoidant coping and DTCC, it explained a substantial amount of additional variance beyond that explained by avoidant coping. In fact, the effect on lifetime (age 13-30) peer use on levels of DTCC was more than twice as strong as the role of trait avoidant coping on DTCC. This finding serves as an important reminder of the role of peer context and situational factors in the learning process. One of the most robust findings in the drug and alcohol use literature (e.g., Moffitt & Caspi, 2001; Steinberg & Morris, 2001) is the powerful role of peer influence in predicting initiation and escalation of risky use. Even so, the finding that avoidant coping predicted levels of DTCC over and above peer use suggests a complementary role of person-level factors in determining beliefs about drinking, contributing to literature on a negative affect-related pathway to alcohol use problems (Hussong et al., 2011, 2017).

Although the sample is not an epidemiological sample, the current study contributes to the descriptive literature on the development of beliefs about drinking in a large, mixed-risk sample. As early as age 13, youth held DTCC across the full range of the scale. Whereas some youth strongly disagreed that alcohol might reduce negative emotions, others strongly agreed with the same statements at age 13. DTCC tended to grow monotonically across time, though the rate of growth slowed as adolescents progressed into adulthood. At age 30, a theoretical average participant tended to feel neutral or agree with the idea that alcohol can serve a negative emotion reduction function. Some work has observed a similar trend across earlier development, with

Settles and colleagues (2014) reporting growth in expectancies from the beginning of fifth grade to the end of sixth grade. Though it has been well-established that alcohol expectancies develop as early as childhood and grow across time, few studies have examined growth trajectories longitudinally in a large group of youth.

Limitations to Aim 2 Analyses. My approach to answering research questions about the role of avoidant coping in the development of DTCC came with both strengths and limitations. Most notably, avoidant coping was measured as a trait due to inconsistencies in measurement across time points. Had avoidant coping been measured with the same items at each time point, it might have been possible to examine avoidant coping both as a person-level covariate and as a time-varying covariate. Growth models are appropriate for modeling overall trends across participants as well as predictors of trends for individuals with certain characteristics. Thus, they were well-suited to the current research questions. However, these methods also require the outcome to be modeled to be measured on an identical scale at each time point. As a result, I was forced to reduce the scope of the DTCC construct to a subset of items that were observed repeatedly.

Chapter 4. Overall Discussion and Conclusions

In the current dissertation, I reviewed literature supporting a longitudinal link between adolescent temperament, expectancies, and eventual use, and proposed an extension to the AP model meant to expound on the mechanisms through which temperament traits predispose youth toward certain learned expectancies. Specifically, I hypothesized that avoidant coping might serve as an intermediate link between adolescent temperament and young adult DTCC. Overall, I did not find evidence that avoidant coping explains the association between personality traits in adolescence and DTCC in young adulthood. Neither hypothesized Aim 1 analyses nor exploratory models supported a relation between avoidant coping and DTCC. Moreover, zero-order correlations between avoidant coping and DTCC were quite small. Thus, the hypothesized mediated role of avoidant coping was not supported. However, in Aim 2 analyses I did observe evidence that an individual's overall level of avoidant coping, conceptualized as a trait measured across many years, predicted their overall level of DTCC. This result was observed controlling for the effects of sex, age at first drink, peer use, and parental AUD. As a whole, these results indicate a possible role of avoidant coping in the development of DTCC, but perhaps one which is distinct from the influence of personality traits.

A pressing question in the current alcohol literature concerns the specificity vs. generality of alcohol-related reinforcement and learning mechanisms. Whereas a good deal of recent work on alcohol use disorders focuses on implicit and explicit beliefs about alcohol in particular (e.g., Wiers et al., 2002, 2011, 2013), other lines of inquiry focus on broader behavioral tendencies (Cyders & Smith, 2007; Gullo et al., 2014; Sharma et al., 2013; Whiteside & Lynam, 2001). It is clear that each approach has its merits; the synthesis and integration of these disparate streams of research presents a monumental yet critical challenge to current alcohol use researchers. To the

extent that general coping styles are only weakly related to alcohol expectancies, future research might focus more on substance-specific learning and contexts, and less on general coping styles. Moreover, interventions targeting general coping and problem-solving might be less likely to influence alcohol use behavior than substance-specific interventions. Future work comparing interventions which operate on different (i.e., general vs. specific) theories of coping and substance use will be invaluable to addressing these questions.

In including temperament, coping, expectancies, and drinking in a comprehensive set of analyses of a rich longitudinal dataset, I hoped to connect knowledge from disparate literatures into a cohesive model. Though I found no evidence of serial mediation, I did observe mixed evidence of links between avoidant coping and DTCC. Although findings do not point strongly and consistently to a relation between temperament, avoidant coping, and alcohol expectancies, I believe that continued work in this area is needed. Each set of relations in this potential mediational path has received substantial attention and empirical examination; most germane to advancing research and theory on coping and DTC, Hasking & Oei (2008) have articulated a conceptual model for the role of coping in explaining alcohol expectancies and drinking behavior. In this model they describe a reinforcement path through which repeated avoidant coping behavior may lead to drinking to cope with negative emotions, and over time strong drinking to cope expectancies. Though the tradition of coping research has been largely supplanted by emotion regulation and its more biological implications (e.g., Cole et al., 2004; Gross, 2013), theory and research from the coping literature should continue to guide our thinking and clinicians and as researchers. Future work testing this process as it unfolds across development has the potential to direct focus and resources toward a particular prevention target, be it more general coping strategies or more specific alcohol expectancies.

I would also be remiss not to mention an important methodological point raised by the current set of analyses: especially in complex models, the choice of method influences the result. Whereas I did not find any relations between temperament and avoidant coping in a serial mediation model, I did find evidence for these relations in a cross-lagged panel model. Whereas avoidant coping was not related to DTCC in any of the Aim 1 models, treating avoidant coping as a trait yielded a statistically significant relation between avoidant coping and levels of DTCC at age 13. In particular, Simonsohn and colleagues have written at length (Simmons et al., 2011; Simonsohn, 2015; Simonsohn et al., 2014) on such topics as researcher degrees of freedom: the idea that many seemingly small decisions can be made, and justified, along the way to a statistically significant finding (Gelman & Loken, 2013). I have attempted to be transparent in reporting primary hypotheses as well as secondary, exploratory analyses. In spite of attempts to answer similar questions carefully from several angles, I find discrepancies in results (e.g., the role of avoidant coping in the development of DTCC) which may be a result of methodological decisions as much as a phenomenon of the data. I raise this point not to criticize the ambiguity of study findings, but to highlight the need for careful translational work on widely-used statistical methods.

Limitations. The current study has numerous strengths, including a longitudinal span of over 18 years, a well-sampled distribution of familial and social risk factors, a broad measurement battery, and a high retention rate of participants. One clear limitation (as well as the largest strength) of the study presented herein is the 17-year longitudinal nature of the study. Attempting to track change in complex psychological variables – each of which comes with considerable nuance in its measurement and development – across 17 years presents a myriad of methodological challenges. Many decisions must be weighed, made, and justified in order to

arrive at a final set of models in each analysis, and each of these decisions in the "garden of forking paths" faced by researchers (Gelman & Loken, 2013) may bias results in one way or another. Unreliability of constructs or measurement non-invariance across developmental periods can also provide a great challenge to interpreting results. This is especially true given long time lags (as long as 5 years) between measurements; to the extent that test-retest reliability is low, subsequent measurements of the same construct may show little stability. Regarding the study sample, the sample consists of primarily non-Hispanic White and Hispanic families, limiting generalizability. Finally, there were no experimental or natural manipulations imposed on subjects, thus any suggested paths may only be consistent with causal interpretations but do not provide direct evidence of causality.

Conclusions. Drinking to cope with negative emotions is a hallmark of problematic drinking and a strong predictor of negative life consequences of drinking alcohol (Cooper et al., 1988, 1995; Holahan et al., 2001; Kuntsche et al., 2006; Merrill et al., 2014; Piasecki et al., 2014). More broadly, the ways in which individuals differ in their regulation of negative emotions shape their lives profoundly (Carver & Connor-Smith, 2010; Gross, 2013). Despite the clear conceptual link between DTC and broader patterns of coping, relatively little research has addressed the relation between coping and DTC. Moreover, no research I am aware of has yet examined whether more general coping styles explain the relation between personality and DTCC. In the current dissertation, I found evidence that trait avoidant coping predicts levels of DTCC; however, I did not find evidence that coping explains the relation between personality and DTCC. I hope that my study contributes to a critical effort to integrate a broad array of sociocognitive factors into an updated, comprehensive model of the development of DTC, and that it becomes only one of many studies in this area. By incrementally bringing the broader

picture of alcohol use disorders and DTC slowly into sharper focus, and with concerted efforts to implement science-based intervention and treatment, psychologists have the ability and opportunity to reduce the profound suffering associated with alcohol use disorders.

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Table 1. Descriptive statistics for study composites.

Domain	Construct	T1-T3 Scale(s)	T4-T6 Scale(s)	T1 Age 13 M (SD)	T2 Age 14 M (SD)	T3 Age 15 M (SD)	T4 Age 20 M (SD)	T5 Age 25 M (SD)	T6 Age 30 M (SD)
Temperament	Emotionality	EASI	NEO-PI-R	2.77 (0.84)	2.71 (0.84)	2.80 (0.80)	2.73 (0.67)	2.61 (0.71)	2.98 (0.60)
	Impulsivity	EASI	NEO-PI-R	3.26 (0.71)	3.29 (0.70)	3.31 (0.69)	3.64 (0.63)	3.75 (0.64)	4.01 (0.51)
Coping	Cognitive Coping	-	COPE	-	-	-	2.69 (0.58)	2.73 (0.57)	3.07 (0.43)
	Active Coping	BBCI	COPE	3.51 (0.57)	3.42 (0.58)	3.42 (0.57)	3.04 (0.56)	3.13 (0.51)	3.52 (0.35)
	Avoidant Coping	BBCI	COPE	3.23 (0.64)	3.19 (0.62)	3.20 (0.60)	1.90 (0.54)	1.83 (0.48)	2.64 (0.27)
Expectancies	Coping	AEQ	AEQ DMQ	2.05 (0.91)	2.08 (0.91)	2.25 (0.90)	2.63 (0.86), 2.78 (0.80)	2.92 (0.76), 2.13 (0.87)	2.10 (0.90), 2.32 (1.20)
	Social/Enhancement	AEQ	AEQ DMQ	1.73 (0.64)	1.78 (0.68)	1.94 (0.66)	2.59 (0.70), 2.66 (0.68)	2.75 (0.64), 2.94 (0.91)	2.93 (0.90), 2.87 (0.94)
Alcohol Use	Frequency	Project Staff	Project Staff	0.95 (2.42)	1.47 (2.91)	1.90 (2.97)	4.28 (3.71)	4.16 (3.34)	3.90 (3.28)
	Quantity	Project Staff	Project Staff	0.84 (1.75)	1.14 (2.11)	1.58 (2.45)	3.84 (3.00)	4.49 (3.19)	6.61 (3.43)
	Consequences	Project Staff	Project Staff	0.19 (0.76)	0.21 (0.72)	0.28 (0.86)	3.20 (3.94)	2.09 (3.04)	2.20 (3.57)
Peer Use	Age at First Drink	Project Staff	Project Staff	15.46 (6.20)	-	-	-	-	-
	Peer Use	Project Staff	Project Staff	0.51 (1.05)	0.66 (1.10)	1.01 (1.30)	1.75 (1.47)	1.92 (1.49)	1.81 (1.43)

Note: EASI = EASI Temperament Scales (Buss & Plomin, 1975) NEO = NEO Personality Inventory-Revision (Costa & McCrae, 2008); BBCI = Behavior-Based Coping Inventory (Wills, 1986); COPE = COPE coping inventory (Carver, Scheier, & Weintraub, 1989); AEQ = Alcohol Expectancies Questionnaire (Man, Chassin, & Sher, 1987; Brown et al., 1987); DMQ = Drinking Motives Questionnaire (Cooper, 1994); Pr Staff = measure written by project staff.

Table 2. Composition of scales used in Aim 1 models post-confirmatory factor analyses.

Domain	Time Points	Construct	Source	Subscale	$\omega_{between}$	ω_{within}	Items	Notes
Temperament	T1-T3 (Age 13-15)	Emotionality	EASI	Emotionality	.90	.61	6/9	(Omitted) Fewer fears, Easily frightened, Displeased
		Impulsivity		Impulsivity	.79	.46	8/12	(Omitted) Seek new, Tolerate frustration, Plan ahead, See through
	T4-T6 (Age 20-30)	Emotionality	NEO	Neuroticism	.95	.76	11/12	(Omitted) Not a worrier
		Impulsivity		Conscientiousness (reverse coded)	.94	.78	10/12	(Omitted) Not methodical, Perform tasks
Coping	T1-T3 (Age 13-15)	Active Coping	BBCI	Behavioral Coping	.91	.55	6/6	
		Avoidant Coping		Cognitive Coping	.84	.52	7/7	
	T4-T6 (Age 20-30)	Cognitive Coping	Reappraisal	.87	.60	3/3		
			Acceptance	.87	.68	2/3		
		Active Coping	Active	.87	.60	3/3		
			Reappraisal	.87	.60	1/3	(Added) Learn something	
	Avoidant Coping	COPE	Denial	.98	.73	3/3		
	Disengagement		.84	.70	3/3			
Expectancies	T1-T6 (Age 13-30)	Coping	AEQ	Tension Reduction	.98	.89	8/8	
				Power	-	-	1/3	(Added) Less fearful
		Social/Enhancement	Global Positive	-	-	1/4	(Added) Rid of feelings	
			Social	.95	.92	3/3		
	T4-T6 (Age 20-30)	Coping	DMQ	Global Positive	-	-	3/4	
				Coping	.96	.88	5/5	
	Social/Enhancement	Social	.98	.90	7/7			
		Enhancement	.92	.89	5/5			
Alcohol Use	T1-T6 (Age 13-30)	Frequency	Pr Staff	Frequency	-	-	3/3	
		Quantity		Quantity	-	-	3/3	
		Consequences		Consequences	-	-	23/23	
	T1-T2 (Age 13-14)	Age at First Drink	Pr Staff		-	-	2/2	
		Peer Use			-	-	2/2	

Note: EASI = EASI Temperament Scales (Buss & Plomin, 1975) NEO = NEO Personality Inventory-Revision (Costa & McCrae, 2008); BBCI = Behavior-Based Coping Inventory (Wills, 1986); COPE = COPE coping inventory (Carver, Scheier, & Weintraub, 1989); AEQ = Alcohol Expectancies Questionnaire (Man, Chassin, & Sher, 1987; Brown et al., 1987); DMQ = Drinking Motives Questionnaire (Cooper, 1994); Pr Staff = measure written by project staff. $\omega_{between}$ indexes between-person reliability of the scale used in analyses; ω_{within} indexes within-person reliability of the scale.

Table 3.1. Within-construct correlations: temperament and personality measures.

	T1Emo	T1Imp	T2Emo	T2Imp	T3Emo	T3Imp	T4EEmo	T4EImp	T4Neu	T4Imp	T5Neu	T5Imp	T6Neu	T6Imp
T1 Emotionality	1.00													
T1 Impulsivity	0.46	1.00												
T2 Emotionality	0.48	0.39	1.00											
T2 Impulsivity	0.23	0.58	0.43	1.00										
T3 Emotionality	0.50	0.35	0.53	0.32	1.00									
T3 Impulsivity	0.23	0.51	0.33	0.65	0.41	1.00								
T4 EASI Emotionality	0.34	0.28	0.39	0.25	0.45	0.26	1.00							
T4 Eysenck Impulsivity	0.08	0.23	0.09	0.33	0.10	0.35	0.22	1.00						
T4 NEO Neuroticism	0.34	0.34	0.37	0.23	0.36	0.25	0.62	0.12	1.00					
T4 NEO Impulsivity	0.18	0.17	0.18	0.17	0.20	0.20	0.28	0.25	0.40	1.00				
T5 Neuroticism	0.30	0.28	0.30	0.16	0.24	0.16	0.45	0.04	0.62	0.34	1.00			
T5 Impulsivity	0.10	0.15	0.16	0.17	0.19	0.17	0.18	0.14	0.26	0.64	0.42	1.00		
T6 Neuroticism	0.31	0.21	0.23	0.11	0.27	0.15	0.36	0.07	0.55	0.33	0.62	0.38	1.00	
T6 Impulsivity	0.14	0.12	0.22	0.14	0.20	0.19	0.19	0.23	0.29	0.52	0.28	0.53	0.35	1.00

Note: Emo = Emotionality, Imp = Impulsivity, Neu = Neuroticism.

Table 3.2. Within-construct correlations: coping measures.

	T1Avo	T1Act	T2Avo	T2Act	T3Avo	T3Act	T4Avo	T4Cog	T4 Act	T5Avo	T5Cog	T5Act	T6Avo	T6Cog	T6Act
T1 Avoidant	1.00														
T1 Active	0.39	1.00													
T2 Avoidant	0.47	0.17	1.00												
T2 Active	0.21	0.37	0.38	1.00											
T3 Avoidant	0.45	0.12	0.50	0.15	1.00										
T3 Active	0.13	0.27	0.20	0.38	0.32	1.00									
T4 Avoidant	0.05	-0.08	0.16	0.01	0.17	-0.04	1.00								
T4 Cognitive	0.01	0.04	0.06	0.02	0.12	0.09	0.34	1.00							
T4 Active	-0.02	0.16	-0.07	0.22	-0.10	0.21	0.00	0.29	1.00						
T5 Avoidant	0.05	-0.06	0.12	-0.01	0.12	0.02	0.35	0.21	0.01	1.00					
T5 Cognitive	0.03	0.06	0.06	0.06	0.03	0.04	0.07	0.39	0.09	0.27	1.00				
T5 Active	0.04	0.13	-0.01	0.25	0.03	0.25	-0.03	0.15	0.38	-0.05	0.22	1.00			
T6 Avoidant	0.08	0.04	-0.01	-0.04	0.07	-0.02	0.12	-0.02	-0.18	0.22	0.14	-0.13	1.00		
T6 Cognitive	0.12	0.11	0.08	0.07	0.12	0.08	0.08	0.17	0.01	0.10	0.27	0.01	0.30	1.00	
T6 Active	-0.05	-0.05	-0.05	0.05	-0.04	0.10	-0.01	0.13	0.20	-0.01	0.12	0.05	0.14	0.19	1.00

Note: Avo = Avoidant, Act = Active, Cog = Cognitive

Table 3.3. Within-construct correlations: alcohol expectancy/drinking motive measures.

	T1Cop	T1Enh	T2Cop	T2Enh	T3Cop	T3Enh	T4Cop	T4Enh	T5Cop	T5Enh	T6Cop	T6Enh
T1 Coping	1.00											
T1 Enhancement	0.82	1.00										
T2 Coping	0.39	0.32	1.00									
T2 Enhancement	0.35	0.38	0.84	1.00								
T3 Coping	0.32	0.28	0.50	0.44	1.00							
T3 Enhancement	0.30	0.31	0.44	0.47	0.85	1.00						
T4 Coping	0.15	0.15	0.24	0.18	0.29	0.22	1.00					
T4 Enhancement	0.16	0.17	0.20	0.18	0.25	0.23	0.73	1.00				
T5 Coping	0.14	0.14	0.18	0.16	0.26	0.20	0.41	0.34	1.00			
T5 Enhancement	0.18	0.14	0.19	0.19	0.25	0.23	0.33	0.49	0.72	1.00		
T6 Coping	0.05	0.04	0.10	0.07	0.15	0.10	0.20	0.09	0.55	0.34	1.00	
T6 Enhancement	0.06	0.02	0.06	0.06	0.14	0.09	0.18	0.18	0.47	0.47	0.80	1.00

Note: Cop = Coping, Enh = Enhancement

Table 3.4. Within-construct correlations: alcohol use and consequences measures.

	T1Q	T1F	T1C	T2Q	T2F	T2C	T3Q	T3F	T3C	T4Q	T4F	T4C	T5Q	T5F	T5C	T6Q	T6F	T6C	
T1 Quant	1.00																		
T1 Freq	0.82	1.00																	
T1 Cons	0.58	0.55	1.00																
T2 Quant	0.73	0.61	0.42	1.00															
T2 Freq	0.70	0.62	0.32	0.83	1.00														
T2 Cons	0.59	0.49	0.42	0.64	0.57	1.00													
T3 Quant	0.54	0.50	0.30	0.63	0.62	0.44	1.00												
T3 Freq	0.50	0.47	0.26	0.58	0.63	0.36	0.84	1.00											
T3 Cons	0.42	0.32	0.24	0.46	0.45	0.41	0.59	0.58	1.00										
T4 Quant	0.22	0.18	0.10	0.34	0.31	0.22	0.33	0.32	0.24	1.00									
T4 Freq	0.18	0.23	0.10	0.26	0.30	0.20	0.36	0.34	0.19	0.63	1.00								
T4 Cons	0.22	0.22	0.17	0.22	0.22	0.24	0.36	0.32	0.31	0.59	0.56	1.00							
T5 Quant	0.22	0.16	0.10	0.35	0.26	0.23	0.30	0.28	0.23	0.53	0.34	0.40	1.00						
T5 Freq	0.06	0.10	-0.04	0.15	0.13	0.09	0.18	0.15	0.03	0.36	0.49	0.29	0.54	1.00					
T5 Cons	0.14	0.13	0.17	0.24	0.17	0.21	0.32	0.21	0.19	0.41	0.35	0.55	0.46	0.36	1.00				
T6 Quant	0.18	0.13	0.15	0.29	0.21	0.15	0.21	0.14	0.16	0.41	0.28	0.34	0.65	0.43	0.46	1.00			
T6 Freq	0.05	0.10	0.06	0.12	0.11	0.03	0.10	0.10	-0.04	0.25	0.34	0.22	0.37	0.64	0.32	0.54	1.00		
T6 Cons	0.07	0.08	0.12	0.18	0.12	0.11	0.23	0.14	0.22	0.31	0.34	0.46	0.40	0.39	0.58	0.46	0.36	1.00	

Note: Q = Quant = Quantity, F = Freq = Frequency, C = Cons = Consequences.

Table 4.1. Between-construct correlations: temperament by coping.

	T1Emo	T1Imp	T2Emo	T2Imp	T3Emo	T3Imp	T4EEmo	T4EImp	T4Neu	T4Imp	T5Neu	T5Imp	T6Neu	T6Imp
T1 Avoidant	-0.07	-0.04	-0.08	-0.05	-0.07	-0.01	0.01	0.00	0.01	-0.08	0.03	-0.06	-0.04	-0.06
T1 Active	-0.12	-0.18	-0.11	-0.17	-0.13	-0.15	-0.08	-0.11	-0.06	-0.09	-0.01	-0.09	-0.09	-0.06
T2 Avoidant	-0.08	0.01	-0.10	0.02	-0.05	0.04	0.03	0.01	-0.01	-0.05	0.07	0.01	0.00	-0.04
T2 Active	-0.08	-0.17	-0.10	-0.19	-0.04	-0.14	-0.04	-0.06	-0.12	-0.11	-0.07	-0.17	-0.15	-0.13
T3 Avoidant	-0.02	0.02	-0.07	0.03	-0.02	0.03	-0.03	0.01	0.01	-0.06	0.10	-0.04	0.04	-0.03
T3 Active	-0.08	-0.08	-0.07	-0.09	-0.07	-0.13	-0.10	-0.11	-0.12	-0.17	-0.06	-0.20	-0.07	-0.12
T4 Avoidant	0.10	0.23	0.12	0.19	0.10	0.18	0.05	0.13	0.23	0.07	0.21	-0.01	0.11	0.02
T4 Cognitive	-0.05	0.02	-0.09	-0.01	-0.16	0.05	-0.30	0.13	-0.23	-0.10	-0.09	0.00	-0.23	0.00
T4 Active	-0.06	-0.09	-0.12	-0.16	-0.09	-0.12	-0.30	-0.14	-0.29	-0.37	-0.21	-0.30	-0.24	-0.23
T5 Avoidant	0.05	0.10	0.02	0.05	0.05	0.08	0.04	0.07	0.18	0.07	0.33	0.10	0.18	0.10
T5 Cognitive	-0.10	-0.03	-0.08	-0.06	-0.06	0.02	-0.17	0.08	-0.13	-0.10	-0.15	-0.05	-0.16	0.01
T5 Active	-0.02	-0.06	-0.06	-0.14	-0.03	-0.06	-0.14	-0.05	-0.19	-0.31	-0.24	-0.49	-0.22	-0.27
T6 Avoidant	0.01	0.00	-0.01	-0.06	0.04	-0.03	0.03	0.05	0.13	0.11	0.15	0.14	0.15	0.14
T6 Cognitive	-0.09	-0.04	-0.06	0.05	-0.01	0.02	-0.14	0.06	-0.10	0.00	-0.10	0.10	-0.11	0.04
T6 Active	-0.03	0.03	0.03	0.05	-0.04	-0.03	-0.11	-0.01	-0.14	-0.14	-0.13	-0.11	-0.18	-0.15

Note: Emo=Emotionality, Imp=Impulsivity

Table 4.2. Between-construct correlations: temperament by expectancies.

	T1Emo	T1Imp	T2Emo	T2Imp	T3Emo	T3Imp	T4EEmo	T4EImp	T4Neu	T4Imp	T5Neu	T5Imp	T6Neu	T6Imp
T1 Coping	0.21	0.20	0.13	0.12	0.17	0.12	0.10	0.04	0.11	0.08	0.15	0.06	0.17	0.05
T1 Enhancement	0.19	0.23	0.16	0.16	0.17	0.14	0.15	0.05	0.17	0.11	0.22	0.07	0.20	0.07
T2 Coping	0.13	0.16	0.23	0.15	0.13	0.07	0.09	0.10	0.09	0.05	0.09	0.06	0.09	0.09
T2 Enhancement	0.11	0.20	0.21	0.16	0.13	0.09	0.15	0.06	0.14	0.03	0.12	0.02	0.12	0.08
T3 Coping	0.10	0.15	0.17	0.12	0.21	0.16	0.11	0.05	0.19	0.03	0.12	0.11	0.14	0.06
T3 Enhancement	0.06	0.18	0.15	0.15	0.17	0.19	0.10	0.06	0.16	0.06	0.14	0.16	0.17	0.11
T4 Coping	0.19	0.14	0.20	0.13	0.16	0.16	0.22	0.20	0.28	0.23	0.26	0.16	0.22	0.16
T4 Enhancement	0.11	0.12	0.14	0.15	0.12	0.16	0.17	0.30	0.13	0.17	0.10	0.12	0.09	0.14
T5 Coping	0.09	0.11	0.11	0.08	0.15	0.10	0.18	0.14	0.17	0.15	0.34	0.23	0.19	0.13
T5 Enhancement	0.10	0.14	0.10	0.20	0.15	0.15	0.14	0.21	0.13	0.13	0.17	0.18	0.10	0.15
T6 Coping	0.03	-0.08	-0.02	-0.07	0.05	-0.04	0.07	0.05	0.09	-0.09	0.13	0.00	0.16	0.04
T6 Enhancement	-0.01	-0.06	-0.07	-0.01	0.05	0.00	0.01	0.07	0.02	-0.06	0.01	0.02	0.06	0.02

Note: Emo = Emotionality, Imp = Impulsivity, Neu = Neuroticism.

Table 4.3. Between-construct correlations: temperament by alcohol use.

	T1Emo	T1Imp	T2Emo	T2Imp	T3Emo	T3Imp	T4EEmo	T4EImp	T4Neu	T4Imp	T5Neu	T5Imp	T6Neu	T6Imp
T1 Quant	0.09	0.16	0.15	0.14	0.13	0.13	0.14	0.04	0.05	-0.02	0.12	0.12	0.10	0.06
T1 Freq	0.11	0.19	0.19	0.17	0.11	0.14	0.10	0.02	0.04	-0.03	0.09	0.10	0.08	0.06
T1 Cons	0.08	0.13	0.12	0.11	0.16	0.09	0.07	0.04	0.02	0.00	0.06	0.05	0.08	0.00
T2 Quant	0.14	0.20	0.20	0.18	0.18	0.19	0.18	0.11	0.03	0.01	0.14	0.15	0.08	0.10
T2 Freq	0.14	0.23	0.23	0.20	0.17	0.19	0.21	0.08	0.08	0.02	0.13	0.09	0.12	0.13
T2 Cons	0.11	0.13	0.12	0.08	0.09	0.08	0.11	0.10	0.03	0.02	0.09	0.13	0.08	0.05
T3 Quant	0.11	0.20	0.18	0.18	0.16	0.25	0.21	0.12	0.06	0.02	0.10	0.12	0.05	0.07
T3 Freq	0.09	0.22	0.17	0.22	0.18	0.31	0.19	0.12	0.07	0.05	0.12	0.13	0.05	0.13
T3 Cons	0.10	0.14	0.12	0.10	0.15	0.17	0.17	0.06	0.14	0.10	0.15	0.14	0.14	0.14
T4 Quant	0.05	0.12	0.04	0.16	0.03	0.22	0.12	0.31	0.08	0.19	0.07	0.15	0.02	0.13
T4 Freq	0.11	0.20	0.02	0.14	0.01	0.17	0.07	0.26	0.00	0.12	0.03	0.08	0.02	0.04
T4 Cons	0.14	0.22	0.09	0.12	0.12	0.15	0.17	0.34	0.19	0.26	0.11	0.12	0.11	0.15
T5 Quant	0.07	0.19	0.13	0.18	0.12	0.19	0.19	0.28	0.14	0.20	0.13	0.14	0.03	0.08
T5 Freq	0.06	0.07	0.03	0.09	0.02	0.11	0.01	0.14	-0.07	0.10	0.04	0.13	-0.05	-0.02
T5 Cons	0.08	0.14	0.14	0.12	0.14	0.14	0.17	0.27	0.06	0.20	0.13	0.22	0.06	0.09
T6 Quant	0.08	0.15	0.12	0.18	0.10	0.11	0.18	0.16	0.11	0.20	0.15	0.16	0.11	0.06
T6 Freq	0.06	0.04	0.06	0.08	0.03	0.02	-0.02	0.15	0.00	0.18	-0.02	0.16	0.03	0.05
T6 Cons	0.17	0.11	0.16	0.10	0.14	0.11	0.16	0.19	0.11	0.18	0.21	0.18	0.18	0.12

Note: Emo = Emotionality, Imp = Impulsivity, Neu = Neuroticism.

Table 4.4. Between-construct correlations: coping by expectancies.

	T1Avo	T1Act	T2Avo	T2Act	T3Avo	T3Act	T4Avo	T4Cog	T4 Act	T5Avo	T5Cog	T5Act	T6Avo	T6Cog	T6Act
T1 Coping	-0.04	-0.12	-0.04	-0.12	0.03	0.02	0.06	-0.01	-0.05	0.06	-0.07	-0.05	0.05	-0.06	-0.02
T1 Enhancement	-0.04	-0.17	0.00	-0.12	0.07	-0.02	0.08	-0.09	-0.09	0.11	-0.12	-0.10	0.07	-0.07	-0.04
T2 Coping	0.00	-0.19	0.01	-0.08	0.03	-0.07	0.07	0.01	-0.04	0.04	-0.06	-0.04	-0.02	-0.08	-0.06
T2 Enhancement	0.03	-0.16	0.01	-0.12	0.03	-0.11	0.08	-0.09	-0.08	0.06	-0.09	-0.07	0.03	-0.09	-0.09
T3 Coping	-0.06	-0.15	-0.03	-0.10	-0.02	-0.11	0.07	0.08	-0.06	0.01	0.01	0.01	0.05	-0.03	-0.06
T3 Enhancement	-0.06	-0.13	-0.04	-0.15	-0.03	-0.15	0.04	-0.02	-0.08	0.07	-0.01	-0.12	0.03	-0.05	-0.09
T4 Coping	-0.03	-0.12	0.01	-0.10	0.05	-0.08	0.03	-0.06	-0.14	0.05	-0.04	-0.05	0.00	-0.08	-0.06
T4 Enhancement	-0.04	-0.11	-0.01	-0.08	0.02	-0.07	0.04	0.04	-0.10	0.09	0.07	-0.03	0.02	-0.07	-0.04
T5 Coping	-0.07	-0.02	0.01	-0.02	0.01	-0.01	0.03	0.04	-0.03	0.16	0.01	-0.12	0.07	-0.05	0.00
T5 Enhancement	-0.08	-0.01	-0.01	0.01	-0.05	0.02	0.07	0.06	0.01	0.11	0.00	-0.12	0.03	-0.07	0.04
T6 Coping	-0.10	-0.05	-0.05	0.03	0.02	0.05	-0.04	0.06	0.07	0.08	0.06	-0.02	0.01	-0.05	-0.02
T6 Enhancement	-0.10	-0.07	-0.08	-0.01	-0.02	0.06	0.00	0.09	0.04	0.05	0.03	-0.07	-0.02	-0.05	0.00

Note: Avo = Avoidant coping, Act= Active coping, Cog = Cognitive coping.

Table 4.5. Between-construct correlations: coping by alcohol use.

	T1Avo	T1Act	T2Avo	T2Act	T3Avo	T3Act	T4Avo	T4Cog	T4 Act	T5Avo	T5Cog	T5Act	T6Avo	T6Cog	T6Act
T1 Quant	0.00	-0.13	0.04	-0.06	0.07	-0.01	-0.04	-0.05	-0.03	-0.01	-0.03	-0.08	0.02	0.01	-0.03
T1 Freq	-0.06	-0.10	-0.04	-0.07	0.05	-0.02	-0.06	-0.03	0.05	-0.07	-0.05	-0.09	0.00	-0.01	0.00
T1 Cons	0.02	-0.05	0.01	-0.04	0.09	-0.03	-0.04	-0.05	-0.01	-0.07	0.01	-0.05	-0.04	-0.03	-0.02
T2 Quant	-0.08	-0.13	-0.03	-0.09	0.00	-0.04	-0.01	-0.04	-0.04	0.04	0.06	-0.06	0.02	0.03	-0.04
T2 Freq	-0.10	-0.19	-0.03	-0.11	0.01	-0.01	-0.03	-0.08	-0.06	-0.03	-0.02	-0.02	0.01	-0.03	0.01
T2 Cons	0.01	-0.13	0.07	-0.06	0.03	-0.06	0.00	0.01	-0.04	-0.03	0.04	-0.03	0.02	0.01	0.03
T3 Quant	-0.05	-0.08	-0.04	-0.12	0.01	-0.08	0.03	-0.03	-0.01	0.06	0.06	-0.07	0.06	0.03	-0.03
T3 Freq	-0.09	-0.12	-0.04	-0.12	0.01	-0.06	0.01	-0.07	-0.06	0.04	0.00	-0.07	0.06	0.00	-0.01
T3 Cons	-0.05	-0.13	0.00	-0.10	-0.02	-0.08	0.02	-0.06	-0.12	0.08	0.01	-0.07	0.12	0.06	0.00
T4 Quant	-0.05	-0.11	0.05	-0.07	0.01	-0.06	0.02	-0.03	-0.09	0.12	0.04	-0.03	-0.03	-0.02	-0.01
T4 Freq	-0.05	-0.14	-0.02	-0.10	-0.05	-0.08	0.01	0.10	0.00	0.08	0.05	0.01	0.00	0.00	0.04
T4 Cons	-0.01	-0.13	0.06	-0.05	-0.02	-0.08	0.00	0.04	-0.08	0.06	0.06	-0.02	0.00	-0.03	-0.05
T5 Quant	-0.03	0.00	0.07	0.00	-0.01	-0.04	0.11	-0.04	-0.11	0.18	0.08	-0.08	0.04	0.01	-0.07
T5 Freq	-0.09	0.01	-0.03	-0.01	-0.09	-0.05	-0.01	0.07	0.04	0.15	0.12	0.01	0.02	0.09	0.09
T5 Cons	-0.10	-0.03	0.01	-0.04	-0.09	-0.13	-0.03	0.04	-0.05	0.06	0.12	-0.06	0.03	0.00	-0.04
T6 Quant	-0.03	-0.04	0.08	0.01	0.00	-0.07	-0.04	-0.12	-0.14	0.13	0.04	-0.16	0.06	0.03	-0.05
T6 Freq	-0.09	-0.02	-0.05	0.04	-0.09	-0.02	-0.04	0.06	-0.01	0.04	0.14	-0.05	0.02	0.12	0.08
T6 Cons	-0.02	-0.07	0.00	-0.05	-0.05	-0.05	0.03	0.07	-0.03	0.15	0.10	-0.14	0.05	0.01	-0.09

Note: Avo = Avoidant coping, Act= Active coping, Cog = Cognitive coping.

Table 4.6. Between-construct correlations: expectancies by alcohol use.

	T1Cop	T1Enh	T2Cop	T2Enh	T3Cop	T3Enh	T4Cop	T4Enh	T5Cop	T5Enh	T6Cop	T6Enh
T1 Quant	0.28	0.35	0.24	0.32	0.18	0.22	0.05	0.12	0.05	0.11	-0.03	-0.02
T1 Freq	0.29	0.34	0.22	0.25	0.17	0.21	0.05	0.11	0.01	0.08	-0.02	-0.05
T1 Cons	0.20	0.20	0.15	0.18	0.12	0.14	0.07	0.06	0.10	0.14	0.00	-0.01
T2 Quant	0.23	0.27	0.25	0.36	0.21	0.28	0.05	0.16	0.09	0.19	-0.01	0.03
T2 Freq	0.24	0.28	0.30	0.39	0.25	0.30	0.10	0.17	0.06	0.14	0.00	0.03
T2 Cons	0.19	0.19	0.23	0.24	0.17	0.19	0.08	0.16	0.08	0.16	0.00	0.02
T3 Quant	0.20	0.21	0.25	0.32	0.25	0.35	0.11	0.19	0.09	0.18	0.01	0.04
T3 Freq	0.18	0.18	0.25	0.31	0.22	0.31	0.09	0.16	0.04	0.14	-0.03	0.01
T3 Cons	0.14	0.15	0.20	0.24	0.25	0.26	0.14	0.13	0.12	0.14	0.06	0.05
T4 Quant	0.13	0.13	0.13	0.14	0.07	0.14	0.22	0.42	0.11	0.28	-0.09	-0.03
T4 Freq	0.14	0.14	0.09	0.14	0.05	0.10	0.19	0.38	0.05	0.22	-0.08	-0.01
T4 Cons	0.07	0.08	0.16	0.16	0.11	0.15	0.29	0.42	0.19	0.28	0.05	0.04
T5 Quant	0.12	0.12	0.11	0.13	0.10	0.15	0.16	0.32	0.26	0.42	0.02	0.04
T5 Freq	0.08	0.05	0.05	0.07	-0.01	0.03	0.08	0.22	0.16	0.33	-0.06	0.00
T5 Cons	0.09	0.05	0.13	0.12	0.14	0.14	0.19	0.30	0.36	0.37	0.11	0.08
T6 Quant	0.08	0.09	0.06	0.10	0.07	0.14	0.07	0.24	0.25	0.37	0.05	0.07
T6 Freq	0.05	0.03	0.03	0.02	0.02	0.03	0.03	0.15	0.14	0.30	-0.03	0.00
T6 Cons	0.07	0.05	0.07	0.10	0.07	0.08	0.19	0.27	0.32	0.34	0.27	0.22

Note: Quant = Alcohol use quantity, Freq = Alcohol use frequency, Cons = Alcohol use consequences, Cop = Coping expectancies/motives, Enh = Enhancement expectancies/motives.

Table 5. Overview of Aim 1 models.

Model	Description	Variables Included	Fit Statistics
Model 1, AP Plus, Age 30, Serial mediation	Addition of coping to AP model, serial mediation model, age 30 drinking	T1 Demographics, T3 Temperament, T4 Coping, T5 Expectancies, T6 Drinking	$X^2(1448) = 1961$, CFI = .92, RMSEA = .03, SRMR = .06
Model 2, AP Plus, Cross-lagged panel model	Addition of coping to AP model, cross-lagged panel model, age 30 drinking	T1 Demographics, T4-T6 Temperament, T4-T6 Coping, T4-T6 Expectancies, T4-T6 Drinking	$X^2(591) = 1565$, CFI = .85, RMSEA = .06, SRMR = .10
Model R1, AP, Age 25 drinking	Replication of AP model, age 25 drinking	T1 Demographics, T3 Temperament, T4 Expectancies, T5 Drinking	$X^2(765) = 1224$, CFI = .92, RMSEA = .04, SRMR = .05
Model R2, AP, Age 30 drinking	Replication of AP model, age 30 drinking	T1 Demographics, T3 Temperament, T4 Expectancies, T6 Drinking	$X^2(765) = 1200$, CFI = .93, RMSEA = .04, SRMR = .05
Model E1, Exploratory Model, Coping as a ratio score	Exploratory analysis, identical to Model 3, with coping instead as a ratio score (avoidant to total)	T1 Demographics, T3 Temperament, T4 Coping Ratio, T5 Expectancies, T6 Drinking	$X^2(800) = 1437$, CFI = .89, RMSEA = .04, SRMR = .06
Model E2, Exploratory Model, Age 25 drinking, Coping replacing expectancies	Exploratory analysis, identical to Model 1, with T4 coping replacing T4 expectancies	T1 Demographics, T3 Temperament, T4 Coping, T5 Drinking	$X^2(499) = 742$, CFI = .88, RMSEA = .03, SRMR = .05
Model E3, Exploratory Model, Age 30 drinking, Coping replacing expectancies	Exploratory analysis, identical to Model 2, with T4 coping replacing T4 expectancies	T1 Demographics, T3 Temperament, T4 Coping, T6 Drinking	$X^2(499) = 727$, CFI = .89, RMSEA = .03, SRMR = .05

Note: AP = Acquired Preparedness, CFI = comparative fit index, RMSEA = root mean square error of approximation, SRMR = standardized root mean square residual.

Table 6. Addition of coping to AP model, serial mediation model

	T6 Drinking			
	Beta	B	SE	p
<i>T3 Impulsivity regressed on...</i>				
Age	0.119	0.046	0.027	0.083
Gender	0.002	0.003	0.077	0.973
Parent AUD	0.177	0.203	0.080	0.011
Race/Ethnicity	-0.040	-0.051	0.086	0.554
<i>T3 Emotionality regressed on...</i>				
Age	0.078	0.044	0.035	0.204
Gender	-0.116	-0.194	0.102	0.057
Parent AUD	0.201	0.337	0.104	0.001
Race/Ethnicity	-0.031	-0.057	0.113	0.613
<i>T4 Active coping regressed on...</i>				
Age	0.095	0.035	0.025	0.164
Gender	0.040	0.043	0.073	0.557
Parent AUD	-0.143	0.155	0.076	0.043
Race/Ethnicity	-0.029	-0.035	0.080	0.663
Impulsivity	-0.024	-0.023	0.103	0.824
Emotionality	-0.075	-0.048	0.066	0.463
<i>T4 Cognitive coping regressed on...</i>				
Age	0.019	0.009	0.032	0.774
Gender	-0.067	-0.095	0.095	0.317
Parent AUD	-0.049	-0.070	0.097	0.472
Race/Ethnicity	-0.074	-0.116	0.104	0.266
Impulsivity	0.190	0.234	0.137	0.089
Emotionality	-0.289	-0.244	0.089	0.006
<i>T4 Avoidant coping regressed on...</i>				
Age	-0.055	-0.024	0.027	0.375
Gender	-0.042	-0.055	0.080	0.497
Parent AUD	0.125	0.162	0.082	0.050
Race/Ethnicity	0.042	0.060	0.088	0.497
Impulsivity	0.190	0.214	0.119	0.074
Emotionality	-0.049	-0.037	0.072	0.603
<i>T5 Social/Enhancement motives regressed on...</i>				
Age	-0.013	-0.009	0.041	0.833
Gender	0.203	0.405	0.122	0.001
Parent AUD	0.172	0.345	0.125	0.006
Race/Ethnicity	-0.078	-0.173	0.132	0.192
Impulsivity	0.093	0.163	0.177	0.359
Emotionality	0.138	0.165	0.115	0.154
Active coping	-0.100	-0.185	0.239	0.439
Cognitive coping	0.178	0.252	0.178	0.161
Avoidant coping	-0.114	-0.176	0.133	0.187
<i>T5 Coping motives regressed on...</i>				
Age	0.027	0.017	0.037	0.643
Gender	0.178	0.331	0.112	0.003
Parent AUD	0.075	0.141	0.114	0.217
Race/Ethnicity	0.008	0.017	0.121	0.890
Impulsivity	-0.071	-0.115	0.163	0.480
Emotionality	0.221	0.245	0.107	0.022
Active coping	-0.213	-0.366	0.225	0.107
Cognitive coping	0.212	0.280	0.167	0.096
Avoidant coping	-0.030	-0.043	0.121	0.726
<i>T6 Alcohol use frequency regressed on...</i>				
Age	-0.016	-0.037	0.125	0.768
Gender	0.095	0.661	0.385	0.086
Parent AUD	0.060	0.420	0.388	0.279
Race/Ethnicity	0.056	0.431	0.409	0.292

Impulsivity	-0.055	-0.335	0.555	0.546
Emotionality	0.039	0.161	0.361	0.655
Active coping	-0.060	-0.388	0.720	0.602
Cognitive coping	0.064	0.315	0.563	0.577
Avoidant coping	-0.081	-0.437	0.409	0.288
Social/Enhancement motives	0.535	1.862	0.356	0.000
Coping motives	-0.240	-0.897	0.333	0.008
<i>T6 Alcohol use quantity regressed on...</i>				
Age	-0.023	-0.051	0.113	0.653
Gender	0.133	0.879	0.348	0.012
Parent AUD	0.139	0.918	0.351	0.009
Race/Ethnicity	0.111	0.808	0.369	0.029
Impulsivity	0.089	0.510	0.508	0.316
Emotionality	-0.030	-0.117	0.328	0.722
Active coping	-0.071	-0.432	0.669	0.519
Cognitive coping	-0.134	-0.624	0.507	0.221
Avoidant coping	-0.018	-0.091	0.369	0.806
Social/Enhancement motives	0.325	1.071	0.299	0.000
Coping motives	0.037	0.130	0.291	0.656
<i>T6 Alcohol use consequences regressed on...</i>				
Age	-0.020	-0.048	0.127	0.708
Gender	0.066	0.477	0.390	0.222
Parent AUD	0.061	0.441	0.394	0.264
Race/Ethnicity	0.034	0.272	0.415	0.513
Impulsivity	0.057	0.360	0.561	0.524
Emotionality	0.071	0.304	0.367	0.407
Active coping	-0.055	-0.366	0.749	0.626
Cognitive coping	0.092	0.470	0.564	0.406
Avoidant coping	-0.053	-0.298	0.414	0.472
Social/Enhancement motives	0.244	0.880	0.324	0.007
Coping motives	0.152	0.588	0.325	0.072

Note: Beta column indicates standardized regression coefficient, B indicates unstandardized estimates. Results are pooled from 20 multiply imputed datasets. T6 drinking results indicate age 30 drinking measures.

Table 7. Addition of coping to AP model, cross-lagged panel model

	Beta	B	SE	p
<i>T4 Emotionality regressed on...</i>				
Age	0.013	0.006	0.010	0.581
Gender	-0.071	-0.090	0.031	0.004
Parent AUD	0.038	0.049	0.031	0.120
Race/Ethnicity	0.043	0.060	0.035	0.081
T3 Emotionality	0.283	0.273	0.045	0.000
<i>T4 Impulsivity regressed on...</i>				
Age	-0.004	-0.002	0.009	0.846
Gender	0.053	0.062	0.026	0.018
Parent AUD	0.029	0.034	0.026	0.194
Race/Ethnicity	-0.017	-0.022	0.029	0.447
T3 Impulsivity	0.178	0.205	0.055	0.000
<i>T5 Emotionality regressed on...</i>				
Age	+	+	+	+
Gender	+	+	+	+
Parent AUD	+	+	+	+
Race/Ethnicity	+	+	+	+
T4 Emotionality	0.548	0.568	0.028	0.000
<i>T5 Impulsivity regressed on...</i>				
Age	+	+	+	+
Gender	+	+	+	+
Parent AUD	+	+	+	+
Race/Ethnicity	+	+	+	+
T4 Impulsivity	0.543	0.500	0.027	0.000
<i>T6 Emotionality regressed on...</i>				
Age	+	+	+	+
Gender	+	+	+	+
Parent AUD	+	+	+	+
Race/Ethnicity	+	+	+	+
T5 Emotionality	+	+	+	+
<i>T6 Impulsivity regressed on...</i>				
Age	+	+	+	+
Gender	+	+	+	+
Parent AUD	+	+	+	+
Race/Ethnicity	+	+	+	+
T5 Impulsivity	+	+	+	+
<i>T4 Avoidant Coping regressed on...</i>				
Age	-0.008	-0.002	0.007	0.734
Gender	0.034	0.031	0.022	0.161
Parent AUD	0.019	0.017	0.022	0.432
Race/Ethnicity	0.031	0.031	0.024	0.193
T3 Avoidant Coping	0.167	0.212	0.040	0.001
T3 Impulsivity	0.153	-0.005	0.049	0.006
T3 Emotionality	0.042	0.103	0.038	0.449
<i>T4 Active Coping regressed on...</i>				
Age	0.025	0.011	0.011	0.328
Gender	-0.008	-0.010	0.033	0.756
Parent AUD	-0.009	-0.012	0.033	0.725
Race/Ethnicity	-0.033	-0.046	0.037	0.218
T3 Active Coping	0.205	0.160	0.057	0.000
T3 Impulsivity	-0.082	-0.274	0.069	0.143
T3 Emotionality	-0.040	-0.040	0.053	0.471
<i>T5 Avoidant Coping regressed on...</i>				
Age	+	+	+	+
Gender	+	+	+	+
Parent AUD	+	+	+	+
Race/Ethnicity	+	+	+	+
T4 Avoidant Coping	+	+	+	+
T4 Impulsivity	-0.008	-0.005	0.041	0.894

T4 Emotionality	0.167	0.103	0.036	0.004
<i>T5 Active Coping regressed on...</i>				
Age	+	+	+	+
Gender	+	+	+	+
Parent AUD	+	+	+	+
Race/Ethnicity	+	+	+	+
T4 Active Coping	+	+	+	+
T4 Impulsivity	-0.288	-0.274	0.059	0.000
T4 Emotionality	-0.046	-0.040	0.051	0.428
<i>T6 Avoidant Coping regressed on...</i>				
Age	+	+	+	+
Gender	+	+	+	+
Parent AUD	+	+	+	+
Race/Ethnicity	+	+	+	+
T5 Avoidant Coping	+	+	+	+
T5 Impulsivity	0.094	0.056	0.033	0.092
T5 Emotionality	0.039	0.019	0.028	0.498
<i>T6 Active Coping regressed on...</i>				
Age	+	+	+	+
Gender	+	+	+	+
Parent AUD	+	+	+	+
Race/Ethnicity	+	+	+	+
T5 Active Coping	+	+	+	+
T5 Impulsivity	0.050	0.045	0.058	0.440
T5 Emotionality	-0.067	-0.049	0.047	0.292
<i>T4 Coping Motives regressed on...</i>				
Age	0.012	0.007	0.013	0.605
Gender	0.060	0.097	0.039	0.013
Parent AUD	0.014	0.023	0.040	0.557
Race/Ethnicity	-0.034	-0.062	0.043	0.156
T3 Coping Expectancies	0.251	0.225	0.038	0.000
T3 Active Coping	-0.076	-0.107	0.072	0.135
T3 Cognitive Coping	0.087	0.118	0.069	0.089
<i>T4 Social/Enhancement Motives regressed on...</i>				
Age	0.005	0.003	0.012	0.829
Gender	0.092	0.143	0.037	0.000
Parent AUD	0.028	0.043	0.038	0.251
Race/Ethnicity	-0.063	0.000	0.041	0.008
T3 Social/Enhancement Expectancies	0.239	0.283	0.051	0.000
T3 Active Coping	-0.038	-0.052	0.069	0.451
T3 Cognitive Coping	0.036	0.047	0.066	0.473
<i>T5 Coping Motives regressed on...</i>				
Age	+	+	+	+
Gender	+	+	+	+
Parent AUD	+	+	+	+
Race/Ethnicity	+	+	+	+
T4 Coping Motives	+	+	+	+
T4 Active Coping	0.027	0.035	0.065	0.590
T4 Cognitive Coping	0.028	0.050	0.089	0.573
<i>T5 Social/Enhancement Motives regressed on...</i>				
Age	+	+	+	+
Gender	+	+	+	+
Parent AUD	+	+	+	+
Race/Ethnicity	+	+	+	+
T4 Social/Enhancement Motives	+	+	+	+
T4 Active Coping	0.055	0.063	0.056	0.262
T4 Cognitive Coping	0.060	0.095	0.078	0.222
<i>T6 Coping Motives regressed on...</i>				
Age	+	+	+	+
Gender	+	+	+	+
Parent AUD	+	+	+	+
Race/Ethnicity	+	+	+	+

T5 Coping Motives	+	+	+	+
T5 Active Coping	0.078	0.094	0.054	0.080
T5 Cognitive Coping	-0.010	-0.018	0.079	0.823
<i>T6 Social/Enhancement Motives regressed on...</i>				
Age	+	+	+	+
Gender	+	+	+	+
Parent AUD	+	+	+	+
Race/Ethnicity	+	+	+	+
T5 Social/Enhancement Motives	+	+	+	+
T5 Active Coping	0.006	0.007	0.052	0.888
T5 Cognitive Coping	-0.032	-0.053	0.076	0.480
<i>T4 Alcohol Use Frequency regressed on...</i>				
Age	-0.003	-0.006	0.053	0.906
Gender	0.079	0.457	0.155	0.003
Parent AUD	0.064	0.369	0.156	0.018
Race/Ethnicity	-0.024	-0.152	0.170	0.371
T3 Alcohol Use Frequency	0.224	0.264	0.053	0.000
T3 Coping Expectancies	-0.065	-0.208	0.296	0.481
T3 Social/Enhancement Expectancies	0.093	0.407	0.416	0.328
<i>T4 Alcohol Use Quantity regressed on...</i>				
Age	-0.022	-0.054	0.055	0.327
Gender	0.114	0.806	0.165	0.000
Parent AUD	0.121	0.861	0.165	0.000
Race/Ethnicity	0.039	0.305	0.178	0.086
T3 Alcohol Use Quantity	0.170	0.202	0.056	0.000
T3 Coping Expectancies	-0.140	-0.552	0.362	0.127
T3 Social/Enhancement Expectancies	0.208	1.118	0.510	0.028
<i>T4 Alcohol Use Consequences regressed on...</i>				
Age	-0.015	-0.039	0.056	0.487
Gender	0.066	0.502	0.169	0.003
Parent AUD	0.099	0.758	0.170	0.000
Race/Ethnicity	-0.001	-0.012	0.183	0.949
T3 Alcohol Use Consequences	0.221	0.974	0.184	0.000
T3 Coping Expectancies	-0.074	-0.315	0.382	0.409
T3 Social/Enhancement Expectancies	0.101	0.918	0.526	0.081
<i>T5 Alcohol Use Frequency regressed on...</i>				
Age	+	+	+	+
Gender	+	+	+	+
Parent AUD	+	+	+	+
Race/Ethnicity	+	+	+	+
T4 Alcohol Use Frequency	0.436	0.472	0.047	0.000
T4 Coping Motives	-0.079	-0.304	0.253	0.230
T4 Social/Enhancement Motives	0.101	0.407	0.275	0.140
<i>T5 Alcohol Use Quantity regressed on...</i>				
Age	+	+	+	+
Gender	+	+	+	+
Parent AUD	+	+	+	+
Race/Ethnicity	+	+	+	+
T4 Alcohol Use Quantity	0.383	0.343	0.040	0.000
T4 Coping Motives	-0.035	-0.138	0.262	0.598
T4 Social/Enhancement Motives	0.152	0.620	0.292	0.033
<i>T5 Alcohol Use Consequences regressed on...</i>				
Age	+	+	+	+
Gender	+	+	+	+
Parent AUD	+	+	+	+
Race/Ethnicity	+	+	+	+
T4 Alcohol Use Consequences	0.459	0.352	0.036	0.459
T4 Coping Motives	-0.033	-0.120	0.236	-0.033
T4 Social/Enhancement Motives	0.108	0.406	0.258	0.108
<i>T6 Alcohol Use Frequency regressed on...</i>				
Age	+	+	+	+
Gender	+	+	+	+

Parent AUD	+	+	+	+
Race/Ethnicity	+	+	+	+
T5 Alcohol Use Frequency	0.562	0.585	0.043	0.000
T5 Coping Motives	-0.036	-0.145	0.237	0.541
T5 Social/Enhancement Motives	0.118	0.531	0.269	0.048
<i>T6 Alcohol Use Quantity regressed on...</i>				
Age	+	+	+	+
Gender	+	+	+	+
Parent AUD	+	+	+	+
Race/Ethnicity	+	+	+	+
T5 Alcohol Use Quantity	0.514	0.509	0.039	0.000
T5 Coping Motives	0.030	0.119	0.224	0.596
T5 Social/Enhancement Motives	0.097	0.423	0.257	0.100
<i>T6 Alcohol Use Consequences regressed on...</i>				
Age	+	+	+	+
Gender	+	+	+	+
Parent AUD	+	+	+	+
Race/Ethnicity	+	+	+	+
T5 Alcohol Use Consequences	0.465	0.551	0.052	0.000
T5 Coping Motives	0.050	0.217	0.258	0.400
T5 Social/Enhancement Motives	0.100	0.483	0.280	0.085

Note: + indicates estimate which was specified to be equal to a previously reported estimate. Covariate effects (age, gender, parent AUD, and race/ethnicity) were fixed to be equal for each endogenous variable across time points. Stability coefficients for all constructs other than alcohol use variables were also specified to be equal across time points. Beta column indicates standardized regression coefficient, B indicates unstandardized estimates. Models use a subset-item-parceling approach; latent factors are indicated by three item parcels each. T6 drinking results indicate age 30 drinking measures.

Table 8. Replication of AP model, age 25 and age 30 drinking.

	T5 Drinking				T6 Drinking			
	Beta	B	SE	p	Beta	B	SE	p
<i>T3 Impulsivity regressed on...</i>								
Age	0.129	0.052	0.026	0.047	0.130	0.052	0.026	0.046
Gender	0.010	0.012	0.076	0.878	0.010	0.012	0.076	0.876
Parent AUD	0.179	0.213	0.081	0.009	0.180	0.212	0.081	0.009
Race/Ethnicity	-0.046	-0.060	0.085	0.479	-0.046	-0.060	0.084	0.481
<i>T3 Emotionality regressed on...</i>								
Age	0.079	0.045	0.033	0.177	0.079	0.045	0.033	0.177
Gender	-0.124	-0.206	0.097	0.034	-0.124	-0.206	0.097	0.035
Parent AUD	0.204	0.339	0.099	0.001	0.204	0.340	0.099	0.001
Race/Ethnicity	-0.035	-0.064	0.108	0.553	-0.035	-0.064	0.108	0.551
<i>T4 Social/Enhancement motives regressed on...</i>								
Age	-0.026	-0.016	0.034	0.643	-0.026	-0.016	0.034	0.642
Gender	0.136	0.244	0.101	0.016	0.135	0.244	0.101	0.016
Parent AUD	0.085	0.153	0.103	0.137	0.085	0.153	0.103	0.137
Race/Ethnicity	-0.019	-0.038	0.110	0.731	-0.019	-0.037	0.110	0.774
Impulsivity	-0.003	-0.005	0.135	0.972	-0.003	-0.005	0.136	0.972
Emotionality	0.242	0.263	0.093	0.005	0.242	0.262	0.093	0.005
<i>T4 Coping motives regressed on...</i>								
Age	0.112	0.077	0.038	0.042	0.112	0.077	0.038	0.042
Gender	0.270	0.544	0.114	0.000	0.271	0.547	0.114	0.000
Parent AUD	0.104	0.209	0.113	0.065	0.103	0.209	0.113	0.066
Race/Ethnicity	0.032	0.072	0.121	0.555	0.032	0.071	0.121	0.561
Impulsivity	0.127	0.215	0.151	0.153	0.126	0.216	0.152	0.157
Emotionality	0.143	0.174	0.101	0.085	0.144	0.175	0.101	0.084
<i>Alcohol use frequency regressed on...</i>								
Age	-0.118	-0.259	0.116	0.026	-0.073	-0.173	0.127	0.173
Gender	0.051	0.330	0.354	0.352	0.097	0.676	0.387	0.081
Parent AUD	0.066	0.431	0.342	0.209	0.102	0.712	0.374	0.058
Race/Ethnicity	-0.038	-0.273	0.367	0.456	-0.017	-0.128	0.401	0.750
Social/Enhancement motives	0.477	1.531	0.336	0.000	0.329	1.133	0.353	0.001
Coping motives	-0.273	-0.983	0.345	0.005	-0.208	-0.804	0.371	0.031
Impulsivity	0.049	0.268	0.468	0.568	-0.052	-0.305	0.507	0.548
Emotionality	-0.023	-0.088	0.310	0.776	0.058	0.245	0.339	0.470
<i>Alcohol use quantity regressed on...</i>								
Age	-0.096	-0.219	0.115	0.057	-0.083	-0.188	0.116	0.106
Gender	0.124	0.837	0.351	0.017	0.148	0.982	0.354	0.006
Parent AUD	0.189	1.275	0.339	0.000	0.184	1.227	0.342	0.000
Race/Ethnicity	0.048	0.355	0.363	0.329	0.088	0.646	0.367	0.078
Social/Enhancement motives	0.416	1.393	0.328	0.000	0.354	1.164	0.328	0.001
Coping motives	-0.195	-0.730	0.338	0.031	-0.249	-0.919	0.342	0.008
Impulsivity	0.117	0.667	0.461	0.148	0.037	0.210	0.468	0.655
Emotionality	0.005	0.022	0.307	0.943	0.071	0.285	0.310	0.359
<i>Alcohol use consequences regressed on...</i>								
Age	-0.061	-0.129	0.108	0.235	-0.068	-0.169	0.130	0.194
Gender	0.105	0.650	0.330	0.049	0.063	0.458	0.396	0.248
Parent AUD	0.175	1.083	0.319	0.001	0.081	0.588	0.383	0.125
Race/Ethnicity	0.006	0.038	0.342	0.912	-0.003	-0.025	0.411	0.951
Social/Enhancement motives	0.337	1.035	0.302	0.001	0.317	1.141	0.361	0.002
Coping motives	-0.116	-0.399	0.315	0.207	-0.082	-0.332	0.378	0.381
Impulsivity	0.060	0.315	0.431	0.466	0.053	0.327	0.520	0.529
Emotionality	0.017	0.065	0.289	0.823	0.081	0.353	0.346	0.308

Note: Beta column indicates standardized regression coefficient, B indicates unstandardized estimates. Results are pooled from 20 multiply imputed datasets. T5 Drinking results indicate age 25 drinking measures; T6 drinking results indicate age 30 drinking measures.

Table 9. Exploratory model, coping as a ratio score

	T6 Drinking			
	Beta	B	SE	p
<i>Impulsivity regressed on...</i>				
Age	0.119	0.048	0.027	0.075
Gender	0.002	0.003	0.077	0.970
Parent AUD	0.176	0.208	0.080	0.009
Race/Ethnicity	-0.042	-0.054	0.086	0.527
<i>Emotionality regressed on...</i>				
Age	0.073	0.042	0.034	0.217
Gender	-0.113	-0.190	0.100	0.056
Parent AUD	0.203	0.343	0.102	0.001
Race/Ethnicity	-0.029	-0.053	0.111	0.630
<i>Avoidant coping ratio regressed on...</i>				
Age	-0.114	-0.451	0.206	0.029
Gender	-0.123	-1.424	0.607	0.020
Parent AUD	0.088	1.019	0.622	0.103
Race/Ethnicity	0.113	1.458	0.668	0.029
Impulsivity	0.061	0.598	0.842	0.478
Emotionality	0.129	0.889	0.545	0.104
<i>Social/Enhancement motives regressed on...</i>				
Age	-0.009	-0.006	0.040	0.872
Gender	0.190	0.379	0.116	0.001
Parent AUD	0.164	0.328	0.119	0.006
Race/Ethnicity	-0.096	-0.211	0.127	0.097
Impulsivity	0.096	0.162	0.159	0.308
Emotionality	0.109	0.129	0.104	0.215
Avoidant coping ratio	-0.004	-0.001	0.010	0.947
<i>Coping motives regressed on...</i>				
Age	0.018	0.012	0.037	0.753
Gender	0.159	0.310	0.109	0.005
Parent AUD	0.083	0.162	0.111	0.146
Race/Ethnicity	-0.009	-0.019	0.119	0.871
Impulsivity	-0.029	-0.048	0.148	0.743
Emotionality	0.151	0.174	0.097	0.075
Avoidant coping ratio	0.101	0.017	0.010	0.081
<i>Alcohol use frequency regressed on...</i>				
Age	-0.024	-0.058	0.121	0.634
Gender	0.082	0.568	0.364	0.118
Parent AUD	0.060	0.415	8.000	0.260
Race/Ethnicity	0.056	0.432	0.394	0.273
Impulsivity	-0.047	-0.279	0.489	0.568
Emotionality	0.028	0.115	0.320	0.718
Avoidant coping ratio	-0.052	-0.031	0.032	0.329
Social/Enhancement motives	0.520	1.816	0.323	0.000
Coping motives	-0.214	-0.764	0.281	0.007
<i>Alcohol use quantity regressed on...</i>				
Age	-0.025	-0.057	0.110	0.606
Gender	0.153	1.011	0.332	0.002
Parent AUD	0.149	0.989	0.336	0.003
Race/Ethnicity	0.114	0.833	0.360	0.021
Impulsivity	0.056	0.312	0.450	0.489
Emotionality	0.016	0.062	0.293	0.833
Avoidant coping ratio	0.062	0.035	0.029	0.222
Social/Enhancement motives	0.308	1.020	0.275	0.000
Coping motives	0.035	0.119	0.250	0.635
<i>Alcohol use consequences regressed on...</i>				
Age	-0.025	-0.061	0.123	0.617
Gender	0.054	0.392	0.370	0.290
Parent AUD	0.058	0.416	0.375	0.267
Race/Ethnicity	0.032	0.259	0.401	0.518

Impulsivity	0.063	0.386	0.499	0.439
Emotionality	0.065	0.277	0.326	0.395
Avoidant coping ratio	-0.049	-0.030	0.032	0.352
Social/Enhancement motives	0.250	0.902	0.296	0.003
Coping motives	0.157	0.582	0.277	0.037

*Note: Beta column indicates standardized regression coefficient, B indicates unstandardized estimates.
Results are pooled from 20 multiply imputed datasets. T6 drinking results indicate age 30 drinking measures.*

Table 10. Exploratory model, coping replacing motives, age 25 and age 30 drinking

	T5 Drinking				T6 Drinking			
	Beta	B	SE	p	Beta	B	SE	p
<i>Impulsivity regressed on...</i>								
Age	0.119	0.047	0.026	0.071	0.119	0.046	0.026	0.070
Gender	0.001	0.002	0.074	0.982	0.001	0.001	0.074	0.984
Parent AUD	0.176	0.204	0.077	0.008	0.176	0.203	0.077	0.008
Race/Ethnicity	-0.040	-0.051	0.083	0.536	-0.040	-0.051	0.082	0.540
<i>Emotionality regressed on...</i>								
Age	0.077	0.044	0.033	0.187	0.077	0.044	0.033	0.186
Gender	-0.116	-0.194	0.098	0.047	-0.116	-0.194	0.098	0.048
Parent AUD	0.200	0.336	0.100	0.001	0.201	0.337	0.100	0.001
Race/Ethnicity	-0.031	-0.057	0.109	0.602	-0.031	-0.057	0.109	0.599
<i>Active coping regressed on...</i>								
Age	0.095	0.035	0.024	0.146	0.096	0.035	0.024	0.145
Gender	0.039	0.042	0.070	0.545	0.040	0.043	0.071	0.539
Parent AUD	-0.144	-0.155	0.073	0.034	-0.143	-0.156	0.073	0.035
Race/Ethnicity	-0.029	-0.034	0.077	0.656	-0.029	-0.035	0.078	0.648
Impulsivity	-0.026	-0.024	0.098	0.804	-0.026	-0.025	0.100	0.806
Emotionality	-0.074	-0.048	0.063	0.450	-0.074	-0.048	0.063	0.450
<i>Cognitive coping regressed on...</i>								
Age	0.019	0.009	0.031	0.766	0.019	0.009	0.031	0.765
Gender	-0.066	-0.094	0.091	0.305	-0.066	-0.094	0.091	0.303
Parent AUD	-0.050	-0.071	0.094	0.449	-0.049	-0.070	0.093	0.452
Race/Ethnicity	-0.074	-0.116	0.101	0.251	-0.074	-0.116	0.100	0.248
Impulsivity	0.190	0.235	0.131	0.076	0.190	0.235	0.132	0.077
Emotionality	-0.290	-0.247	0.086	0.004	-0.290	-0.245	0.085	0.004
<i>Avoidant coping regressed on...</i>								
Age	-0.056	-0.024	0.026	0.353	-0.055	-0.024	0.026	0.353
Gender	-0.043	-0.055	0.078	0.479	-0.043	-0.055	0.077	0.478
Parent AUD	0.126	0.164	0.080	0.041	0.126	0.162	0.079	0.041
Race/Ethnicity	0.043	0.062	0.086	0.467	0.042	0.061	0.085	0.476
Impulsivity	0.189	0.212	0.114	0.064	0.191	0.214	0.115	0.063
Emotionality	-0.048	-0.037	0.070	0.592	-0.049	-0.038	0.069	0.586
<i>Alcohol use frequency regressed on...</i>								
Age	-0.061	-0.134	0.117	0.252	-0.030	-0.070	0.125	0.576
Gender	0.136	0.875	0.346	0.012	0.161	1.116	0.373	0.003
Parent AUD	0.105	0.675	0.354	0.057	0.135	0.938	0.382	0.014
Race/Ethnicity	0.003	0.024	0.378	0.949	0.012	0.092	0.407	0.821
Impulsivity	0.132	0.733	0.508	0.149	0.011	0.069	0.540	0.898
Emotionality	-0.013	-0.050	0.327	0.879	0.059	0.245	0.352	0.486
Active coping	-0.001	-0.006	0.672	0.993	-0.061	-0.388	0.723	0.592
Cognitive coping	0.094	0.426	0.503	0.398	0.107	0.522	0.548	0.341
Avoidant coping	-0.097	-0.483	0.374	0.198	-0.133	-0.718	0.407	0.079
<i>Alcohol use quantity regressed on...</i>								
Age	-0.025	-0.057	0.115	0.623	-0.026	-0.059	0.114	0.607
Gender	0.212	1.421	0.342	0.000	0.206	1.359	0.338	0.000
Parent AUD	0.195	1.309	0.350	0.000	0.198	1.306	0.346	0.000
Race/Ethnicity	0.061	0.456	0.374	0.222	0.086	0.628	0.369	0.089
Impulsivity	0.153	0.884	0.502	0.078	0.116	0.667	0.500	0.183
Emotionality	0.012	0.050	0.324	0.878	0.023	0.092	0.320	0.774
Active coping	-0.119	-0.739	0.678	0.277	-0.111	-0.677	0.654	0.302
Cognitive coping	0.022	0.105	0.503	0.833	-0.067	-0.311	0.489	0.526
Avoidant coping	0.073	0.377	0.374	0.310	-0.056	-0.287	0.367	0.436
<i>Alcohol use consequences regressed on...</i>								
Age	-0.013	-0.027	0.108	0.800	-0.019	-0.046	0.130	0.724
Gender	0.194	1.182	0.321	0.000	0.143	1.029	0.386	0.008
Parent AUD	0.192	1.174	0.328	0.000	0.115	0.830	0.395	0.036
Race/Ethnicity	0.019	0.130	0.350	0.710	0.016	0.128	0.421	0.761
Impulsivity	0.080	0.423	0.463	0.361	0.069	0.433	0.561	0.441
Emotionality	0.067	0.246	0.303	0.418	0.138	0.594	0.365	0.103

Active coping	-0.123	-0.700	0.645	0.280	-0.111	-0.738	0.747	0.324
Cognitive coping	0.111	0.477	0.474	0.317	0.169	0.856	0.561	0.128
Avoidant coping	-0.021	-0.100	0.349	0.775	-0.086	-0.483	0.418	0.249

Note: Beta column indicates standardized regression coefficient, B indicates unstandardized estimates. Results are pooled from 20 multiply imputed datasets. T5 Drinking results indicate age 25 drinking measures; T6 drinking results indicate age 30 drinking measures.

Table 11. Aim 2 growth models tested.

Model	Description	Terms Added	AIC	BIC	Comparison with Previous Model
Model 2.1	Unconditional model: Fixed linear time, Random intercept	Time, Random intercept	6424	6447	
Model 2.2	Unconditional model: Random slope	Random effect for Time	6373	6409	$X^2(2) = 54.4, p < .001$
Model 2.3	Unconditional model: Fixed quadratic time	Fixed effect of Time ²	6326	6367	$X^2(1) = 49.8, p < .001$
Model 2.4	Unconditional model: Random quadratic slope	Random effect for Time ²	6299	6358	$X^2(3) = 32.5, p < .001$
Model 2.5	Covariate model	Sex, Parental alcohol use disorder, Race/ethnicity	6294	6364	$X^2(2) = 9.0, p = .011$
Model 2.6	Avoidant Coping on Intercept	Avoidant coping predicting Intercept	6292	6368	$X^2(1) = 3.7, p = .055$
Model 2.7	Avoidant Coping on Time	Avoidant coping predicting effect of Time	6292	6373	$X^2(1) = 3.0, p = .086$
Model 2.8	Avoidant Coping on Time ²	Avoidant coping predicting effect of Time ²	6293	6380	$X^2(1) = 0.7, p = .395$

Note: AIC = Akaike's information criterion, BIC = Bayesian information criterion.

Table 12. Aim 3 growth models tested.

Model	Description	Terms Added	AIC	BIC	Comparison with Previous Model
Model 3.1	First Drink on DTCC Trajectories (Intercept, Slope) and Interactions with Avoidant Coping	Age at First Drink predicting Intercept, Slope, Age at First Drink * Avoidant Coping predicting Intercept, Slope	5891	5989	$X^2(2) = 3.4, p = .183$
Model 3.2	First Drink on DTCC Trajectories (Intercept, Slope) and Interactions with Avoidant Coping	Peer Use (centered within-person) as a time-varying covariate; Peer Use (person-mean) predicting Intercept, Slope	5814	5929	$X^2(3) = 82.9, p < .001$
Model 3.3	First Drink on DTCC Trajectories (Intercept, Slope) and Interactions with Avoidant Coping	Peer Use (centered within-person) as a time-varying covariate; Peer Use (person-mean) predicting Intercept, Slope	5816	5955	$X^2(4) = 5.7, p = .222$

Note: Model 3.1 compared with model 2.6. AIC = Akaike's information criterion, BIC = Bayesian information criterion.

Table 13. Unconditional growth models for trajectories of drinking to cope cognitions.

	β	B	SE	p
Level-1 Predictors				
(Intercept)		0.012	0.039	0.756
Time	0.152	0.119	0.010	0.000
Time²	-0.004	-0.003	0.001	0.000
Random Effects				
	σ			
Intercept	0.667			
Slope	0.109			
Quadratic	0.004			
Intercept-slope covariance	-0.634			
Intercept-quadratic covariance	0.553			
Slope-quadratic covariance	-0.995			
Residual	0.699			

Note. β denotes standardized coefficient. β values are standardized with respect to either between-person variation in drinking to cope or within-person variation in drinking to cope, depending on the level of the predictor. Time (measured in years) was standardized with respect to the outcome only in order to maintain interpretability.

Table 14. Direct effects of avoidant coping on trajectories of drinking to cope cognitions (Aim 2) and the moderating effect of drinking behavior on the effect of avoidant coping on trajectories of drinking to cope cognitions (Aim 3).

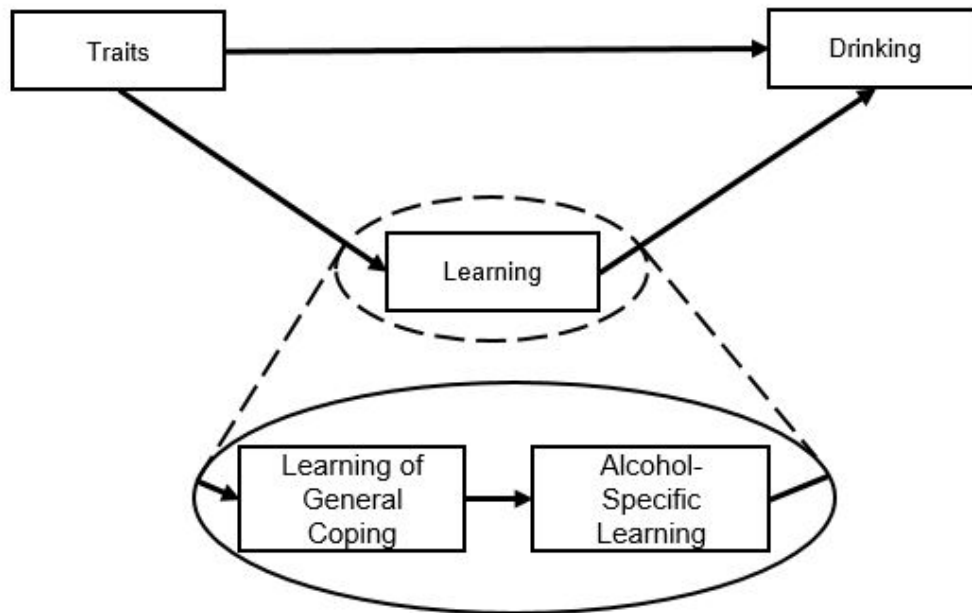
	Aim 2				Aim 3			
	β	B	SE	p	β	B	SE	p
Level-1 Predictors								
(Intercept)		-0.112	0.058	0.053		-0.013	0.059	0.821
Time	0.154	0.120	0.010	0.000	0.117	0.091	0.011	0.000
Time²	-0.005	-0.004	0.001	0.000	-0.003	-0.002	0.001	0.000
Peer alcohol use (CWP)					0.165	0.112	0.015	0.000
Level-2 Predictors								
Predictors of Intercept								
Sex	0.137	0.079	0.053	0.134	-0.023	0.015	0.053	0.779
Parental AUD diagnosis	0.210	0.121	0.053	0.024	0.117	0.067	0.055	0.229
Race/Ethnicity	0.082	0.047	0.059	0.430	0.059	0.034	0.059	0.565
Trait avoidant coping	0.141	0.081	0.035	0.020	0.150	0.086	0.037	0.020
Age at first drink					0.001	0.001	0.006	0.869
Peer alcohol use (PM)					0.350	0.239	0.043	0.000
Trait avoidant coping x Age at first drink						-0.008	0.007	0.219
Trait avoidant coping x Peer alcohol use (PM)						0.033	0.045	0.464
Predictors of Linear Slope								
Trait avoidant coping	-0.009	-0.005	0.003	0.108	-0.005	-0.004	0.003	0.208
Age at first drink					0.001	0.001	0.000	0.288
Peer alcohol use (PM)					-0.008	-0.007	0.004	0.049
Trait avoidant coping x Age at first drink						0.000	0.001	0.958
Trait avoidant coping x Peer alcohol use (PM)						0.001	0.004	0.795
Random Effects								
	σ				σ			
Intercept	0.655				0.604			
Slope	0.110				0.100			
Quadratic	0.004				0.004			
Intercept-slope covariance	-0.639				-0.621			
Intercept-quadratic covariance	0.563				0.549			
Slope-quadratic covariance	-0.995				-0.996			
Residual	0.698				0.695			

Note. Intercept is calculated relative to DTC expectancies centered at TI ($M = 1.91$). CWP = centered within-person; PM = person-mean. β denotes standardized coefficient. β values are standardized with respect to either between-person variation in drinking to cope or within-person variation in drinking to cope, depending on the level of the predictor. Time (measured in years), Sex, and Parental AUD diagnosis were standardized with respect to the outcome only in order to maintain interpretability. Interaction effects were not standardized due to limited interpretability of standardized interaction effects.

Figures

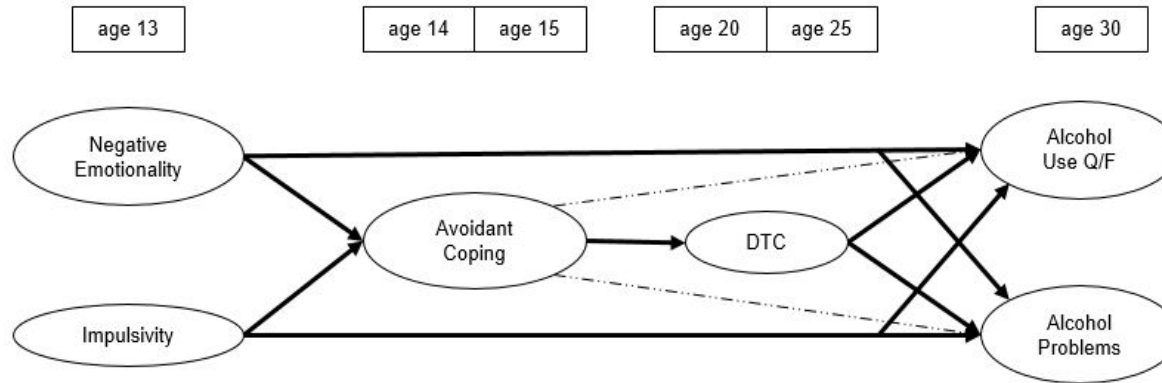
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Figure 1. Conceptual model of proposed extension to Acquired Preparedness model.



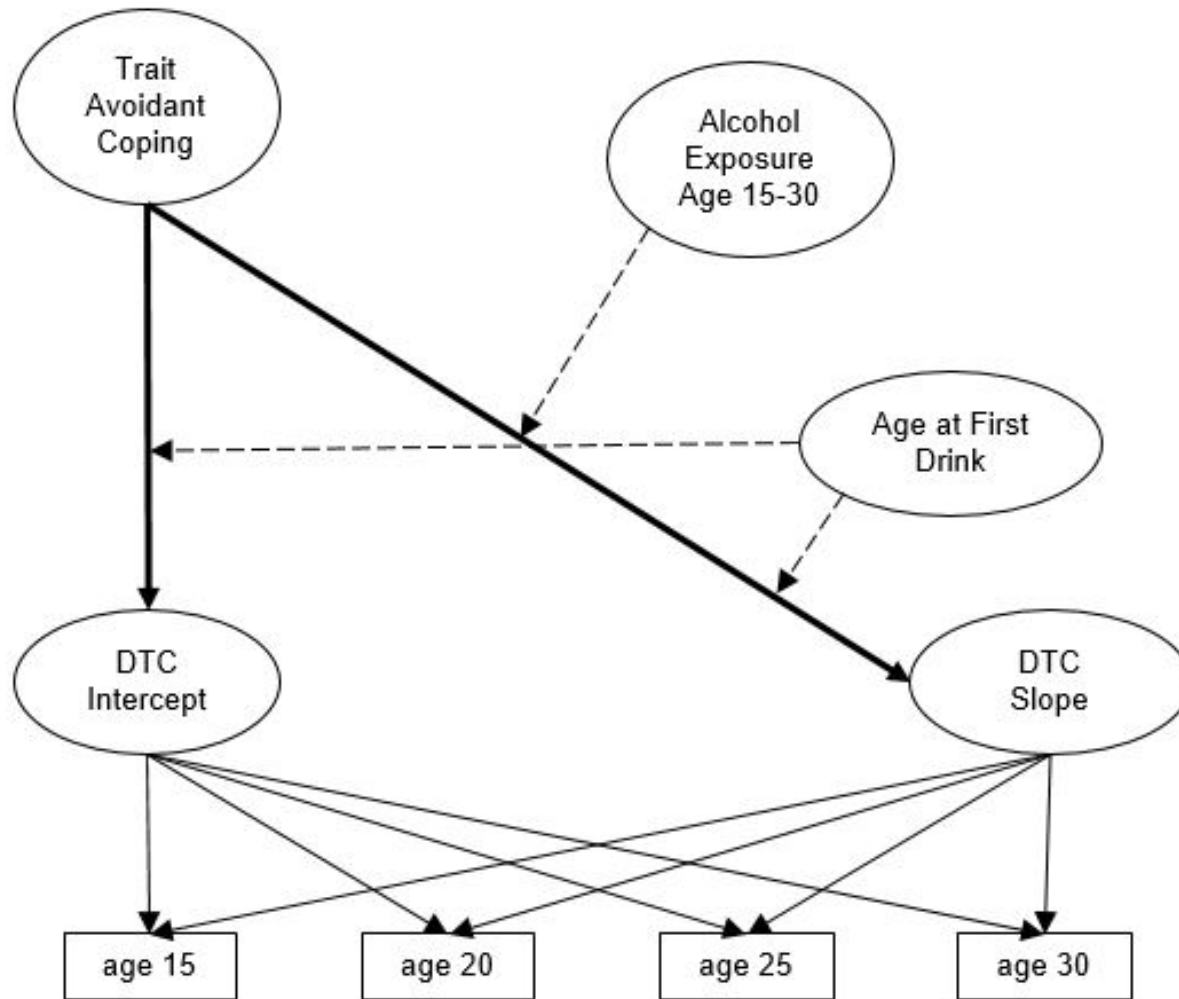
Note: Magnified area indicates explication of learning mechanisms, first through general coping-related learning, and eventually through alcohol-specific learning.

Figure 2. Proposed Aim 1 longitudinal structural equation model.



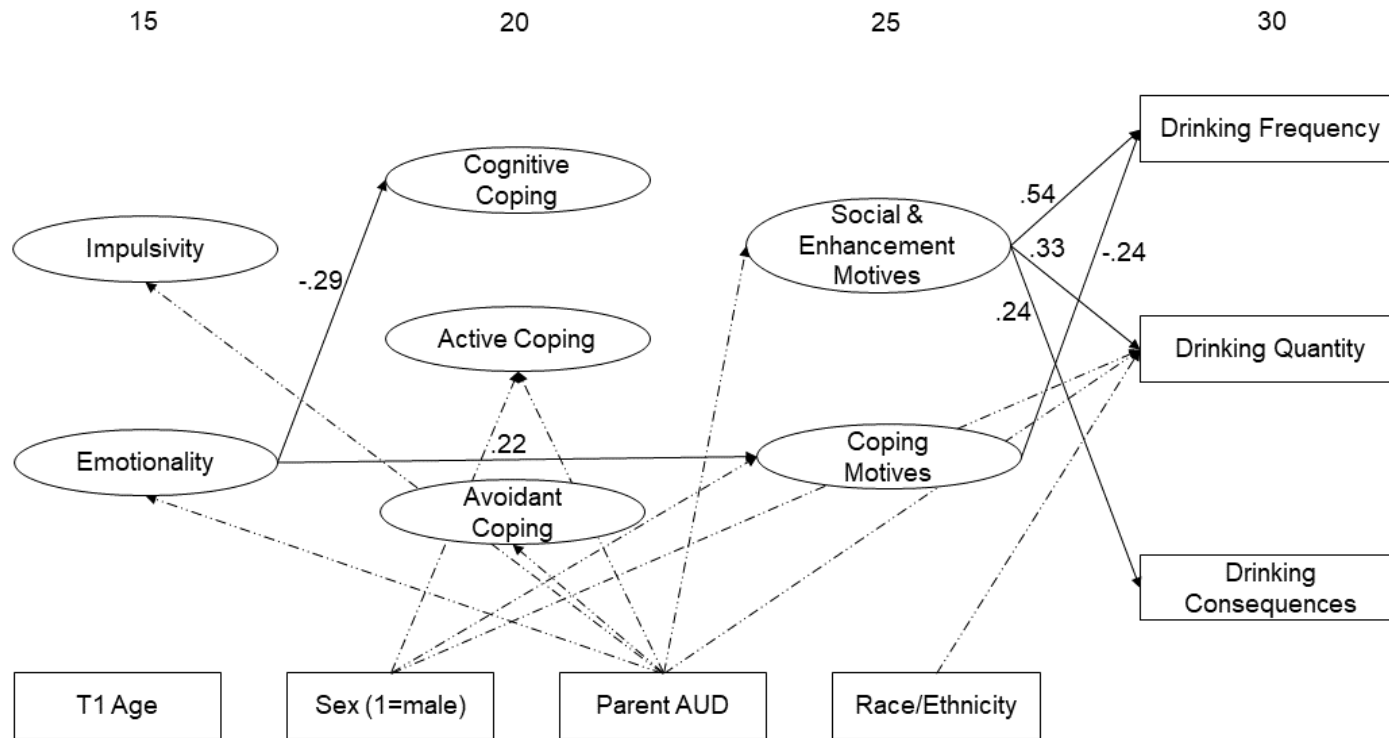
Note: Aim 1 hypotheses indicated by bolded lines; dashed lines indicate a priori model respecifications in the case of a poorly-fitting model.

Figure 3. Proposed Aim 2 and Aim 3 latent growth curve models.



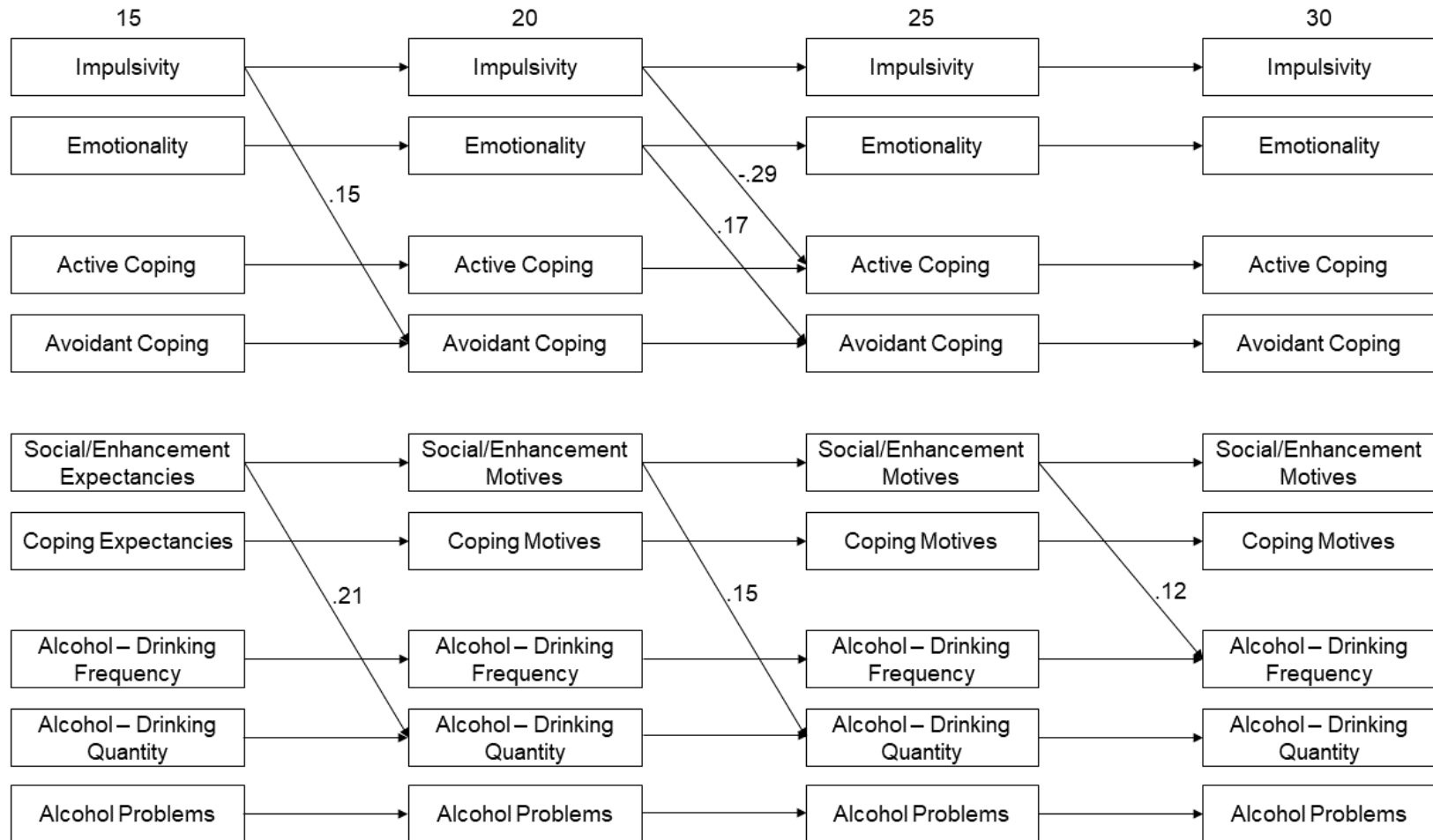
Note: Aim 2 hypotheses indicated by bolded lines; Aim 3 hypotheses indicated by dashed lines.

Figure 4. Addition of coping to AP model, serial mediation model



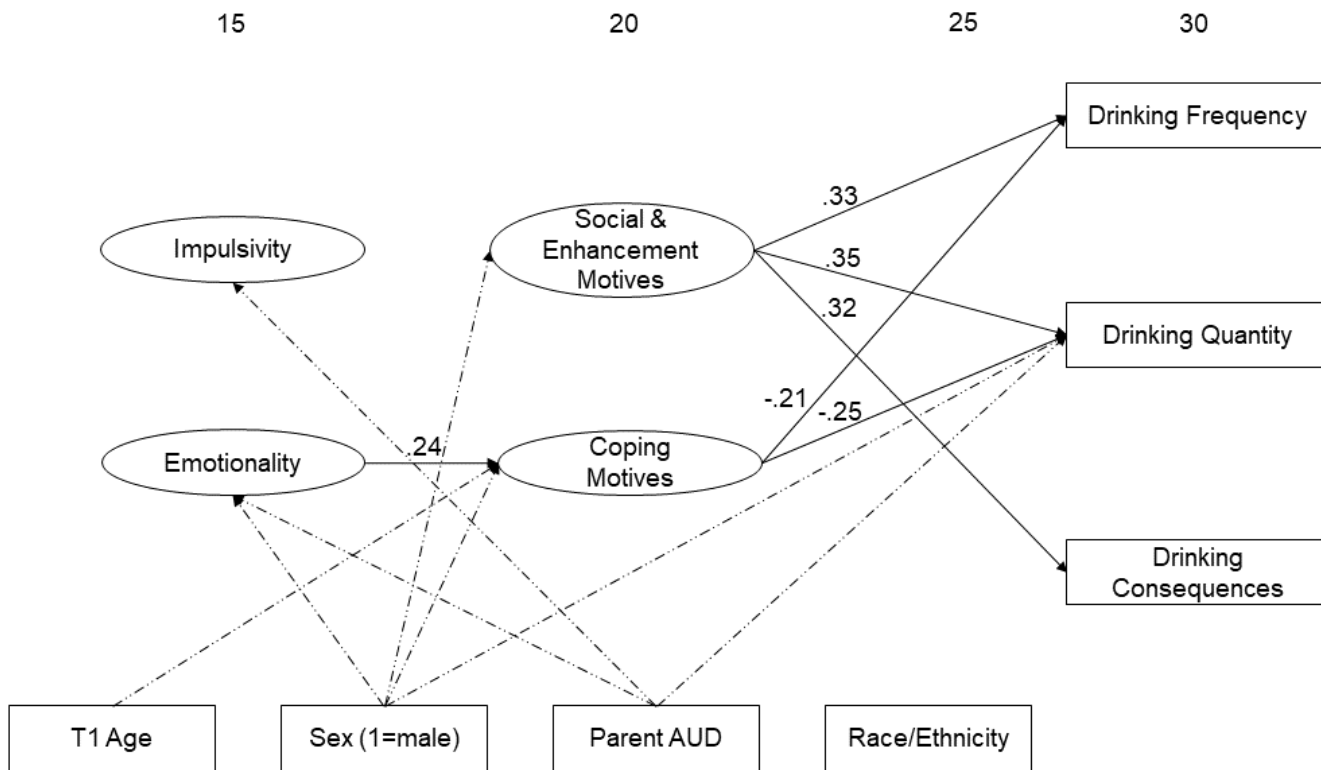
Note. All statistically significant paths ($p < .05$ for regression weight) displayed; non-significant paths and covariate relations omitted for readability. Statistically significant relations between control covariates and endogenous variables shown with dashed lines. See Table 6 for all model estimates.

Figure 5. Addition of coping to AP model, cross-lagged panel model



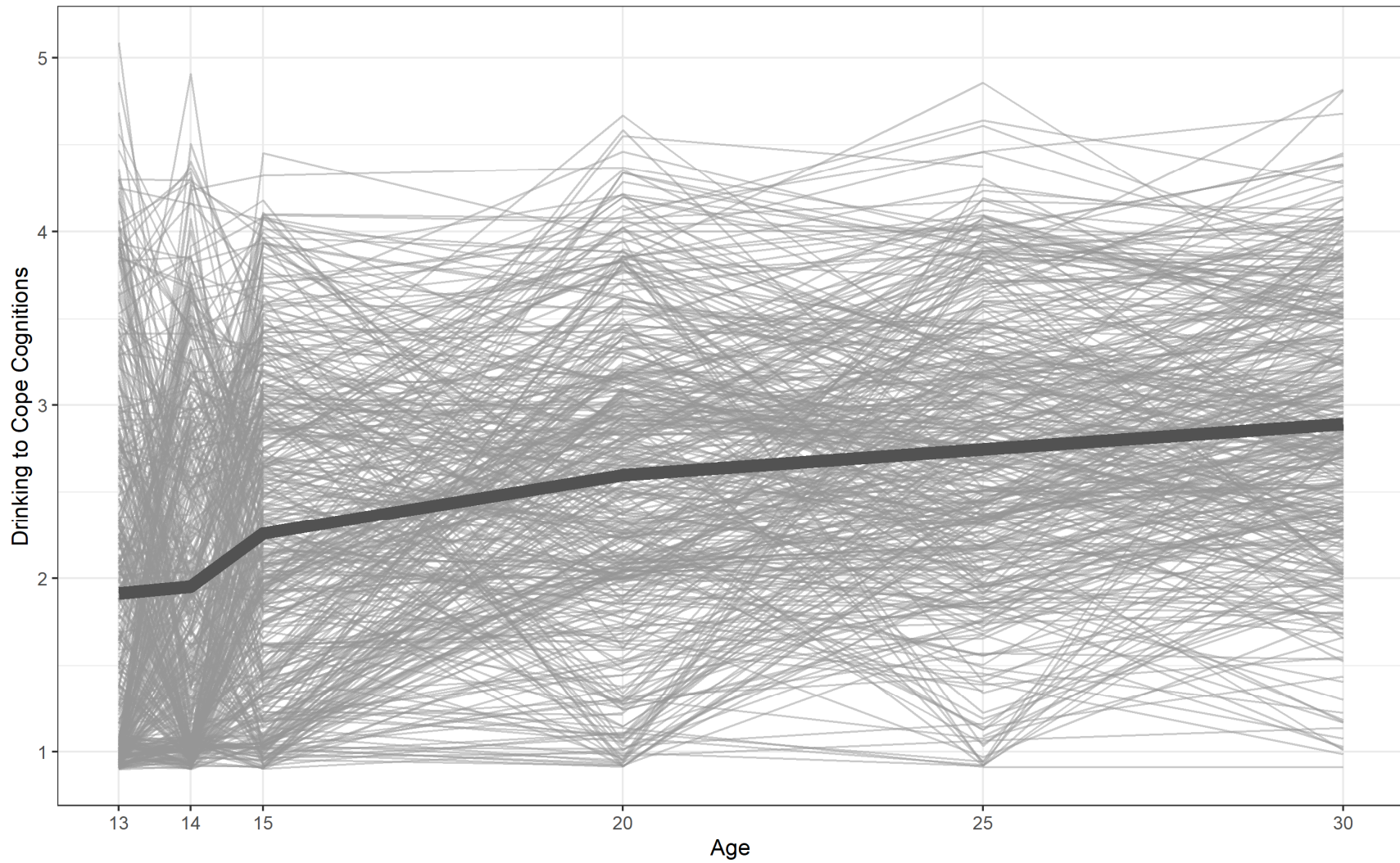
Note. All statistically significant paths ($p < .05$ for regression weight) displayed; non-significant paths omitted for readability. Model specification included all lagged paths in the proposed causal direction (from top of figure to bottom of figure). Stability coefficients and covariates omitted for readability. See Table 7 for all model estimates.

Figure 7. Replication of AP model, age 30 drinking



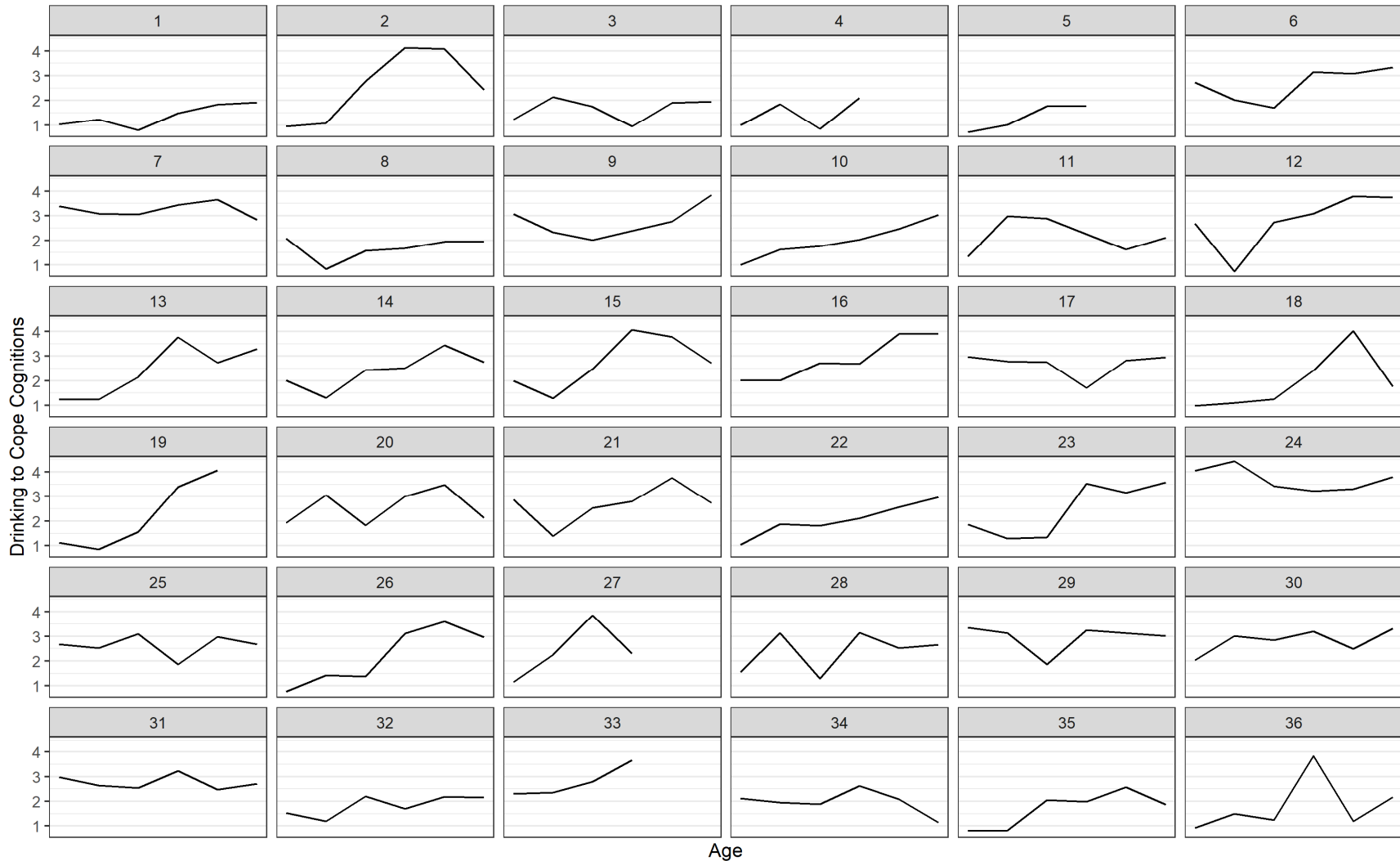
Note. All statistically significant paths ($p < .05$ for regression weight) displayed; non-significant paths and covariate relations omitted for readability. Statistically significant relations between control covariates and endogenous variables shown with dashed lines. See Table 8 for all model estimates.

Figure 8. Trajectories of drinking to cope cognitions: mean trajectory overlaid on individual trajectories.



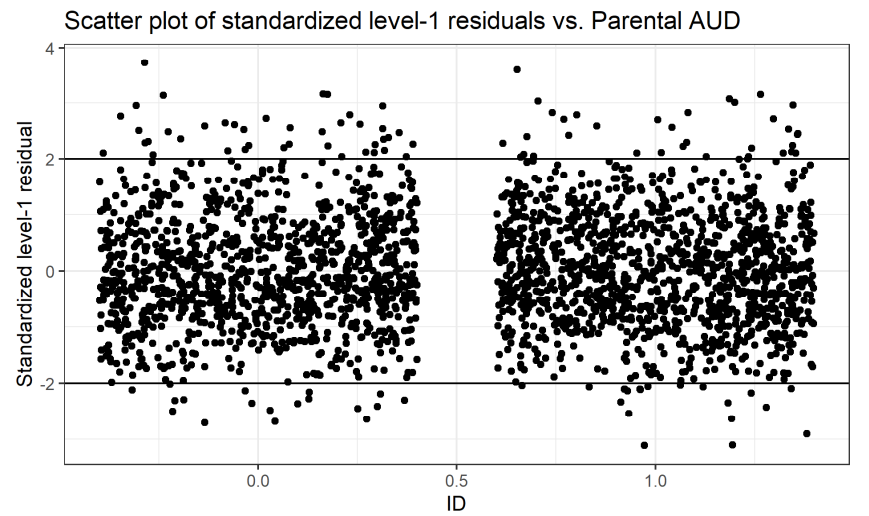
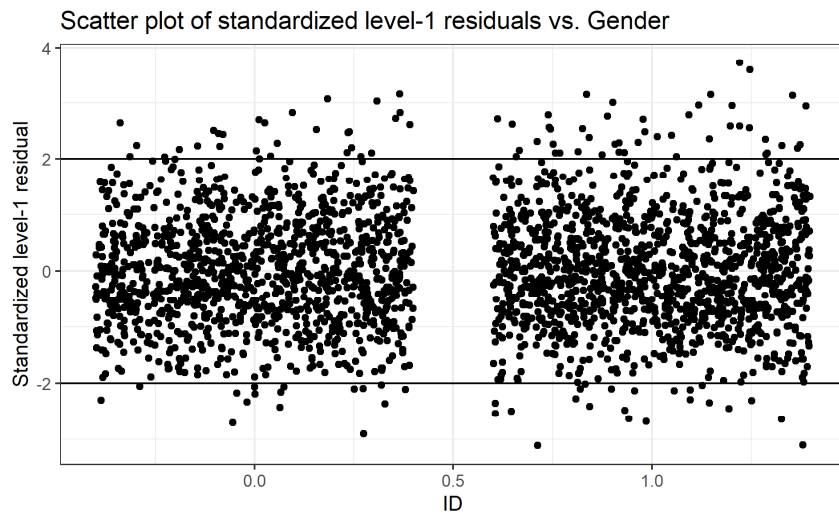
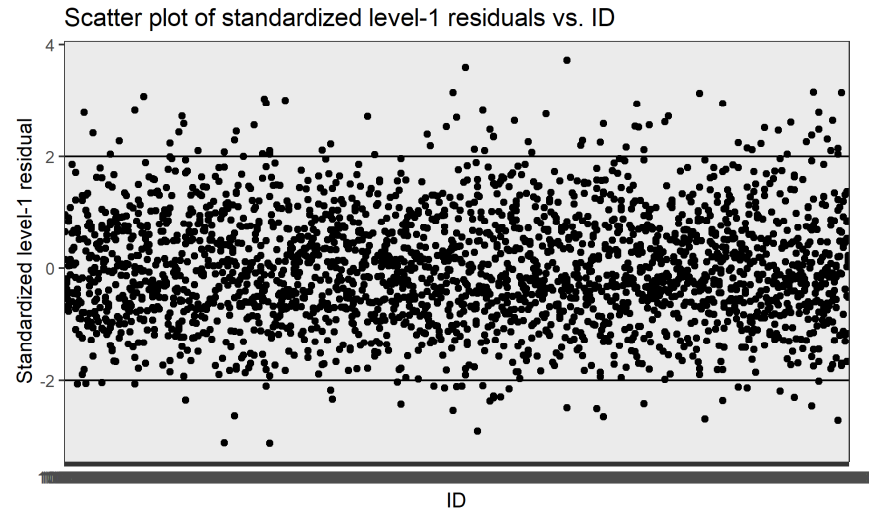
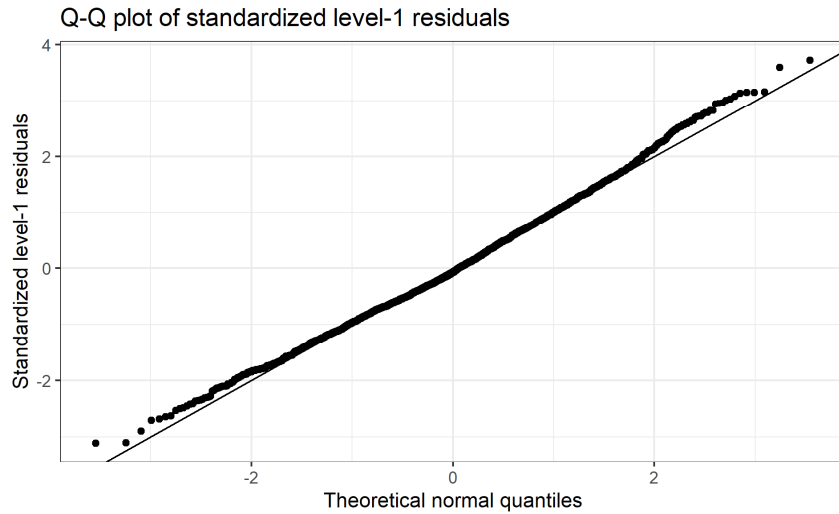
Note. Bold line shows mean trajectory across all participants; narrow lines show individual trajectories.

Figure 9. Trajectories of drinking to cope cognitions: random sample of 36 participants' individual trajectories.



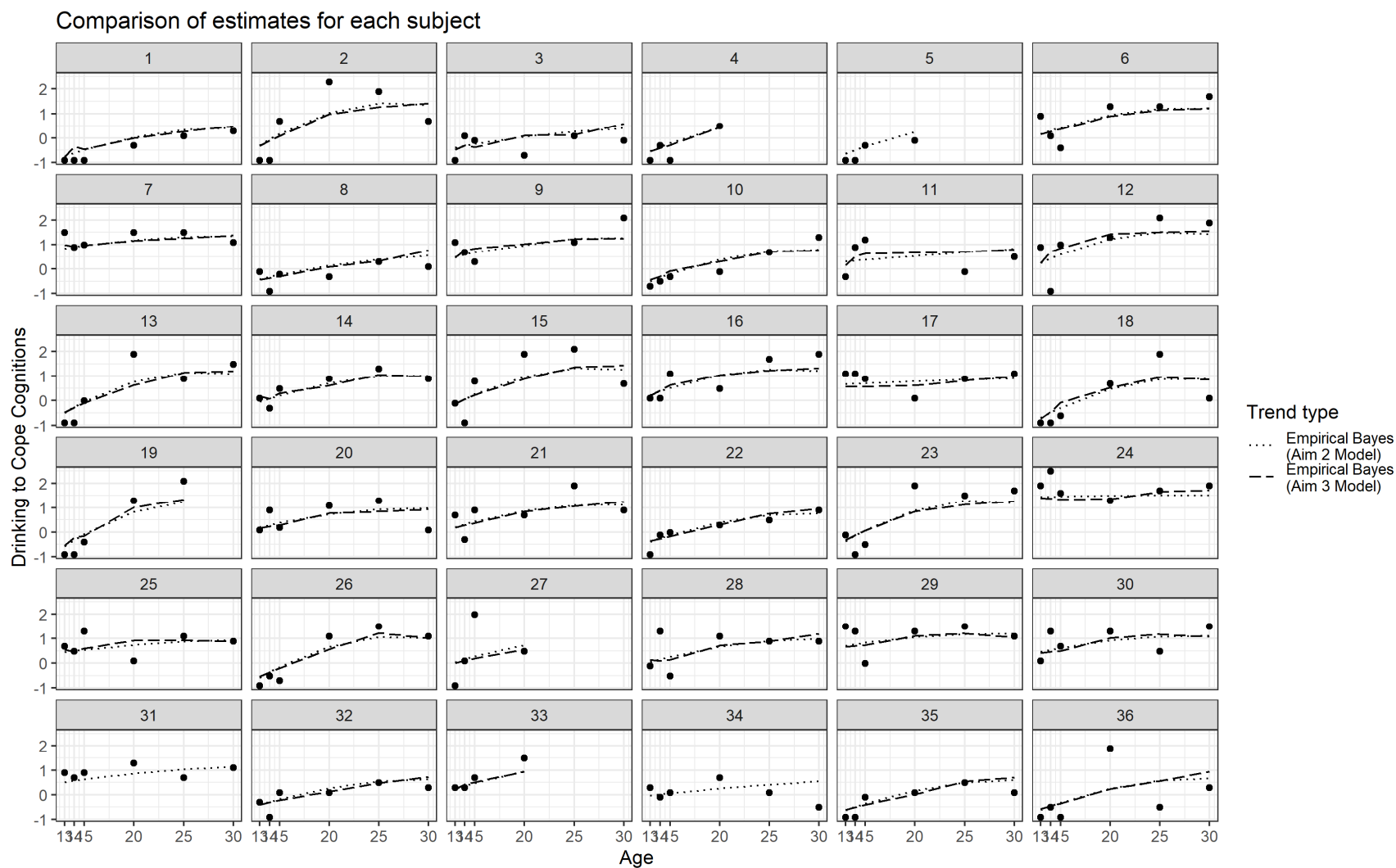
Note: Raw drinking to cope cognition trajectories for 36 randomly-selected individuals from age 13 to age 30.

Figure 10. Diagnostic plots for Aim 2 model (Model 2.6)



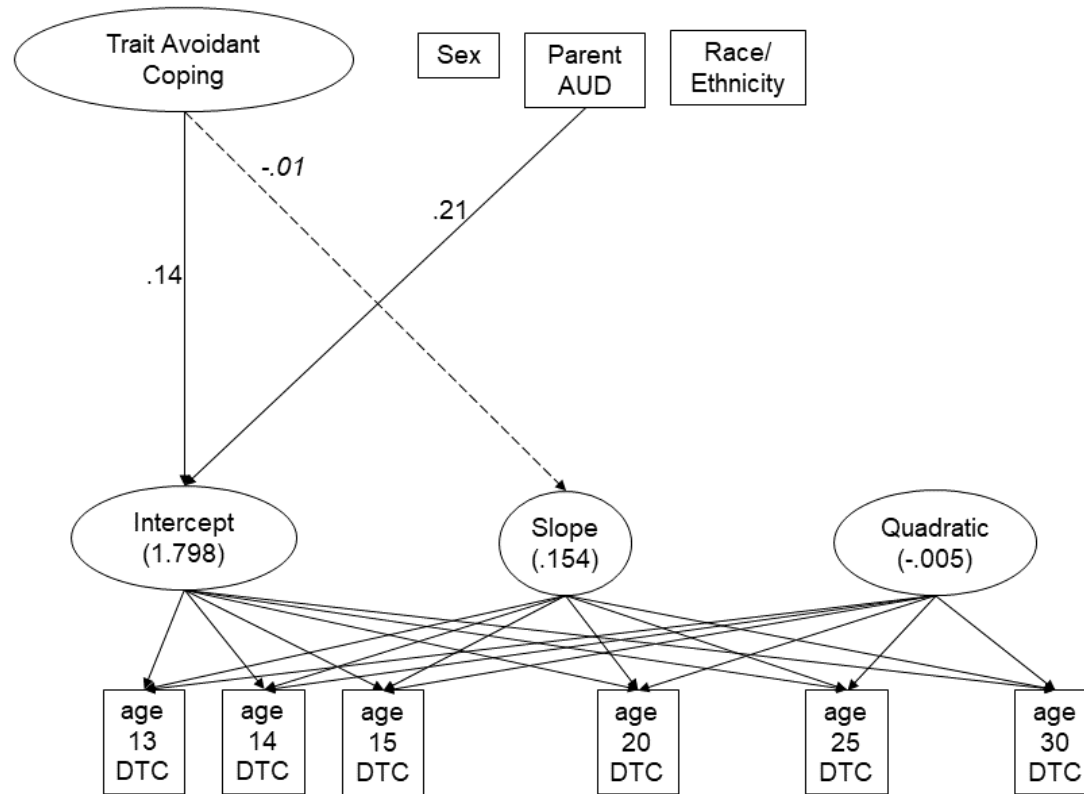
Note: Q-Q = quantile-quantile.

Figure 11. Model fit to drinking to cope trajectories for 36 participants.



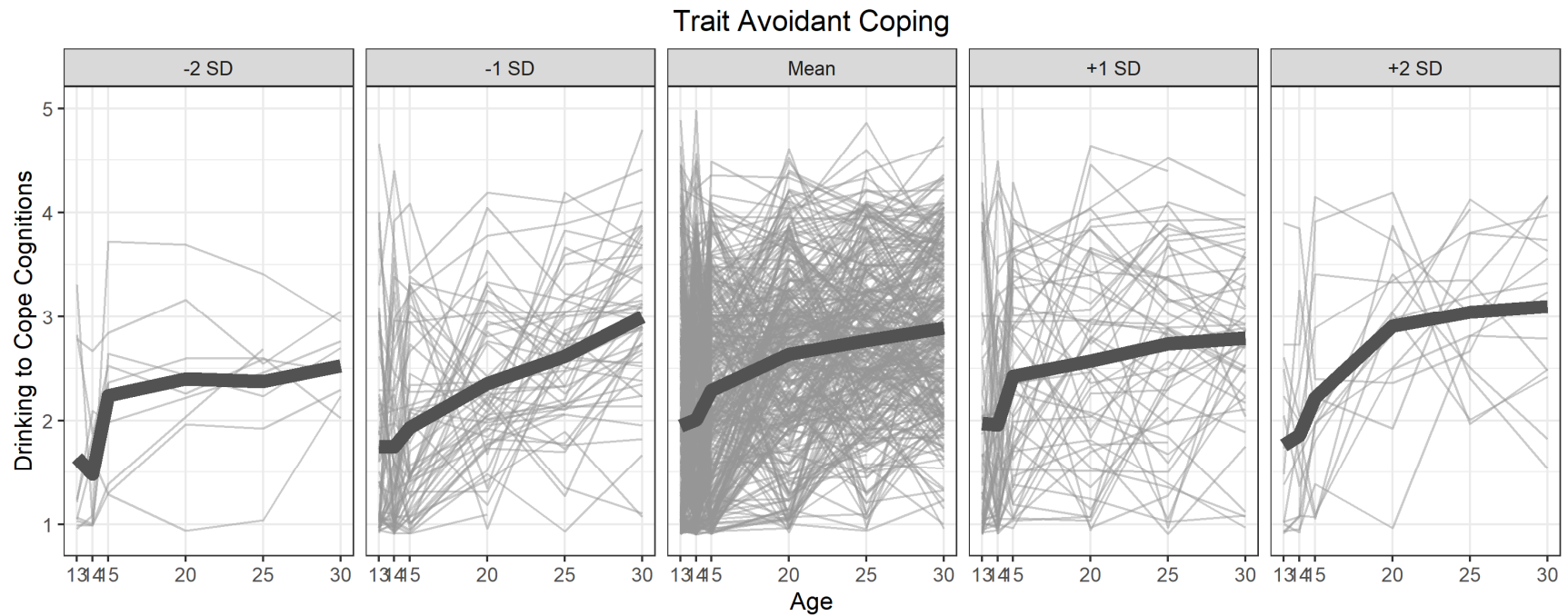
Note: Dotted lines indicate empirical Bayes estimates for Aim 2 model (Model 2.6). Dashed lines indicate empirical Bayes estimates for Aim 3 model (Model 3.2).

Figure 12. Relations of avoidant coping with DTC trajectories.



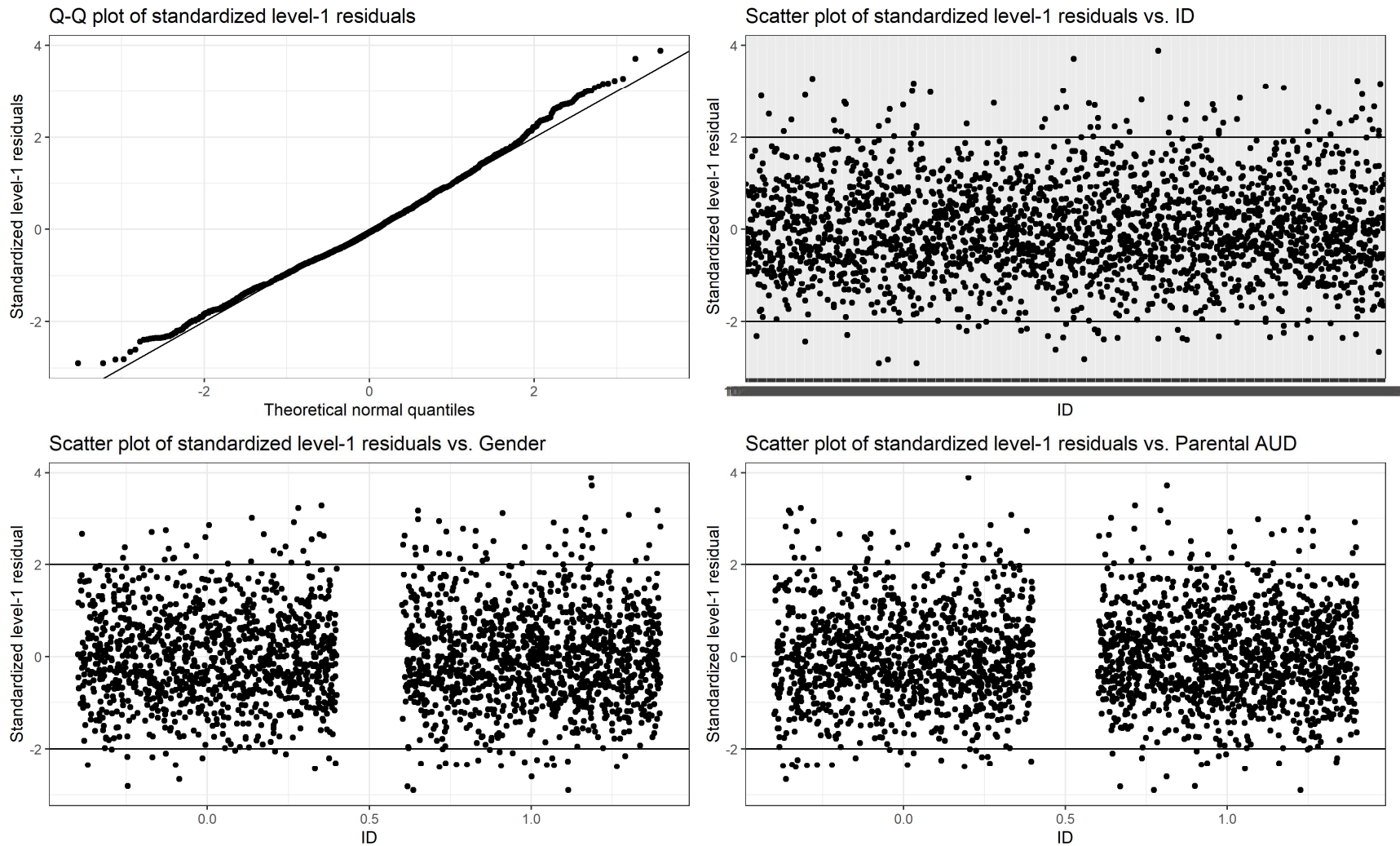
Note: Dotted lines and italic estimates denote hypothesized paths which were non-significant. Estimates shown are standardized coefficients. See Table 14 for all model estimates.

Figure 13. Raw trajectories of drinking to cope cognitions by level of trait avoidant coping.



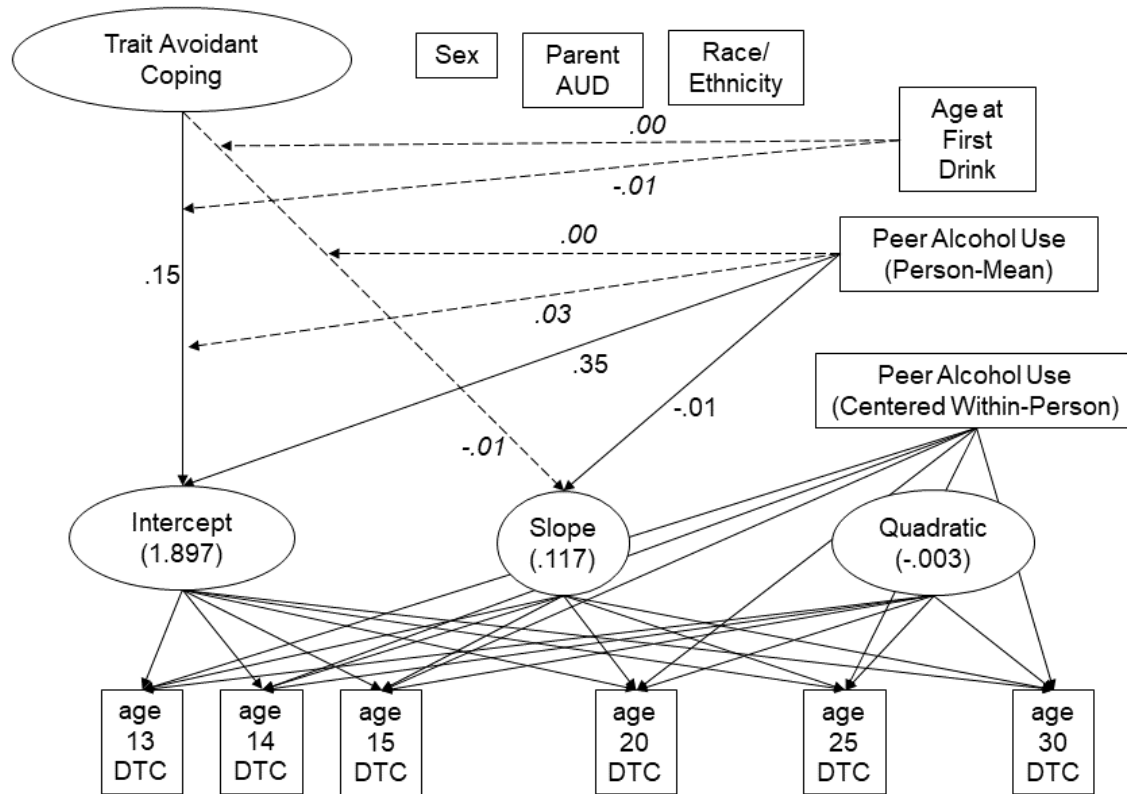
Note: Bold lines are mean trajectories across individuals in the group. Narrow lines depict raw individual trajectories. -2 SD group consists of individuals with standardized trait avoidant coping score of -2 or below; -1 SD group -2 to -1; Mean group -1 to 1; +1 SD group 1 to 2; +2 SD group 2 or higher.

Figure 14. Diagnostic plots for Aim 3 model (Model 3.3)



Note: Q-Q = quantile-quantile.

Figure 15. Relations of avoidant coping with DTC trajectories: tests of moderation by exposure to alcohol use.



Note: Dotted lines and italic estimates denote hypothesized paths which were non-significant. Estimates shown are standardized coefficients, with the exception of interaction effects, which are unstandardized. Effect of peer alcohol use, which was a statistically significant time-varying covariate, is omitted for readability. See Table 14 for all model estimates.