2013

Bayesian Analysis of Parental Drinking Motives and Children's Adjustment

Aaron A. Duke

University of Kentucky, dukuru@gmail.com

Click here to let us know how access to this document benefits you.

BAYESIAN ANALYSIS OF
PARENTAL DRINKING MOTIVES
AND CHILDREN'S ADJUSTMENT

DISSERTATION

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

By

Aaron Adriel Duke

Lexington, Kentucky

Director: Dr. Peggy Keller, Assistant Professor of Psychology

Lexington, Kentucky

ABSTRACT OF DISSERTATION

BAYESIAN ANALYSIS OF
PARENTAL DRINKING MOTIVES
AND CHILDREN'S ADJUSTMENT

Harm reduction strategies can mitigate against some of the deleterious effects of alcohol on families. These strategies are most feasible and cost-effective when they can be targeted at those who are most at risk. Previous studies examining the relation between parents' alcohol use and their children's psychological adjustment have failed to consider important contextual questions such as drinking motives. The current investigation set out to identify the extent to which parents' drinking motives predict internalizing and externalizing psychopathology in their children. The investigation consisted of cross sectional analysis of parents' drinking motives and their children's adjustment using data from 154 families recruited from the local community. Utilizing Bayesian data analytic techniques, we examined the role of parents' drinking motives along with possible mediating variables including familial conflict, parental depression, and parenting style. Results showed that maternal social drinking motives were better predictors of children's maladjustment than either coping or enhancement drinking motives. Unexpectedly, maternal enhancement drinking motives were associated with fewer adjustment problems. Maternal enhancement drinking motives also predicted higher levels of collaborative conflict resolution and lower levels of parental depression, both of which were associated with reduced levels of children's externalizing problems. Paternal alcohol consumption and drinking motives were not associated with children's internalizing or externalizing problems. Clinical implications and directions for future research are discussed.

Aaron Adriel Duke

Student's Signature

May 15, 2013

Date

BAYESIAN ANALYSIS OF
PARENTAL DRINKING MOTIVES
AND CHILDREN'S ADJUSTMENT

By

Aaron Adriel Duke

Peggy Keller, Ph.D.

Director of Dissertation

David T. Berry, Ph.D.

Director of Graduate Studies

May 15, 2013

DEDICATION

I lovingly dedicate this dissertation to my wife, Amanda, who bravely faced many nights alone with three young children while I worked on my research, and whose job, despite being unquestionably more important than mine, lacks the glory and praise it rightfully deserves.

ACKNOWLEDGEMENTS

I owe a special thanks to Dr. Peggy Keller for her willingness to take a non-developmental student under her wings and for her patience in dealing with my proleptic digressions. I would like to thank Dr. Peter Giancola who helped me to grow my own wings and gain a sense of confidence in my research abilities. Also, I want to thank Dr. Paul Glaser for his helpful comments and for being the only surviving member of my previous dissertation committee as well as Dr. Greg Smith and Dr. Rich Milich for helping create a clinical program second to none in the nation where I have been able to hone my critical thinking skills and increase my appetite for knowledge.

Finally, this acknowledgement section would not be complete without recognizing the most important people in my life, my beautiful and inspiring wife Amanda, my little kinchins — Eli, Noah, and Sarah — and the best babysitters in the world, my wonderful parents. Thank you all.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter 1: Introduction

> Parents wonder why the streams are bitter,
> when they themselves have poisoned the
> fountain.

> JOHN LOCKE

Alcohol consumption in the U.S. is at a 25-year high, and 30 percent of Americans admit that drinking has caused trouble in their families (Gallup, 2010, 2011). While "family trouble" caused by alcohol use can come in many forms, perhaps the most pernicious is the negative impact it can have on children. Recent estimates suggest that more than 1 in 10 children in the United States under the age of 18 (between 7.5 and 10 million children) *currently live* with a parent who has qualified for an alcohol use disorder within the past year (B. F. Grant, 2000; SAMHSA, 2012). Children of parents with alcohol problems are more likely to experience a range of adverse childhood experiences including neglect and emotional, physical, and sexual abuse (De Bellis et al., 2001; Dube et al., 2001; D. K. Smith, Johnson, Pears, Fisher, & DeGarmo, 2007; West & Prinz, 1987; Young, Boles, & Otero, 2007). These adverse childhood experiences have been associated with poorer life outcomes and higher rates of internalizing and externalizing psychopathology (e.g., Connell & S. H. Goodman, 2002; McLaughlin et al., 2012).

Despite the negative impact that parental alcohol use can have on children, most children of parents who drink are not abused or neglected, nor do they necessarily have significant internalizing and/or externalizing problems; in an early review of the literature on parental alcoholism and childhood psychopathology, West and Prinz emphasized that "neither all nor a major portion of the population of children from alcoholic homes are inevitably doomed to psychological disorder" (1987, p. 214). Many important mediators and moderators of parental alcohol use and child psychopathology have been the subject of previous research including *resilience* (H. H. Lee & Cranford, 2008; Werner, 1986), *anxiety sensitivity* (MacPherson, Stewart, & McWilliams, 2001), *attachment* (El-Sheikh & Buckhalt, 2003), *parent-child communication* (Jacob, Krahn, & Leonard, 1991; Jones & Houts, 1992), *parental depression* (El-Sheikh & Flanagan, 2001), *parenting* (Reich, Earls, & Powell, 1988; Roosa, Tein, Groppenbacher, Michaels, & Dumka, 1993), *family conflict/cohesion* (Farrell, Barnes, & Banerjee, 1995; El-Sheikh & Flanagan, 2001; El-Sheikh & Buckhalt, 2003), *child personality* (A. Berkowitz & Perkins, 1988), and *punishment/abuse* (e.g., Reich et al., 1988). However, many important contextual questions have yet to be addressed that could shed light on why all parental alcohol use is

not equally damaging to children. One such question is *how do parents' motivations for drinking fit into the picture*?

Drinking Motives

Individuals who choose to consume alcohol do so for diverse reasons including to "fit in" (*conformity motives*), because they enjoy how it feels (*enhancement motives*), because it makes them "loosen up" and behave more sociably (*social motives*), and to cope with stress and other negative emotions (*coping motives;* M. L. Cooper, 1994). Of these different drinking motives, drinking to cope with negative affect has been shown to be particularly hazardous (V. V. Grant, Stewart, & Mohr, 2009), and may prove to have the most detrimental impact on children.

Wills and Shiffman (1985) posited that people use alcohol to regulate both their positive and negative affective experiences. According to this *affective regulation hypothesis*, alcohol is used to reduce negative affect when one is overaroused and to augment positive affect when one is underaroused. These two drinking motives are argued to map onto the two major biological motivational systems proposed by Gray (1970) in his original physiological theory of personality (i.e., the behavioral activation and behavioral inhibition systems; see also Willem, Bijttebier, Claes, & Uytterhaegen, 2012). In this model, drinking for enhancement is thought to reflect positive-valenced, appetitive motives, while drinking to cope is thought to represent negative, avoidant, threat-focused motives. Cooper et al.'s originally hypothesized model is reproduced in Figure 1.1; this model was largely supported by the results of two large samples—one with adults and one with adolescents (M. L. Cooper, Frone, Russell, & Mudar, 1995).

Motivations for drinking alcohol are not restricted to emotion regulation. Cox and Klinger (1988, 2011) outlined a four-factor motivational model of alcohol use where each factor was defined by the valence of the affective change and whether the change is direct or indirect. Thus, the four categories are 1) direct enhancement of positive affect, 2) indirect enhancement of positive affect, 3) direct reduction of negative affect, and 4) indirect reduction of negative affect. M. L. Cooper (1994) tested Cox and Klinger's theory by revising their three-factor questionnaire of drinking motives (M. L. Cooper, Russell, Skinner, & Windle, 1992) to include a fourth factor corresponding to *conformity* motives. Thus, enhancement and coping motives were conceptualized as direct pharmacological motivations while social and conformity motives were conceptualized as indirect motivations. The results of their study were interpreted as supporting Cox and Klinger's theory.
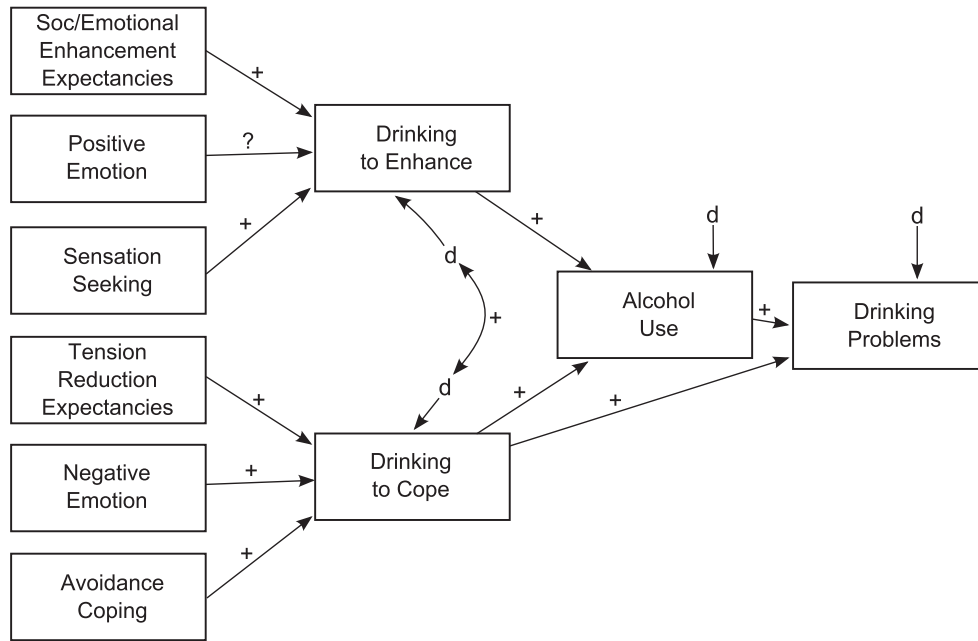
Figure 1.1: Hypothesized model of alcohol use as an emotion management strategy. Reproduced from "Drinking to Regulate Positive and Negative Emotions: A Motivational Model of Alcohol Use," by M. L. Cooper, M. R. Frone, M. Russell, and P. Mudar, 1995, *Journal of Personality and Social Psychology, 69*, p. 992. Copyright 1995 by the American Psychological Association.

Over the past decade, numerous studies have tested the factor structure of drinking motives. They have been found to be mostly invariant across large-scale surveys conducted in Switzerland, Canada, and the United States, with social motives being the most prevalent, followed by enhancement, coping, and then conformity motives (E. Kuntsche, Stewart, & Cooper, 2008). Smaller studies ($N < 1,000$) have reported similar findings in Spain, Hungary, Italy, and Brazil (Hauck-Filho, Teixeira, & Cooper, 2012; Mazzardis, Vieno, Kuntsche, & Santinello, 2010; Németh, Urbán, et al., 2011). However, it is worth noting that some studies have found coping motives to be more common than enhancement motives (e.g., in the U.S. and Nigeria; Gire, 2002).

Drinking motives are not mutually exclusive—they can both coexist and vary over time. In-depth interviews with South Korean women undergoing treatment for alcohol dependence revealed a series of motivational transitions from drinking for pleasure (i.e., enhancement), to drinking in order to cope with negative emotions, and finally, to needing alcohol to function (Kim, Wiechelt, & Kim, 2010). Drinking motives have also been shown to vary from moment to moment depending upon positive and negative affect (Arbeau, Kuiken, & Wild, 2011). Drinking motives are also thought to undergo a

developmental transition from adolescence to adulthood. For example, it has been argued that true *social* drinking motives do not exist for adolescents, but rather are subsumed within conformity motives; this was the case in a study of First Nations (Mi'kmaq) adolescents in Nova Scotia (Mushquash, Stewart, Comeau, & McGrath, 2008).

Predicting Intoxicated Behavior

Drinking motives are of clinical relevance not just because they influence alcohol consumption, but also because they provide insight into *drinking context*, which is critical in predicting harmful drinking-related behaviors. It is well documented that alcohol intoxication can have widely discrepant effects ranging from prosocial behaviors (e.g., conviviality, helping, and social bonding; see Sayette et al., 2012) on one extreme to antisocial behaviors (e.g., aggression, withdrawal, and risk-taking) on the other (see Steele & Josephs, 1990). It makes little sense to aggregate across individuals with strong tendencies on opposite ends of the pro-vs-antisocial spectrum. The determinants of where someone will be on this continuum include both environmental and personality factors. For example, very few people are naturally aggressive under alcohol unless provoked (Giancola, Helton, et al., 2002). Provocation represents one of a number of important environmental influences to harmful drinking behavior. However, provocation alone is not sufficient to predict aggression. Individuals who tend to aggress while under the influence of alcohol typically have aggressive personalities (Denson, Aviles, et al., 2008; Giancola, 2002a, 2002b; Giancola, Godlaski, & Parrott, 2005; Giancola, Parrott, et al., 2012). Importantly, drinking motives are able to capture both environmental and personality-level variance important in predicting intoxicated behavior.

From Parents to Children

Studies have shown that parental problem drinking influences children's adjustment by way of numerous environmental and behavioral mediators (e.g., Eiden, Edwards, & Leonard, 2007; Keller, Cummings, & Davies, 2005; Keller, Cummings, Davies, & Mitchell, 2008; Keller, Gilbert, Koss, Cummings, & Davies, 2011; Rafferty & Hartley, 2006; Reich et al., 1988; Roosa et al., 1993; El-Sheikh & Flanagan, 2001). In order to expand upon this literature, we propose to go one step further by treating drinking behavior as a multidimensional construct and examining how different parental drinking motives might predict children's adjustment. A useful place to begin in testing this postulate is to look at established mediators of parental problem drinking and children's adjustment. Below we argue that different drinking motives may differentially predict the

mechanisms by which parental drinking affects adjustment problems in children. Specifically, we examine the role of *conflict* (parent-parent and parent-child), *parental depression*, and *parenting behavior* and argue that coping drinking motives have the strongest theoretical link to children's maladjustment, followed by enhancement, and then social drinking motives.

Conflict

One of the ways in which parental problem drinking negatively impacts children is by engendering conflict both between parents (i.e., parental conflict) and between parent and child (i.e., parent-child conflict; see Keller, Cummings, & Davies, 2005, Keller, Gilbert, et al., 2011, Rafferty & Hartley, 2006, Reich et al., 1988, El-Sheikh & Flanagan, 2001). Alcohol intoxication is one of the most reliable general risk factors for aggression (Bushman, H. M. Cooper, et al., 1990; Exum, 2006; Ito, N. Miller, Pollock, et al., 1996) and has been repeatedly linked to intimate partner violence (Foran, O'Leary, et al., 2008) and child abuse (Widom & Hiller-Sturmhöfel, 2001). Drinking motives, as contextual moderators of drinking behavior, are likely linked to drinking-related conflict. There are reasons to believe that both coping and enhancement motives may be predictive of alcohol-related conflict, but for different reasons. On the other hand, social drinking motives may be inversely related to conflict given evidence that social drinking may facilitate social bonding and helping behaviors (e.g., Sayette et al., 2012).

Drinking to cope may result in particularly salient frustration cues capable of instigating aggression. The frustration-aggression hypothesis argues that frustration (or more generally, negative affect; see L. Berkowitz et al., 1989) leads to aggressive inclinations that are often displaced (i.e., not directed at the source of one's frustration; N. E. Miller, 1941). Further, displaced aggression is most pronounced when coupled with alcohol consumption (e.g., Aviles, Earleywine, Pollock, Stratton, & Miller, 2005; Denson, Aviles, et al., 2008; Denson, White, & Warburton, 2009). A meta-analysis of displaced aggression revealed a relatively robust effect size (mean Cohen's $d = 0.54$) and found that displaced aggression was stronger when there were similarities between the source of one's frustration and the target of the displaced aggression (Marcus-Newhall, Pedersen, Carlson, & Miller, 2000). It is not difficult to imagine a situation where coping drinking motives are clearly linked to increased familial conflict via displaced aggression. For example, imagine a father of two who loses a child and turns to alcohol in order to cope with his loss, and each time he looks at his surviving child he is reminded of the child he lost. Such a father may be more likely to create conflict with his surviving child due to frustration and generalized negative affect coupled with the disinhibitory effects of

5

alcohol.

Enhancement drinking motives may also increase the likelihood of conflict through increased exposure to salient sensation-seeking/cues. Sensation-seeking can be defined as "the seeking of varied, novel, complex, and intense sensations and experiences, and the willingness to take physical, social, legal, and financial risk for the sake of such experience" (Zuckerman, 1994, p. 27). A meta-analytic review including a total of over 32,000 participants revealed a positive relation between sensation-seeking and aggression (Cohen's $d = 0.20$; Wilson & Scarpa, 2011). Underarousal Theory posits that individuals who are chronically underaroused seek out intense sensations *including conflict* in order to alleviate the dysphoria associated with their underaroused state (Zuckerman, 1990). This hypothesis has been supported by at least two meta-analyses of physiological arousal and aggressive behavior (Lorber, 2004; Ortiz & Raine, 2004). Thus, enhancement drinking motives may increase conflict via increased levels of disinhibited sensation-seeking.

Depression

The impact of parental problem drinking has also been shown to be mediated by parental depression in at least one study (El-Sheikh & Flanagan, 2001). A comprehensive meta-analytic review identified maternal depression as being particularly salient to children's adjustment, especially when coupled with paternal alcoholism (S. H. Goodman et al., 2011). We propose that parental depression may be a potential mediator between coping drinking motives and children's adjustment problems given coping drinking motives relation to depression (Armeli, Conner, Cullum, & Tennen, 2010; V. V. Grant, Stewart, & Mohr, 2009; M. Windle & R. Windle, 2012) and the ability of alcohol use to increase depressive symptoms (e.g., Gilman & Abraham, 2001). Whether parental depression consistently mediates the relation between parental drinking and children's adjustment has been highlighted as an important area in need of further research (S. H. Goodman, 2007).

Parenting Behavior

Finally, an important mechanistic link between parental drinking motives and children's adjustment may be parenting behavior. The negative impact of parental problem drinking has been shown to be mediated by less effective parenting, lax discipline, and less parental support (Eiden et al., 2007; Keller, Cummings, Davies, & Mitchell, 2008; Roosa et al., 1993). Coping drinking motives, being more strongly associated with negative emotionality and the depressive effects of alcohol, likely facilitate these negative

parenting styles (i.e., decreased parental involvement and less consistent discipline). This hypothesis is supported by a meta-analytic study linking maternal depression to maladaptive parenting behaviors (Lovejoy, Graczyk, O'Hare, & Neuman, 2000). More generally, there is ample evidence linking maternal personality to parenting behaviors (e.g., Belsky & Barends, 2002; Clark, Kochanska, & Ready, 2000; McKee, Colletti, Rakow, Jones, & Forehand, 2008) and a correspondingly expansive literature linking parenting behaviors to children's adjustment (e.g., Galambos, Barker, & Almeida, 2003; Scaramella, Conger, & Simons, 1999). Given previous research demonstrating unique personality correlates of different drinking motives (e.g., Arbeau et al., 2011; Hussong, 2003; Littlefield, Agrawal, et al., 2011; Mezquita, Stewart, & Ruipérez, 2010; Stewart & Devine, 2000; Stewart, Loughlin, & Rhyno, 2001; Theakston, Stewart, Dawson, Knowlden-Loewen, & Lehman, 2004), it is reasonable to expect a similar pattern of different effects on parenting behavior of different parental drinking motives.

Current Study

There is a pronounced clinical need to better understand which families are most at risk for negative consequences associated with parental drinking. We have identified reasons why parents' drinking motivations may be related to internalizing and externalizing problems in their offspring. The primary aim of the current study was to test whether phenomenologically distinct drinking motives can help explain the widely disparate effects of parents' alcohol use on their children's emotional well-being.

We formulated three hypotheses on the relation between parents' drinking motives and their children's psychological adjustment. *First*, we hypothesized that measurement of parents' drinking motives will provide meaningful gains in our ability to predict children's adjustment when compared with only taking into account parents' problematic drinking. *Second*, we hypothesized that parents' coping drinking motives would have the strongest association with children's maladjustment, followed by enhancement motives, and finally, social motives. *Third*, we predicted that the relation between parental drinking motives and children's adjustment would be mediated by partner conflict, parent-child conflict, parental warmth, parental psychological and behavioral control, and parental depression.

Rationale for Bayesian Approach

Bayesian approaches to data analysis are generally superior to traditional frequentist approaches with their reliance on null hypothesis significance testing (NHST; Kruschke, 2010b). This study represents the first effort, which we are aware of, to apply Bayesian

data analytic techniques to the study of drinking motives. Of course, it is also the first study to examine the relation between parental drinking motives and their children's adjustment. Prior to introducing the details of the current study, it is worthwhile to further explicate our rationale behind choosing a Bayesian, as opposed to a frequentist, framework for making statistical inferences.

Problems with the Status Quo

Null hypothesis significant testing (NHST) and its reliance on *p*-values remains the *de facto* standard in social scientific communication. However, there are a number of serious problems with the use of *p*-values that researchers may or may not be aware of. For example, many researchers do not realize that classical statistical testing does not stem from a single philosophy of statistical inference, but rather, is an amalgam of two schools of thought: one popularized by Fisher and another advocated by Neyman and Pearson (Hubbard & Bayarri, 2003). Fisher's approach relied on Karl Pearson's *p* statistic, which was conceived of as an index of inductive evidence against the null hypothesis and is derived from a hypothetical, infinite sample. Neyman–Pearson's α and β thresholds for respectively controlling Type I and Type II error rates relied on repeated sampling of defined populations. The currently popular approach to use Fisherian *p* values within the Neyman–Pearson framework of controlling for errors has conflated statistical evidence (*p*-values) with error rates (α and β values) and makes it easy to misinterpret what *p*-values actually signify.

One common misinterpretation of *p*-values is that they speak to the probability of the null hypothesis being true. *p*-values are conditioned on the null hypothesis being true and therefore cannot be correctly interpreted as a *direct* index of support for the null hypothesis given that the null hypothesis must be true in order for a *p*-value to be defined. Further, the *p*-value, and by extension, confidence interval, are ill-defined because there are no unique *p*-values or corresponding confidence intervals for any particular set of data (Kruschke, 2010b). There are no unique *p*-values for specific data sets because *p*-values are not conditioned on the data (i.e., what is *known*), but rather, on *unknowable* parameter values and the often unspecified intentions of the researcher interpreting the data (Wagenmakers, Lee, Lodewyckx, & Iverson, 2008). The result of relying on researcher intentions to determine statistical significance is that it becomes "trivial to make any observed difference non-significant merely by conceiving of many other conditions with which to compare [one's] data" (Kruschke, 2010b, p. 294).[1] Further, these intentions are

---

[1]Contrast this with Bayesian data analysis, in which multiple comparisons do not change one's interpretation of the data (see Gelman, Hill, & Yajima, 2012).

easily concealed and misrepresented. It has been noted that the flexibility in data collection, analysis, and reporting make it "unacceptably easy to publish 'statistically significant' evidence consistent with *any* hypothesis" (Simmons, Nelson, & Simonsohn, 2011, p. 1359, italics in original).

A comprehensive overview of the criticisms of NHST is beyond the scope of this article. However, it should be noted that published criticisms of NHST are plentiful (e.g., Armstrong, 2007; Bakan, 1966; Carver, 1978; Cohen, 1994; Edwards, 2008; Falk & Greenbaum, 1995; Gelman, 2010; Gelman & C. P. Robert, 2012; Gill, 1999; Glover & Dixon, 2004; S. N. Goodman, 1999a, 1999b; Haller & Krauss, 2002; Harlow, Muliak, & Steiger, 1997; Howson & Urbach, 2006; Hubbard, 2004; Hubbard & Armstrong, 2006; Hubbard & Lindsay, 2008; Hubbard & Ryan, 2000; Hunter, 1997; Ioannidis, 2005; Jaynes, 2003; Johansson, 2011; Kmetz, 2011a, 2011b; Lambdin, 2012; Levine, Weber, Hullett, Park, & Linsey, 2008; Loftus, 1996; McCloskey, 1992; Meehl, 1967, 1978, 1990; Murray, 1993; Nix & Barnette, 1998; Omi, 2012; Rodgers, 2010; Rozeboom, 1960; Shaver, 1993; Shrout, 1997; Siegfried, 2010; Stang, Poole, & Kuss, 2010; Wagenmakers, 2007; Wagenmakers et al., 2008; Westover, Westover, & Bianchi, 2011; Ziliak & McCloskey, 2007, 2009). Fortunately, there is a readily available alternative to the NHST framework.

A Bayesian Alternative

Bayesian data analysis resolves most of the problems inherent in NHST and *p*-values, but represents a paradigm shift that, while intuitive, is intimidating to many trained in classical methods. Historically, frequentists have conceded Bayesian inference's philosophical superiority[2] while dismissing it as impractical (e.g., Efron, 1986). In the past, Bayesian data analysis was limited by the computational costs associated with integrating high-dimensional posterior distributions when no closed-form analytic solutions were available. However, the advancement of computer technology and the discovery of efficient algorithms for sampling high-dimensional spaces has now made the integration problem largely moot. Bayesian data analysis has only become practical within the past decade or so, and its promulgation in psychological research is still limited; however, Bayesian data analysis is gaining traction at a steady rate and has been predicted to become the predominate method of data analysis by the middle of the 21st century (e.g., S. P. Brooks, 2003; Efron, 2010; Gelman, 2010; Kruschke, 2011; Lindley, 1975).

---

[2]Unlike frequentist theory, Bayesian inference is *coherent* (in the technical sense) inasmuch as it does not violate the likelihood principle (Birnbaum, 1962)—which states that "models and data sets leading to the same likelihood function should generate the same statistical inferences" (Little, 2006, p. 5).

Bayesian inference relies on applying Bayes' Theorem (see Equation 1.1), which simply states that the probability distribution of plausible (i.e., *credible* or *believable*) parameter values θ, given the observed data $\mathbf{D}$ is a function of the likelihood of obtaining the data $\mathbf{D}$ given the parameter values θ multiplied by the prior plausibility of various values of θ divided by all possible data combinations.[3] In Bayes' Theorem, $p(\theta|\mathbf{D})$ is referred to as the *posterior*, $p(\mathbf{D}|\theta)$ as the *likelihood*, and $p(\theta)$ as the *prior*.[4]

$$p(\theta|\mathbf{D}) = \frac{p(\mathbf{D}|\theta)p(\theta)}{p(\mathbf{D})} \tag{1.1}$$

Bayesian data analysis results in a distribution of plausible parameter values (not just a point estimate), providing an intuitive way to assess statistical power and replication probability (Kruschke, 2011). Further, the impact that data will have on different theories (i.e., the 'robustness' of one's conclusions) is testable within the Bayesian inference by using a variety of different prior plausibility distributions and/or likelihood functions. Unlike in certain NHST methods (e.g., ANOVA) where unequal numbers of data points are problematic, Bayesian data analysis is computationally robust, not only against unequal sample sizes (Kruschke, 2010b), but also against multiple comparisons (Gelman, Hill, & Yajima, 2012). Finally, one of the key advantages of Bayesian data analysis over NHST is that inference is conditioned on the data as opposed to the intentions of the researcher; for example, if a researcher takes a 'sneak peek' at his/her data, the interpretation of the data does not change.

Bayesian data analysis facilitates scientific progress by providing a natural means of accumulating scientific evidence. The posterior distribution of a previous experiment can become the prior distribution of a replication experiment. Thus, if data are consistent, the new posterior will lead to stronger conclusions (i.e., be more accurate), and if the data are inconsistent, then the added uncertainty in the previous experiment's conclusions is now formally specified in the form of a new posterior distribution. Bayesian analysis is more conservative than NHST; by incorporating prior knowledge into one's inferences, Bayesian data analysis "goes with what is already known, unless the data force a change" (Gelman, 2010; see also Gelman & Jakulin, 2007).[5]

---

[3] $p(\mathbf{D})$ is merely a normalizing constant so that the posterior probability distribution sums to 1. The normalizing constant is often omitted (Koch, 2007), leaving $p(\theta|\mathbf{D}) \propto p(\mathbf{D}|\theta)p(\theta)$.

[4] Bayesian inference is the "the reallocation of credibility across a space of possibilities" (Kruschke, 2011, p. 300). Herein we use the words 'credible,' 'plausible,' and 'believable' interchangeably, and in lue of the term 'statistical significance.' Thus, we speak of *credible* differences or *highly plausible* differences as opposed to significant differences. This terminology has the added benefit of not confounding connotations of 'important' with 'reliably different.'

[5] In contrast, estimates from NHST are subject to radical change from data set to data set (Cumming, 2008; Gelman, 2010).

Chapter 2: Methods

Participants

Participants were 154 families taking part in a larger study of parental alcohol use, conflict, and child sleep. Participants were recruited from the greater Lexington, Kentucky area. Each family included married or cohabiting parents who are at least 21 years of age and a child between the ages of 6 and 11. Only one child from each family was included in the study. Inclusion criteria required parents to have lived together for at least 2 years prior to participating in the study. Participants were required to complete questionnaires in English. Children with mental retardation, developmental delays, or attention-deficit hyperactivity disorder (ADHD) were excluded from participating along with children who had an acute or chronic illness. Children with acute illnesses were allowed to participate once they recovered. In order to obtain a sample with sufficient variability in alcohol consumption, a screening questionnaire was used to classify potential participants as light, moderate, or heavy drinkers. Light drinkers were defined as someone who consumes no more than two drinks per occasion, with no more than one drinking occasion per month. Moderate drinkers were defined as women who consume no more than one drink per day or men who consume no more than two drinks per day. Heavy drinkers were defined as individuals who consume greater alcohol in greater quantities than moderate drinkers. Families were classified based on the partner who exhibits the highest level of drinking. An effort was made to recruit participants such that roughly $\frac{1}{3}$ of the sample fell within each category.

A total of 288 parents had complete data including 142 fathers and 146 mothers. At the time of the study, couples had been together for a median of 14 years (*mean* = 13.8). Parents' ages ranged from 22 to 59 with a median age of 39 (*mean* = 39.1). Most parents were married (91.6%), Caucasian (86.5%), and well-educated with a median of 16 years of education (*mean* = 15.7 years). Approximately 10.1% of parents self-identified as African American, 2.1% as Asian, 1% as Hispanic, and 1.4% as "other." The majority of parents were Protestant (69.1%) with minorities endorsing Catholicism (20.8%), no religion (7.6%), Islam (1.4%), and Judaism (0.3%). Annual family income ranged from $2,000 to $228,000 with a median income of $68,000 and a mean income of $75,500. The median number of children in each family was 1 (*mean* = 1.8). Most of the guardians in the study were biological parents (*n* = 261), however, there were also step-parents (*n* = 8), foster parents (*n* = 1), adoptive parents (*n* = 13), and live-in boyfriends/girlfriends to the child's parent (*n* = 4); for the sake of simplicity, individuals in all of these categories are referred to collectively as 'parents' throughout this article. Approximately 14.2 percent of

the adults in the study had been divorced at least once with 2.4 percent reporting multiple divorces. The ages of the children participating in the study ranged from 5.5 to 12.9 with a median age of 9.1 (*mean* = 9.2). Participating children were roughly divided equally between boys (49.4%, *n* = 76) and girls (48.7%, *n* = 75).

Procedure

All participants were screened over the telephone to ensure they met inclusion criteria. Informed consent was obtained from each adult and informed assent was obtained from each child prior to participating in the study. The study was reviewed and approved by the University of Kentucky Institutional Review Board (IRB). At the end of the week-long assessment of the participating child's sleep behaviors, families came into the laboratory in order to fill out questionnaires and complete a variety of other physiological measures and tasks not included in the present study. Only one family attended the laboratory session at a time. The laboratory includes several rooms, and for the completion of questionnaires, family members were separated into different rooms to allow for privacy. Parents completed questionnaires on a computer while children completed questionnaires in an interview format. Only parent questionnaires were utilized in the current analyses with each parent completing each questionnaire separately (see below). At the end of the laboratory session, participants were debriefed and compensated. Families received $150 for their participation; $140 was divided evenly between the male and female partners, and the child was given a choice between a $10 toy or a $10 check.

Instruments

Drinking Motives Questionnaire–Revised (DMQ-R)

The DMQ-R is a 20-item measure of the relative frequency of four major categories of drinking motives, including *social motives* (e.g., "because it helps you enjoy a party"), *enhancement motives* (e.g., "to get high"), *conformity motives* (e.g., "so you won't feel left out'), and *coping motives* (e.g., "to forget your problems;" M. L. Cooper, 1994). Subscales named after each of these categories of drinking motives are derived by averaging across the 5 items contained in each subscale. Items were scored using a 1–5 Likert scale with the following anchors: 1 = *almost never/never*, 2 = *some of the time*, 3 = *half of the time*, 4 = *most of the time*, 5 = *almost always/always*.[1] For the current study, only the three subscales of the original DMQ (M. L. Cooper, Russell, et al., 1992) were

---

[1] Note that the original DMQ utilized a 1–4 Likert scale as opposed to the 1–5 range of the revised version.

included (i.e., the Conformity Motives subscale was not included). The DMQ-R has well-established psychometric properties (M. L. Cooper, 1994; M. L. Cooper, Krull, et al., 2008; E. Kuntsche, Stewart, & Cooper, 2008), and its factor structure has been confirmed in validation studies in several different countries including Brazil, Canada, Switzerland, and the United States (e.g., V. V. Grant, Stewart, O'Connor, Blackwell, & Conrod, 2007; Hauck-Filho et al., 2012; E. Kuntsche, Stewart, & Cooper, 2008; MacLean & Lecci, 2000).

The Alcohol Use Disorders Identification Test (AUDIT)

The AUDIT is a 10-item questionnaire developed by the World Health Organization (WHO) to screen for hazardous and harmful alcohol consumption (Saunders, Aasland, Babor, de la Fuente, & Grant, 1993). Responses are provided in a Likert format with anchors that vary by question and range from 0 to 4. Most of the questions (numbers 3–8) ask about the frequency of alcohol-related behaviors and problems (e.g., "How often do you have six or more drinks on one occasion?") with the following response options: 0 = *never*, 1 = *less than monthly*, 2 = *monthly*, 3 = *weekly*, and 4 = *daily or almost daily*. The first two questions ask about drinking frequency and volume, and the last two questions ask if the respondent's drinking has ever harmed someone or if anyone has suggested the respondent "cut down" on their drinking.

The AUDIT is a well-established measure of alcohol use disorders and has generally good support for its reliability and validity with high specificity and adequate sensitivity to current hazardous alcohol use (e.g., Allen, Litten, Fertig, & Babor, 1997; Berner, Kriston, Bentele, & Härter, 2007; K. A. Bradley, Bush, McDonell, Malone, & Fihn, 1998; O'Hare & Sherrer, 1999). However, there are some concerns with the AUDIT's factor structure (e.g., Gmel, Heeb, & Rehm, 2001). Specifically, it is not clear to what degree drinking *frequency* is related problem drinking. A two-factor structure reflecting a) *consumption* and b) *consequences* is probably the most strongly indicated (Gmel et al., 2001; C.-Z. Peng, Wilsnack, Kristjanson, Benson, & Wilsnack, 2012; Wade, Varker, O'Donnell, & Forbes, 2012) and was adopted in the current study. Consumption scores were calculated by summing across the first three questions of the AUDIT while the score for the Consequences subscale was calculated by summing across the remaining seven questions. The total AUDIT score was used to classify participants as "Hazardous Drinkers" (a score of 8 or greater) and "Alcohol Dependent" (indicated by a score of 13 or above for women and 15 or above for men; Berner et al., 2007).

Child Behavior Checklist (CBCL)

Parents completed the Internalizing Problems and Externalizing Problems scales of the CBCL (Achenbach, 1991)—the most widely used dimensional rating scales of child psychopathology (Seligman, Ollendick, Langley, & Baldacci, 2004). Each parent rated their child's behavior over the past 6 months in relation to numerous descriptive statements using a 3-point Likert scale (0 = *not true*, 1 = *somewhat or sometimes true*, 2 = *very true or often true*). The Internalizing Problems scale includes items that measure anxiety (e.g., "nervous, high strung, or tense," "too fearful or anxious"), mood (e.g., "feels worthless or inferior," "unhappy, sad, or depressed"), and somatic complaints (e.g., "overtired," "stomachaches or cramps"). The Externalizing Problems scale includes items that measure rule-breaking behavior (e.g., "lying or cheating," "swearing or obscene language") and aggressive behavior (e.g., "gets in many fights," "temper tantrums or hot temper"). Internalizing and Externalizing scores on the CBCL were summed and transformed into *T*-scores based on child gender and age (see Achenbach & Rescorla, 2001). Following Achenbach's recommendations, *T*-scores below 60 were considered average, *T*-scores between 60 and 63 were considered "borderline clinical," and *T*-scores 64 and above were considered clinically elevated (Achenbach & Rescorla, 2001). The CBCL has well-established reliability and validity (e.g., Berg, Lucas, & McGuire, 1992; Bingham, Loukas, Fitzgerald, & Zucker, 2003; Fanti & Henrich, 2010; Lowe, 1998) and the Internalizing and Externalizing scales have empirically substantiated clinical utility (Dutra, Campbell, & Westen, 2004; Seligman et al., 2004; Warnick, Bracken, & Kasl, 2008).

Conflicts and Problem-Solving Scales (CPS)

The CPS is an 82-item measure of conflict and conflict resolution among partners in a relationship consisting of a set of subscales designed to be administered separately (Kerig, 1996). The subscales utilized in the present study include conflict frequency, collaborative conflict resolution, and verbally aggressive conflict resolution. The conflict frequency subscale measures the combined number of 'minor' and 'major' conflicts over the previous year rated on a 6-point ordinal scale, ranging from "once a year or less' to "just about every day." Major conflicts are weighted twice as much as minor conflicts, thus the total score can range from 3 to 18 (see Kerig, 1998). The conflict resolution scales are rated on a 4-point scale where participants are asked how often they use a particular strategy (0 = "never" and 3 = "often") with a differing number of items in each scale. The verbal aggression subscale includes 8 items (e.g., "raise voice, yell, shout") while the

collaboration subscale includes 6 items (e.g., "try to reason with the other"). Scores for these two subscales were calculated by averaging across the relevant responses. The CPS has been shown to have good psychometric support with subscale reliability coefficients ranging from .70 to .98 (see Johnson, 2001).

Parent-Child Conflict Tactics Scale (CTSPC)

The CTSPC was designed as a parent-to-child version of the popular Conflict Tactics Scale (CTS) in order to better conduct epidemiological research on child maltreatment (Straus, Hamby, Finkelhor, Moore, & Runyan, 1998). The scale contains 22 items assessing nonviolent discipline, psychological aggression, and physical assault. Response options range from 0 "this has never happened" to 6 "more than 20 times in the past year." The CTSPC has five subscales: Nonviolent Discipline (e.g., "put him/her in time out"), Psychological Aggression (e.g., "called him/her dumb or lazy or some other name like that"), Physical Assault (e.g., "spanked him/her on the bottom with my bare hand"), Severe Physical Assault (e.g., "hit him/her on the botton with something like a belt, hairbrush, a stick or some other hard object"), and Very Severe Physical Assault (e.g., "grabbed him/her around the neck and choked him/her"). The CTSPC has shown good internal consistency with the exception of the Severe Assault and Very Severe Assault subscales, which suffer from very low rates of endorsement (see Friendrich, Olafson, & Connelly, 2004). In the current study, only the Physical Assault and Psychological Aggression subscales were included and were computed by averaging across the relevant responses.

Parent Report of Parent Behavior Inventory (PRPBI)

The PRPBI is the parent rating form of the Child Report of Parent Behavior Inventory (CRPBI; Margolies & Weintraub, 1977, E. Schludermann & S. Schludermann, 1970), one of the most popular measures of parenting behavior (M. Smith, 2011). Respondents rate the similarity of their parenting style to 30 items on a three-point scale where 1 = *not like*, 2 = *somewhat like*, and 3 = *like*. Factor analytic studies have identified three major dimensions of the CRPBI: acceptance versus rejection—*warmth*; psychological autonomy versus control—*psychological control*; and firm control versus lax control—*behavioral control* (Burger & Armentrout, 1971; E. Schludermann & S. Schludermann, 1970). These subscales have been shown to have good psychometric characteristics (e.g., Butler, Skinner, Gelfand, Berg, & Wiebe, 2007; Zeller, Boles, & Reiter-Purtill, 2008).

Center for Epidemiologic Studies Depression Scale (CES-D)

The CES-D is a short 20-item questionnaire designed to measure depressive symptoms in the general population (Radloff, 1977). Response options include the relative frequency of experiencing each symptom where 1 = *rarely or none of the time (< 1 day)*, 2 = *some or a little of the time (1–2 days)*, 3 = *occasionally or a moderate amount of the time (3–4 days)*, and 4 = *most or all of the time (5–7 days)* with the exception of items 4, 8, 12, and 16, which are reverse scored. An overall depression score is computed by averaging across the items, and scores above 2.05 suggest possible major depression while scores between 1.75 and 2.05 suggest mild to moderate depression. The CES-D is one of the most widely used measures of depression and has been validated across different ethnicities, languages, and regions (e.g., Roberts, 1980). The CES-D provides an overall index of depressive symptomatology that incorporates somatic, affective, and, to a lesser extent, interpersonal elements (see Shafer, 2006).

Analyses

A series of Pearson product-moment correlation coefficients were computed between parental drinking variables and externalizing and internalizing scores (T-scores) using hierarchical Bayesian models. A model of the dependencies involved in estimation of Pearson's r along with the parameter values for the various priors are presented in Figure 2.1 after the manner of Kruschke (2010a) where Greek letters (μ and τ) represent random variables and capitalized roman letters (M, T, S, R) represent scalars. T and M represent the fixed precision and mean of a normal distribution while τ and μ are the randomly distributed equivalents, and S and R represent the fixed values for the shape and rate parameters of a gamma distribution. Arrows indexed with '=' indicate deterministic relationships while arrows indexed with '$\sim$' indicate stochastic relationships. Finally, arrows indexed with ellipses '...' indicate repeated variables. An alternative graphical model, adapted from M. D. Lee and Wagenmakers (2012), using the more traditional plate notation is presented in Appendix 4.4 along with the corresponding BUGS code. Plausible differences between correlations were assessed by estimating the correlation models in parallel with an added $r_{\text{difference}}$ parameter. The mean correlation coefficient from the posterior distribution along with the 95% highest density interval (HDI) is reported for each pair of variables. One advantage of HDIs over their NHST equivalents (i.e., confidence intervals) is that because they are not based on a point estimate, they are not biased when posterior distributions are skewed (Kruschke, 2010b). Differences were considered credible only if the 95% highest density interval did not include the value 0

(i.e., analogous to the *de facto* 95% standard for NHST confidence intervals).

Minimally informed priors were used in calculating posterior estimates consistent with commonly accepted practice (e.g., Kruschke, 2010a; M. D. Lee & Wagenmakers, 2012). The mean of each variable was estimated using a Gaussian prior with low precision for its mean (e.g., $\mu \sim Normal(0, 0.001)$) and a gamma prior with small shape (*S*) and rate (*R*) parameters for its precision (e.g., $\tau \sim Gamma(0.001, 0.001)$). The prior for mean Internalizing/Externalizing scores was set to have a mean of 50 corresponding to the mean score the CBCL validation sample with a precision of .01 (equivalent to a standard deviation of 10). The priors for drinking motive and alcohol problems scores were each assigned a mean of 1 and precision of .01. Note that a large standard deviation on the prior is considered *minimally informative* because it will be largely washed out by the likelihood and have only a *minimal* impact on the posterior distribution. The minimally informative priors for Pearson's *r* values were set to a uniform distribution ranging from -1 to 1 ($r \sim Uniform(-1, 1)$).

Posterior probability estimates were estimated using Markov chain Monte Carlo methods (Gibbs sampling via JAGS). MCMC methods are able to approximate high-dimensional probability distributions by generating chains of randomly sampled values from the parameter space of interest where each subsequent step in the chain relies only on the previous step (i.e., fulfills the Markov property; see Gelman, Carlin, Stern, & Rubin, 2003; C. Robert & Casella, 2004). The Gibbs sampler is a popular MCMC algorithm considered to be the "workhorse of the MCMC world" (C. Robert & Casella, 2010, p. 199), which capitalizes on the computational efficiency of sampling from conditional distributions as opposed to directly sampling from joint distributions.[2]

We conducted three-step hierarchical regression analyses where basic demographic variables including family income, child age, child sex, and child race were entered at step one. Step two consisted of drinking consumption and drinking problems as measured by the AUDIT. Finally, Step Three involved entering coping, enhancement, and social drinking motives. The following minimally informed priors were used for the multiple linear regression analyses:

$$\beta_0 \sim Normal(50, 0.001)$$
$$\beta_j \sim Normal(0, 0.01)$$
$$\tau_y \sim Gamma(0.01, 0.01)$$

where β_0 is the intercept of the regression equation distributed normally with mean 0 and

---

[2]For an accessible overview of MCMC methods and the Gibbs algorithm in particular, see Resnik & Hardisty, 2010.
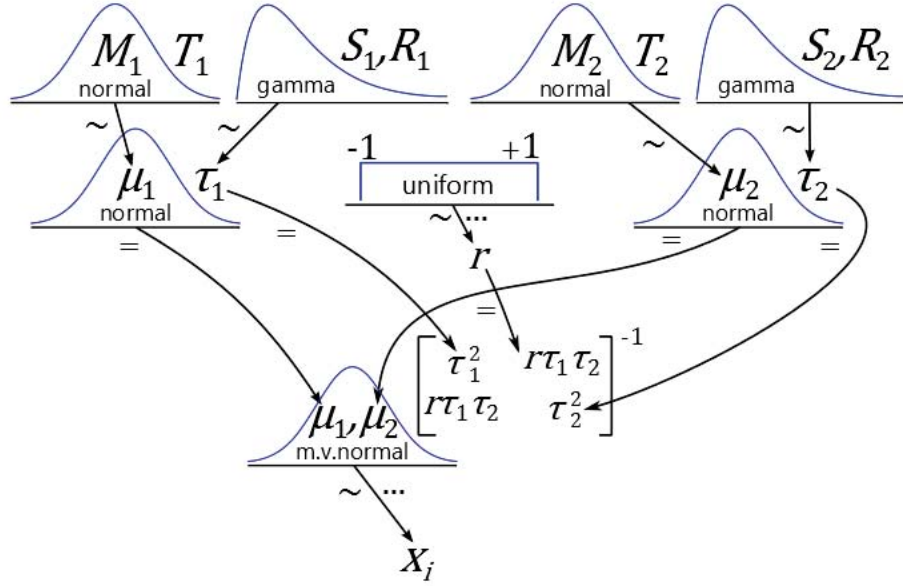
Figure 2.1: Graphical Model of Pearson Correlation Model Dependencies

precision 0.001, β_j is the regression coefficient for variable j, also distributed normally with mean 0 and precision 0.01, and τ_y is the precision of the regression estimate distributed as a gamma distribution with shape = 0.01 and rate = 0.01. See Figure 2.2 for the graphical model and Appendix 4.4 for the BUGS code.

Assessing Model Fit

Model fit between each step of the hierarchical regression model was assessed by comparing deviance information criterion (*DIC*) values. The deviance information criterion is calculated as $DIC = p_D + \bar{D}$ where p_D is the effective number of model parameters and $\bar{D}$ is the expected model deviance. $\bar{D}$ is calculated by averaging $D(\theta)$ over the MCMC samples of θ, and p_D is calculated by subtracting $D(\bar{\theta})$ from $\bar{D}$ where $D(\bar{\theta})$ is the value of D evaluated at the average of the MCMC samples θ. *DIC* has been shown to be large-sample equivalent to the natural model-robust version of the Akaike information criterion or AIC (Claeskens & Hjort, 2008). Absolute values of *DIC* are not particularly meaningful and only differences in *DIC* should be interpreted. Differences of 1–2 are considered 'negligible,' differences of 3–7 are considered 'moderate,' and differences greater than 7 are considered 'large' (Spiegelhalter, Best, Carlin, & Van Der Linde, 2002).
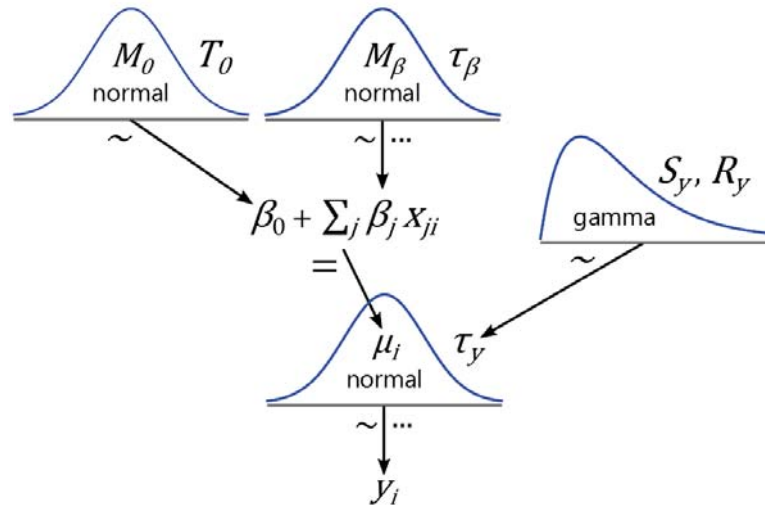
Figure 2.2: Hierarchical diagram for multiple linear regression

Bayesian p-values

Bayesian *p*-values are not interpreted in a similar fashion to frequentist *p*-values (i.e., as a statistic uniformly distributed under the null hypothesis)[3] but rather as posterior probabilities comparing replicated data to observed data (Gelman, 2007). One advantage of the MCMC simulations used to estimate the posterior sampling distribution is that they facilitate the generation of data sets y^{rep} that could have arisen from the model generated by the observed data *y*. Bayesian *p*-values are calculated as $p(y^{\text{rep}}|y)$, which probability distribution is often referred to as the posterior predictive distribution given that y^{rep} are equivalent to predictions. Thus, values of *p* close to .5 suggest that the model parameters generated data y^{rep} that are interchangeable with the observed data *y* while values close to 0 or 1 would suggest model misspecification. While Bayesian *p*-values provide a useful, informal tool for identifying possible model misspecification, they should not be considered a formal decision analysis tool due to a number of mathematical limitations such as having non-uniform distributional properties (see Metcalf, Stephens, Rees, Louda, & Keeler, 2009). In other words, Bayesian *p*-values are useful for identifying possible model misspecification, but should not be used as the basis for rejecting models or favoring one model over another.

---

[3] Andrew Gelman refers to traditional *p*-values as *u*-values to reflect such assumptions (Gelman, 2007).

Bayesian Mediation Analysis

In order to assess whether partner conflict, partner problem-solving style, child-parent conflict, parental depression, or parental style act as mediators between parental drinking motives and their children's adjustment, Bayesian mediation analysis was implemented as recommended by Yuan and MacKinnon (2009). These authors note that Bayesian mediation analysis is superior to frequentist mediation analysis, especially when dealing with small sample sizes. Bayesian inference facilitates the construction of credibility intervals for mediation effects, which are exact in finite samples. Posterior credibility intervals "do not impose restrictive normality assumptions on sampling distributions of estimates and do not rely on large sample approximations" (Yuan & MacKinnon, 2009, p. 301). This is particularly relevant when dealing with mediation because it is well known that the sampling distribution of mediation effects is not normal (e.g., Bollen & Stine, 1990; MacKinnon & Dwyer, 1993; Stone & Sobel, 1990).

Descriptives and Associations Among Variables

Descriptive statistics for study variables including means, medians, modes, standard deviations, skewness, kurtosis, minimum, maximum, ranges, Chronbach's α, and Guttman's λ_6[1] are included in Table 3.1 and Table 3.2. In the current study, the DMQ exhibited good internal consistency with the Social Motives scale having the highest degree of consistency (*mothers*: $\alpha = 0.9$, $\lambda_6 = 0.93$; *fathers*: $\alpha = 0.92$, $\lambda_6 = 0.91$) followed by the Coping Motives scale (*mothers*: $\alpha = 0.86$, $\lambda_6 = 0.85$; *fathers*: $\alpha = 0.83$, $\lambda_6 = 0.87$), and the Enhancement Motives scale (*mothers*: $\alpha = 0.75$, $\lambda_6 = 0.77$; *fathers*: $\alpha = 0.85$, $\lambda_6 = 0.85$). These ratings of internal consistency are comparable to other studies utilizing the DMQ (e.g., Adams, Kaiser, Lynam, Charnigo, & Milich, 2012; Coskunpinar & Cyders, 2012; V. V. Grant, Stewart, & Mohr, 2009; E. Kuntsche, Stewart, & Cooper, 2008; LaBrie, Ehret, Hummer, & Prenovost, 2011; Lyvers, Hasking, Hani, Rhodes, & Trew, 2010; MacLean & Lecci, 2000; Rousseau, Irons, & Correia, 2011).

Ten fathers and four mothers had total AUDIT scores in the hazardous drinking range, while only two fathers and two mothers had scores in the alcohol dependence range. Moreover, the consequences factor of the AUDIT (as measured by questions 4 through 10) tended to be quite low with median values of 0 for both parent genders. The AUDIT Total and Consequences scales exhibited adequate internal consistency within the the the present study for both mothers (*Total*: $\alpha = 0.78$, $\lambda_6 = 0.93$; *Consequences*: $\alpha = 0.88$, $\lambda_6 = 0.95$) and fathers (*Total*: $\alpha = 0.75$, $\lambda_6 = 0.86$; *Consequences*: $\alpha = 0.77$, $\lambda_6 = 0.84$) consistent with other empirical reports (e.g., Allen et al., 1997; O'Hare & Sherrer, 1999); however, the AUDIT consumption score exhibited poor internal consistency for both mothers ($\alpha = 0.48$, $\lambda_6 = 0.53$) and fathers ($\alpha = 0.15$, $\lambda_6 = 0.09$).

The distributions of internalizing and externalizing scores are presented in Figure 3.1. Most parents rated their children in the average range for externalizing and internalizing problems (75% and 64.9% of parents respectively); however, there were still a substantial percentage of parents who rated their child as either in the borderline clinical range (10.8% for externalizing and 15.3% for internalizing) or in the clinical range (14.2% for externalizing and 19.8% for internalizing). Parents' ratings of internalizing and externalizing symptoms were correlated, $r = 0.44$, 95% *HDI*[0.34, 0.53]. Agreement between parents' ratings of the same child appeared to be moderately correlated for internalizing ratings ($r = .32$, 95% *HDI*[.18, .47]) and strongly correlated for externalizing

---

[1]Note that Guttman's λ_6 is an alternative to Chronbach's α, which considers the variance in each item that can be accounted for by the linear regression of all other items (Revelle, 2012). λ_6 is more robust than Chronbach's α and is sensitive to the 'lumpiness' of a test.

Table 3.1: Descriptive Statistics for Main Study Variables

Scale	min	max	mean	median	mode	SD	skewness	kurtosis	α	λ_6	$\bar{r}_{\text{inter-item}}$
Demographics											
Mother's Age	22	58	38.29	38	38	7.11	0.14	−0.47			
Father's Age	24	59	39.98	40	37	6.86	0.25	−0.04			
Child's Age	6	12	8.76	9	7	1.95	0.14	−1.23			
Family Income ($1,000s)	0	203	64.6	60.5	58	37.3	1	1.7			
Mother's Education (years)	11	20	15.78	16	16	2.26	−0.23	−0.83			
Father's Education (years)	9	20	15.52	16	16	2.69	−0.2	−1.12			
Number of Children in Family	1	5	1.79	1	1	1.01	1.17	0.54			
Years Married/Cohabitating	2	31	13.58	14	16	6.06	0.27	0.15			
Parental Drinking Motives (DMQ)											
Mother's Coping Motives	1	4.8	1.38	1	1	0.7	2.46	6.45	0.86	0.85	0.56
Mother's Enhancement Motives	1	5.4	1.86	1.8	1	0.83	1.08	1.6	0.75	0.77	0.36
Mother's Social Motives	1	5.8	2.56	2.6	2.6	1.1	0.49	−0.11	0.9	0.93	0.66
Father's Coping Motives	1	4.2	1.39	1	1	0.64	1.85	3.21	0.83	0.87	0.47
Father's Enhancement Motives	1	6	2.1	1.8	1	1.04	1.11	0.98	0.85	0.85	0.54
Father's Social Motives	1	6	2.55	2.6	1	1.22	0.46	−0.45	0.92	0.91	0.69
Parent's Alcohol Problems (AUDIT)											
Mother's Consumption	0	6	1.73	2	1	1.29	0.96	1.13	0.48	0.53	0.31
Mother's Consequences	0	21	0.42	0	0	1.95	8.58	83.78	0.88	0.95	0.55
Mother's Total	0	24	2.13	2	1	2.66	4.69	31.95	0.78	0.93	0.39
Father's Consumption	0	8	2.4	2	2	1.92	1.15	0.98	0.61	0.64	0.38
Father's Consequences	0	11	0.53	0	0	1.72	4.25	19.37	0.78	0.83	0.43
Father's Total	0	18	2.89	2	2	3.14	2.38	6.81	0.75	0.86	0.35
Child Adjustment (CBCL)											
Mother's Report of Internalizing Problems	33	72	55.42	56	52	8.89	−0.23	−0.29	0.76	0.83	0.11
Mother's Report of Externalizing Problems	33	72	53.44	55	59	9.27	−0.32	−0.39	0.84	0.88	0.15
Father's Report of Internalizing Problems	33	74	54.42	54	52	9.62	−0.18	−0.79	0.79	0.84	0.12
Father's Report of Externalizing Problems	33	74	53.97	53.5	44	8.84	0.03	−0.27	0.86	0.92	0.18

Table 3.2: Descriptive Statistics for Mediator Variables

Scale	min	max	mean	median	mode	SD	skewness	kurtosis	α	λ_6	$\bar{r}_{\text{inter-item}}$
Conflicts and Problem-Solving Scales (CPS)											
Mother's Marital Conflict	2	11	5.93	6	6	1.95	0.18	−0.26	0.66	0.5	0.5
Father's Marital Conflict	2	11	6.01	6	6	2.02	0.33	−0.37	0.75	0.6	0.6
Mother's Collaborative Problem Solving	2.5	4	3.64	3.67	4	0.37	−1.02	0.47	0.79	0.78	0.39
Father's Collaborative Problem Solving	1.83	4	3.56	3.67	4	0.4	−1.11	1.71	0.76	0.77	0.36
Mother's Aggressive Problem Solving	1.25	3.88	2.48	2.5	2.62	0.51	−0.08	−0.29	0.82	0.83	0.37
Father's Aggressive Problem Solving	1.12	3.5	2.34	2.38	2.12	0.5	−0.18	−0.57	0.8	0.81	0.34
Parent-Child Conflict Tactics Scale (CTSPC)											
Mother-Child Physical Conflict	0.25	5	1.92	1.62	1.5	1.01	0.85	0.31	0.41	0.36	0.15
Father-Child Physical Conflict	0.25	6	1.96	1.75	1.25	1.07	1.05	1.02	0.4	0.39	0.16
Mother-Child Verbal Conflict	0.8	5.2	3.05	3.1	3.4	0.97	0.05	−0.64	0.45	0.61	0.17
Father-Child Verbal Conflict	0.8	5.6	2.91	2.8	2.2	1.05	0.3	−0.53	0.32	0.52	0.1
Center for Epidemiologic Studies Depression Scale (CES-D)											
Mother's Depression	1	3.05	1.42	1.3	1.1	0.4	1.74	3	0.89	0.92	0.29
Father's Depression	1	3.05	1.41	1.3	1	0.41	1.66	2.69	0.89	0.93	0.3
Parent Report of Parent Behavior Inventory (PRPBI)											
Mother's Warmth	1	2.06	1.33	1.28	1.22	0.23	0.77	0.05	0.77	0.83	0.18
Father's Warmth	1	2.28	1.43	1.39	1.39	0.25	0.71	0.76	0.77	0.83	0.18
Mother's Behavioral Control	2.25	3	2.85	2.88	3	0.15	−1.33	1.86	0.69	0.72	0.11
Father's Behavioral Control	1.94	3	2.85	2.94	2.94	0.2	−2.28	5.94	0.83	0.85	0.22
Mother's Psychological Control	2	2.93	2.64	2.67	2.8	0.2	−0.71	−0.07	0.6	0.67	0.1
Father's Psychological Control	1.6	3	2.61	2.67	2.8	0.27	−1.13	1.03	0.77	0.81	0.19

Figure 3.1: Histograms and Density Estimates of Children's Adjustment
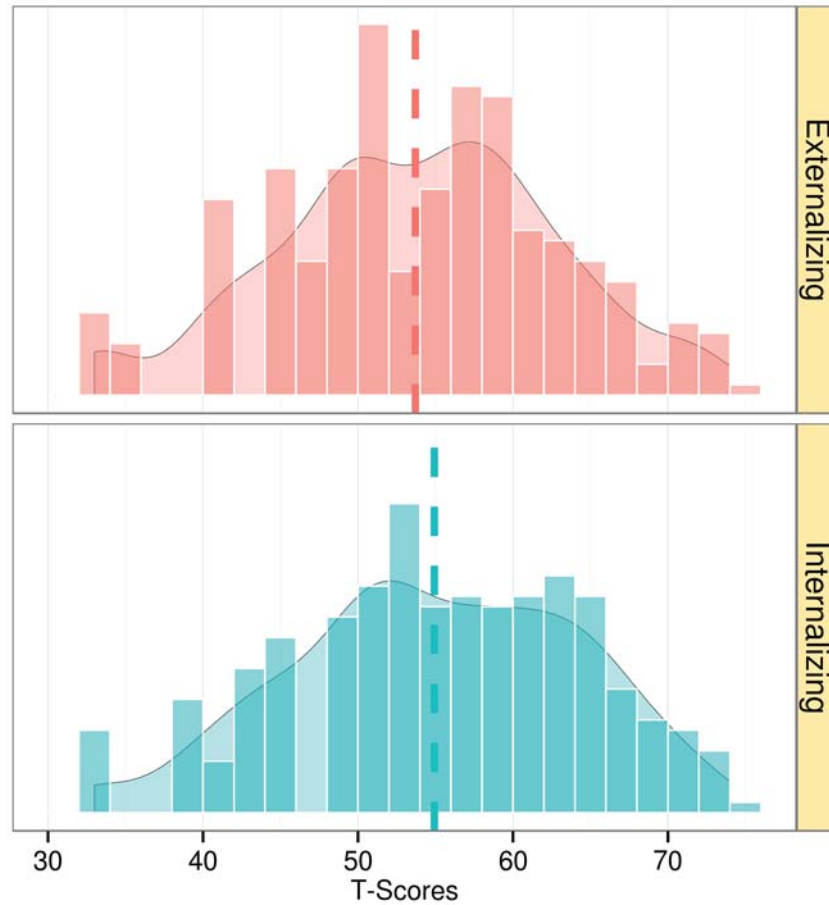
ratings ($r = .47$, 95% *HDI*[.35, .60]). Percent agreement for clinical classifications followed a similar pattern with higher agreement for externalizing psychopathology (74.63%) than internalizing psychopathology (55.97%). All additional analyses were conducted after averaging ratings of internalizing and externalizing symptoms across parents. The Externalizing Problems scale exhibited slightly higher internal consistency (*mothers*: $\alpha = 0.84$, $\lambda_6 = 0.88$; *fathers*: $\alpha = 0.86$, $\lambda_6 = 0.92$) than the Internalizing Problems scale (*mothers*: $\alpha = 0.76$, $\lambda_6 = 0.83$; *fathers*: $\alpha = 0.79$, $\lambda_6 = 0.84$), which is consistent with previous research (e.g., Fanti & Henrich, 2010).

   Correlations between demographic variables and internalizing and externalizing symptoms are presented in Figure 3.2 while correlations between alcohol measures are presented separately for each parent in Figure 3.3. Ratings of internalizing and

Figure 3.2: Correlation plot for demographic variables and children's adjustment
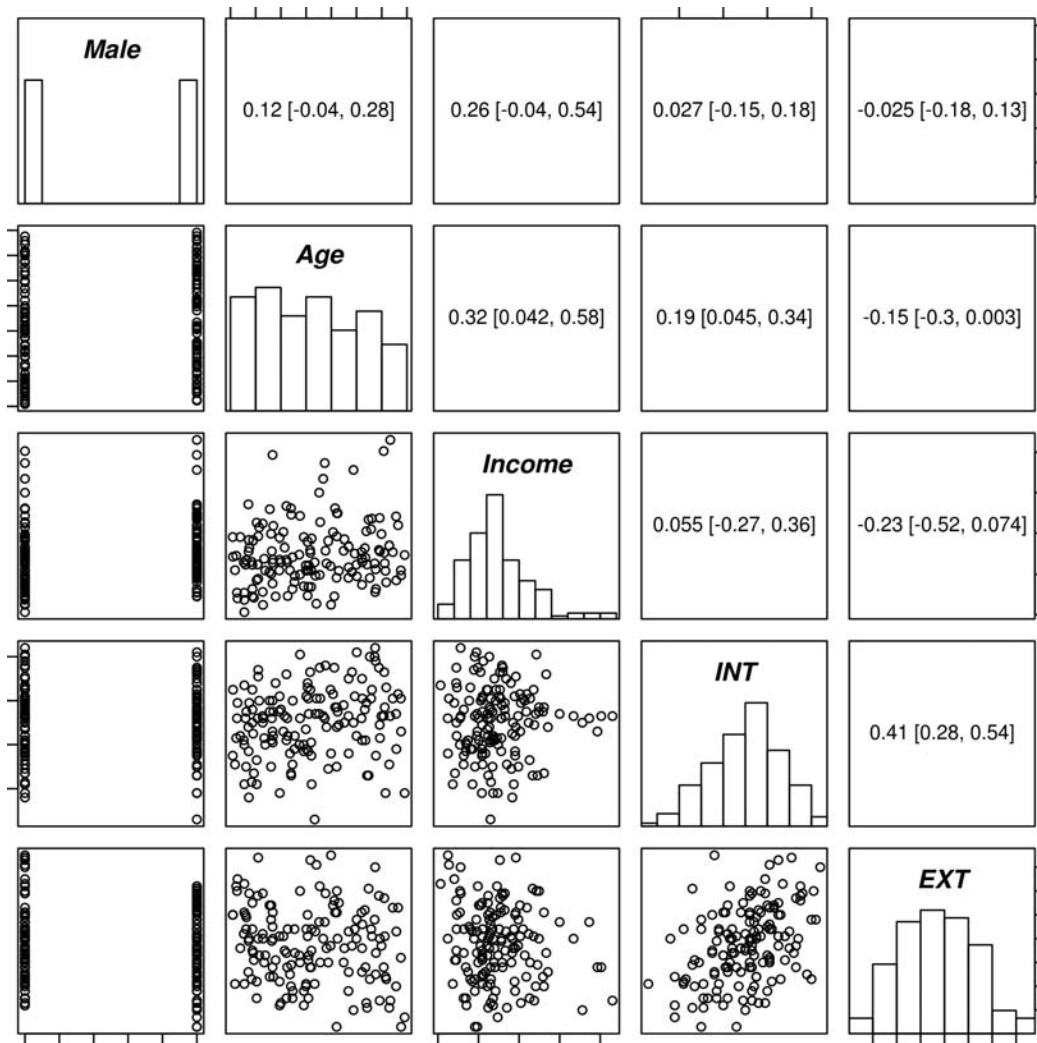
externalizing symptoms did not differ as a function of child gender, minority status, or family income; however, child age was positively correlated with internalizing symptoms, $r = .19$, 95% *HDI*[.04, .34], and inversely correlated with externalizing symptoms, $r = -.15$, 95% *HDI*[-.3, .003]. Mothers and fathers' AUDIT scores were not reliably correlated to their children's internalizing symptoms ($r = .07$, 95% *HDI*[-0.1, 0.23] and $r = .02$, 95% *HDI*[-.14, .18]) or externalizing symptoms ($r = .04$, 95% *HDI*[-0.11, 0.20] and $r = -.08$, 95% *HDI*[-.23, .10] respectively).

Figure 3.3: Correlation plots for drinking variables seperated by parent

Mothers' Ratings

AUDIT			
		0.68 [0.58, 0.75]	0.47 [0.34, 0.59]	0.47 [0.34, 0.59]

(Cope, 0.46 [0.33, 0.58], 0.46 [0.34, 0.58]; Enhance, 0.63 [0.53, 0.72]; Social)

Fathers' Ratings

(AUDIT; 0.51 [0.38, 0.63], 0.63 [0.53, 0.72], 0.55 [0.44, 0.65]; Cope, 0.59 [0.48, 0.69], 0.48 [0.36, 0.61]; Enhance, 0.74 [0.66, 0.81]; Social)
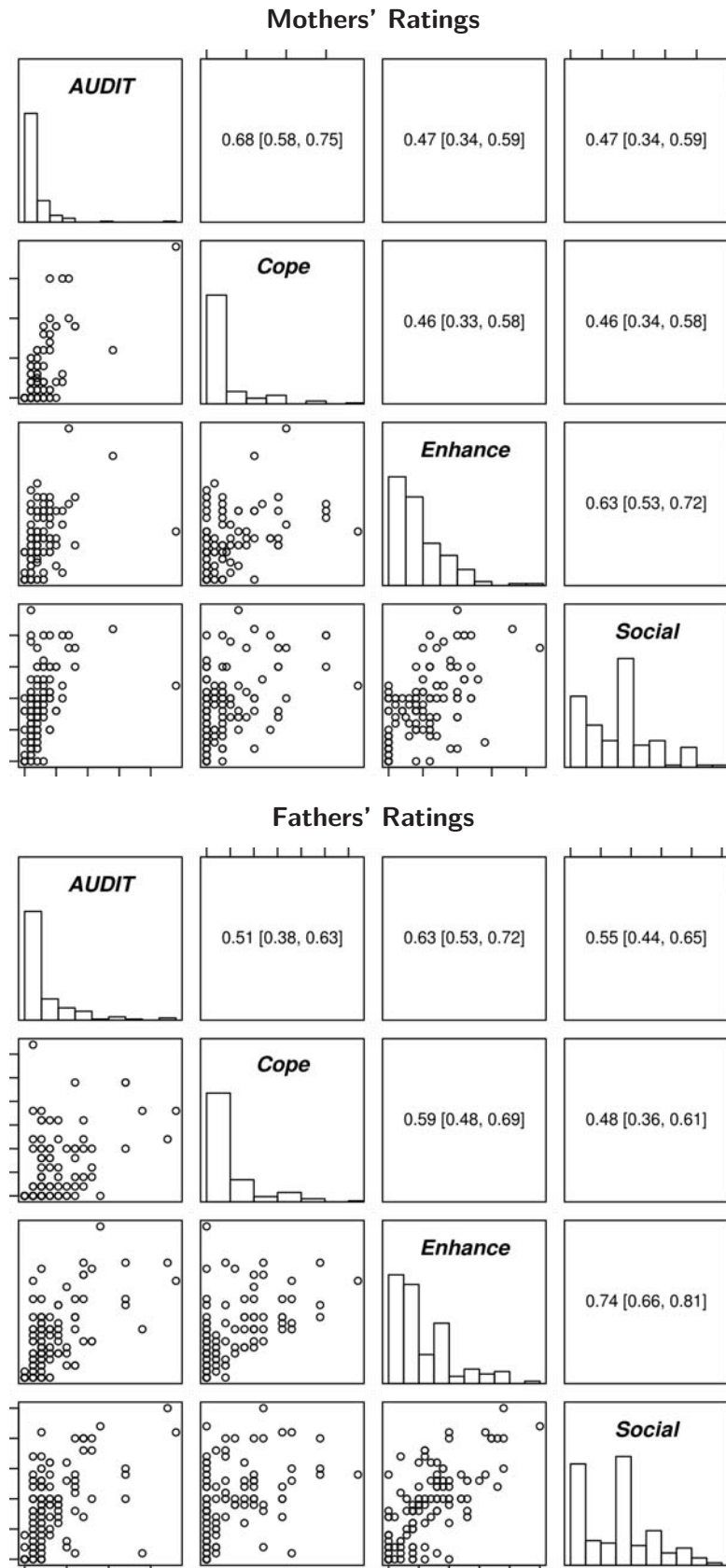
Hierarchical Regression Analyses

In order to test whether parental drinking motives provide meaningful gains in predicting their children's internalizing and externalizing symptoms, data were modeled as a series of hierarchical multiple regressions and then analyzed using Bayesian inferential procedures (Kruschke, 2010a). Demographic variables including family income, child's age, gender, and racial minority status were controlled for by entering them in the initial step of the analyses. The second step included the two components of the AUDIT: alcohol consumption (AUDIT-consumption) and negative consequences (AUDIT-consequences). In the third and final step of the model, coping, enhancement, and social drinking motives were added. Mothers' and fathers' alcohol use patterns and motives were analyzed separately. Because internalizing and externalizing symptoms as measured by the CBCL were also analyzed separately, a total of four sets of models were analyzed. Results are reported in Table 3.3 along with deviance information criterion values (DIC), and Bayesian p-values for each step in the model.

The pattern of findings was mixed. DIC values were compared for each step in each model. In no case did the inclusion of AUDIT scores substantially improve the model fit. For mothers, the addition of drinking motives led to substantial improvement in model fit for internalizing problems (ΔDIC = 8.6) and a negligible improvement in fit for externalizing problems (ΔDIC = 1.3). For fathers, the addition of drinking variables led to substantially worse model fit (ΔDIC = -6.6 and -7.2 for internalizing and externalizing problems respectively) due to an increase in the number of effective parameters and a negligible increase in model fit. For ease of interpretation, frequentist analyses were also conducted on the models revealing effects sizes of ΔR^2s of .096 (p = .002) for mothers' drinking motives on internalizing problems and .064 (p = .022) for mothers' drinking motives on externalizing problems. The equivalent ΔR^2s for fathers' drinking motives were respectively .027 (p = .29) and .031 (p = .22) for internalizing and externalizing problems.

Mothers' self-reported enhancement motives were inversely related to their children's internalizing symptoms (B = -2.98, 95% HDI[-4.98, -0.72]) and externalizing symptoms (B = -2.55, 95% HDI[-4.80, -0.45]) while mothers' social drinking motives were positively related to their children's internalizing symptoms (B = 2.91, 95% HDI[1.33, 4.51]) and externalizing symptoms (B = 2.04, 95% HDI[0.34 3.60]). On the other hand, mothers' self-reported coping motives were not related to either internalizing symptoms (B = 0.44, 95% HDI[-2.03, 2.94]) or externalizing symptoms (B = 1.61, 95% HDI[-1.17, 4.18]). Fathers' self-reported drinking motives (coping, enhancement, and social) were

not related to their children's internalizing or externalizing symptoms (see Table 3.3).

Mediator Analyses

Given the failure to identify any relation between paternal drinking motives and children's adjustment, mediator analyses were restricted to maternal drinking motives only. Potential mediators were identified by regressing them upon the full model used above (i.e., with demographic variables, AUDIT scores, and drinking motives) using a similar set of minimally informed priors. The following variables were tested: partner conflict, partner collaboration, and partner aggression from the CPS, child-parent physical aggression and verbal aggression from the CTSPC, depression as measured by the CES-D, and parental warmth, behavioral control, and psychological control as measured by the PRPBI. In the majority of cases maternal drinking motives were not predictive of these variables; however, there were a couple of notable exceptions. Maternal enhancement drinking motives were positively related to collaborative partner problem-solving ($B = 0.114$, 95% HDI[0.02, 0.21]) and negatively related to maternal depression ($B = -0.113$, 95% HDI[-0.22, 0.02]). Also, maternal coping drinking motives were positively related to maternal depression ($B = 0.250$, 95% HDI[0.13, 0.37]) and verbal child-parent conflict ($B = 0.372$, 95% HDI[0.06, 0.69]).

These three variables (maternal collaborative problem-solving, depression, and child-parent verbal conflict) were then tested by augmenting them to the full models predicting children's internalizing and externalizing symptoms. Only maternal depression was predictive of children's internalizing symptoms ($B = 3.91$, 95% HDI[0.36, 7.14]). However, all three variables were predictive of externalizing symptoms (depression: $B = 5.01$, 95% HDI[1.55, 8.58]; collaborative problem-solving: $B = -3.57$, 95% HDI[-7.10, -0.14]; verbal parent-child conflict: $B = 1.90$, 95% HDI[0.59, 3.19]).

Finally, mediation effect sizes ($\alpha\beta$) were examined using both Bayesian and frequentist analyses. For the Bayesian analyses (Yuan & MacKinnon, 2009), in no case were the mediation effects credibly different from zero. Frequentist analyses confirmed no significant mediating effects between maternal drinking motives and their children's adjustment (all p-values $> .05$).

Table 3.3: Regression analyses of parental drinking motives on children's adjustment

| | Internalizing Symptoms | | | | | | Externalizing Symptoms | | | | | |
| | Mothers | | | Fathers | | | Mothers | | | Fathers | | |
Variable	B	95%HDI	SE	B	95%HDI	SE	B	95%HDI	SE	B	95%HDI	SE
Step 1												
Intercept	55.21	[54.03, 56.44]	0.62	54.64	[53.42, 55.97]	0.64	53.78	[52.58, 55.07]	0.65	54.66	[53.44, 55.92]	0.64
Age	0.87	[0.25, 1.51]	0.33	0.61	[-0.09, 1.28]	0.35	-0.51	[-1.17, 0.15]	0.35	0.60	[-0.12, 1.29]	0.36
Gender[a]	0.58	[-1.96, 3.03]	1.30	0.19	[-2.49, 2.62]	1.30	0.11	[-2.49, 2.76]	1.36	0.17	[-2.22, 2.68]	1.29
Race[b]	-0.97	[-4.28, 2.50]	1.74	-0.78	[-4.10, 2.51]	1.67	-0.25	[-3.81, 3.27]	1.80	-0.81	[-3.82, 2.65]	1.68
Family Income	0.01	[-0.03, 0.04]	0.02	0.01	[-0.02, 0.04]	0.02	-0.02	[-0.05, 0.02]	0.02	0.01	[-0.02, 0.04]	0.02
DIC; Bp	1023.6; .509			981.9; .507			1026.1; .506			982.3; .516		
Step 2												
AUDIT-consumption	-0.49	[-1.91, 0.79]	0.69	-0.17	[-1.15, 0.79]	0.49	-1.14	[-2.40, 0.36]	0.69	-0.18	[-1.11, 0.81]	0.49
AUDIT-consequences	0.46	[-0.30, 1.27]	0.41	-0.19	[-1.11, 0.68]	0.46	0.05	[-0.76, 0.89]	0.42	-0.18	[-1.13, 0.65]	0.46
DIC; Bp	1024.6; .521			985.8; .510			1027.7; .502			985.8; .506		
Step 3												
Coping	0.44	[-2.03, 2.94]	1.26	1.42	[-1.21, 4.02]	1.33	1.61	[-1.17, 4.18]	1.34	1.41	[-1.26, 3.96]	1.34
Enhancement	-2.98	[-4.98, -0.72]	1.09	-0.36	[-2.54, 1.66]	1.07	-2.55	[-4.80, -0.45]	1.11	-0.40	[-2.43, 1.83]	1.08
Social	2.91	[1.33, 4.51]	0.82	0.97	[-0.83, 2.64]	0.89	2.04	[0.34, 3.60]	0.84	0.99	[-0.83, 2.68]	0.89
DIC; Bp	1015.; .545			988.5; .522			1024.8; .523			989.5; .508		

Note. [a]Girls = 0, boys = 1; [b]Other = 0, Caucasians = 1; DIC = deviance information criterion; Bp = Bayesian p-value; HDI = highest density interval.

29

Table 3.4: Longitudinal analysis of parental drinking motives on children's adjustment

| | Internalizing Symptoms | | | | | | Externalizing Symptoms | | | | | |
| | Mothers | | | Fathers | | | Mothers | | | Fathers | | |
Variable	B	95%HDI	SE	B	95%HDI	SE	B	95%HDI	SE	B	95%HDI	SE
Step 1												
Intercept	0.06	[-4.00, 4.14]	2.05	-0.03	[-3.59, 3.92]	1.89	-0.02	[-2.81, 2.50]	1.32	0.04	[-3.56, 3.67]	1.82
Age	0.03	[-0.77, 0.73]	0.37	-0.01	[-0.65, 0.75]	0.35	-0.57	[-1.42, 0.08]	0.38	-0.34	[-1.06, 0.29]	0.34
Gender[a]	-3.50	[-12.92, 5.90]	4.78	4.40	[-4.22, 13.01]	4.33	2.45	[-4.11, 8.02]	2.99	6.35	[-2.03, 14.59]	4.23
Race[b]	-15.05	[-30.19, -0.11]	7.52	-1.95	[-14.46, 11.88]	6.68	-1.12	[-8.14, 6.64]	3.68	2.29	[-10.69, 14.78]	6.54
Family Income	0.06	[-0.05, 0.19]	0.06	-0.02	[-0.12, 0.09]	0.05	0.05	[-0.03, 0.13]	0.04	0.06	[-0.04, 0.17]	0.05
DIC; Bp		186.9; .548			182.1; .541			182.8; .527			193; .541	
Step 2												
T1 Symptoms	-4.54	[-10.56, 1.51]	3.04	0.35	[-4.85, 6.51]	2.88	0.18	[-1.01, 1.44]	0.62	0.80	[-4.60, 6.34]	2.75
DIC; Bp		186.9; .540			176.1; .562			160.6; .536			180.8; .537	
Step 3												
T1 AUDIT	-4.54	[-10.56, 1.51]	3.04	0.35	[-4.85, 6.51]	2.88	0.18	[-1.01, 1.44]	0.62	0.80	[-4.60, 6.34]	2.75
DIC; Bp		186.7; .534			181.7; .555			165.1; .540			182.3; .539	
Step 4												
T1 Coping	0.66	[-8.30, 10.87]	4.74	1.15	[-6.42, 9.88]	4.17	-1.70	[-9.78, 7.24]	4.25	2.41	[-5.78, 10.61]	4.20
T1 Enhancement	3.08	[-7.29, 12.27]	5.01	-2.13	[-11.96, 7.72]	4.93	0.46	[-2.92, 3.75]	1.69	-4.31	[-13.34, 4.95]	4.55
T1 Social	1.80	[-4.64, 7.48]	3.08	0.62	[-4.32, 5.97]	2.59	-0.57	[-4.45, 3.23]	1.95	-1.18	[-6.00, 4.78]	2.72
DIC; Bp		198.4; .525			193.4; .538			177.5; .544			193.6; .561	

Note. [a]Girls = 0, boys = 1; [b]Other = 0, Caucasians = 1; *DIC* = deviance information criterion; *Bp* = Bayesian p-value; *HDI* = highest density interval.

Additional Analyses

Seeking to clarify the relation between parental drinking motives and child internalizing and externalizing problems, we conducted a series of additional statistical analyses. First, we tested possible interactions among drinking motive and between drinking motives and alcohol consumption by including the cross product of the relevant variables as an additional step in our model (i.e., coping x enhancement, coping x social, enhancement x social, coping x AUDIT-consumption, etc.). Results suggested no interaction effects with interaction terms leading to decreased model fit. Second, we looked for the presence of curvilinear relations by using a variety of power functions on the drinking motive variables—none of which led to any noticeable gains in model fit. Finally, we conducted longitudinal analyses on a subset of the data.

A small number of participants in the study had participated in an earlier study (T1) in our lab that included measures of alcohol use problems (i.e., AUDIT) and drinking motives (i.e., DMQ). Overall, 24 children participated in both studies. Similar to our primary analyses above, a series of hierarchical regression models were generated and then evaluated using Bayesian data analytic techniques. Each set of models consisted of demographic variables (step 1), internalizing/externalizing symptoms measured at time 1 (T1; step 2), T1 AUDIT scores (step 3), and T1 drinking motives (step 4). Results are presented in Table 3.4. T1 AUDIT and drinking motive scores did not improve the fit of any of the models predicting internalizing/externalizing problems at T2.

Chapter 4: Discussion

Overview

Researchers examining the impact of parental drinking on children's adjustment have typically treated drinking behavior as a unitary phenomenon; however, there is ample evidence to suggest that drinking behavior is highly dependent upon contextual and motivational factors. In the first ever study of the influence of parental drinking motives on their children's psychological adjustment, 288 parents completed questionnaires measuring their own alcohol use, drinking motives, familial conflict, depression, parenting behavior, and their children's adjustment. We made three main hypotheses: (a) drinking motives would predict children's adjustment, (b) coping motives would be associated with worse outcomes than enhancement and social drinking motives, and (c) the relation between parental drinking motives and children's adjustment would be mediated by family conflict, parental depression, and parenting style. Our first and third hypotheses were partially supported by our findings; however, our second hypothesis was not.

Do Parental Drinking Motives Predict Children's Adjustment?

Our hypothesis that parental drinking motives would provide incremental predictive ability of children's adjustment over a measure of problematic drinking received mixed support. Specifically, mothers' drinking motives were found to account for some of the variance in their children's internalizing and externalizing problems while fathers' drinking motives were found to be unrelated to their children's adjustment. Maternal drinking motives proved to be much more predictive of children's adjustment than maternal problem drinking, which, contrary to expectations was not predictive of adjustment problems in the current study. The finding that father's drinking behaviors and motivations did not relate to ratings of their children's internalizing and externalizing symptoms was somewhat surprising. There is some evidence to suggest that mother's psychopathology may be more important in predicting children's internalizing problems than father's psychopathology (Connell & S. H. Goodman, 2002); however, previous research has suggested a greater impact of father's substance abuse than mothers' substance abuse on children's adjustment (see Connell & S. H. Goodman, 2002). It is not clear how to square our findings with the growing literature recognizing the importance of father's influence on their children's adjustment (e.g., Ang, 2006; Kane, Garber, et al., 2004). One possibility is that our study was limited by a relatively small amount of hazardous drinkers. It is possible that a large number of fathers who were classified as "light drinkers" masked the detrimental impact of fathers who were classified as "heavy

drinkers" (the sample only included 2 fathers classified as "alcohol dependent" on the AUDIT and only 10 classified as "hazardous drinkers").

Are Coping Drinking Motives the Most Harmful?

Our second hypothesis was that coping drinking motives would be the strongest predictor of children's adjustment problems followed by by enhancement and social drinking motives. This hypothesis was not supported by our findings. In fact, we found that parental coping motives were unrelated to children's adjustment even when accounting for possible mediators such as parental depression and parent-child conflict. Mothers' social and enhancement drinking motives were related to children's adjustment; however, counter-intuitively, self-reported maternal enhancement motives were *positively* related to their children's adjustment. Thus, the class of drinking motives that we predicted to be the most benign — social motives — was actually the strongest predictor of negative outcomes. We discuss this finding in more detail below while discussing the clinical implications of our study's results.

What Mediates the Relation?

We posited that the relation between parents' drinking motives and their children's adjustment would be mediated by family conflict (including both parent-parent conflict and parent-child conflict), conflict resolution approach, parental depression, and parenting style. Restricting our analyses to maternal drinking motives, we found that maternal enhancement drinking motives predicted increased collaborative conflict resolution and decreased maternal depression. Furthermore, maternal collaborative conflict resolution was associated with less internalizing problems while maternal depression was associated with more internalizing problems. While the indirect mediation term (i.e., $\alpha\beta$) was not credibly different from zero for these two variables, our investigation raises the possibility that maternal collaborative conflict resolution and maternal depression are important intervening variables between maternal drinking motives and children's internalizing psychopathology.

One possible explanation for the positive link between maternal enhancement drinking motives and children's adjustment is enhancement motives' association with *approach motivation*. Approach motivation can be defined as "the energization of behavior by, or the direction of behavior toward, positive stimuli (objects, events, possibilities)" (Elliot, 2006, p. 112). Consistent with this hypothesis, our meta-analysis of the Drinking Motives Questionnaire (see Appendix 4.4) found some evidence for a limited relation between

enhancement drinking motives and extroversion (r = .13, 95% *HDI*[.05, .21]) as well as positive affect (r = .12, 95% *HDI*[-.03, .30]). Approach motivations have also been shown to be inversely related to depression (Dickson & MacLeod, 2004a, 2004b; Sideridis, 2005), which helps explain the inverse relation we observed between maternal enhancement motives and maternal depression. Moreover, the 'energization of behavior' towards positive possibilities would explain the positive relationship we observed between enhancement drinking motives and higher levels of collaborative conflict resolution. Ostensibly, collaborative conflict resolution efforts may be motivated by increased sensitivity to the possible rewards of collaborative as opposed to aggressive or avoidance conflict resolution tactics.

It is also possible that enhancement drinking motives lead to decreased sensitivity towards the risks of engagement. Our meta-analysis found that enhancement motives correlate positively with both sensation-seeking (r = .35, 95% *HDI*[.24, .46]) and risky behavior (r = .16, 95% *HDI*[.06, .27]; Appendix 4.4).[1] Previous research has linked parental behavioral inhibition (i.e., social anxiety and avoidance) to increased rates of children's problem behaviors (Rettew, Stanger, McKee, Doyle, & Hudziak, 2006; Rinaldi & Howe, 2012; L. R. Williams et al., 2009). On the other hand, authoritative parenting, which is marked by both high levels of engagement and responsivity, has been repeatedly linked to positive adjustment outcomes in children (Amato & Gilbreth, 1999; Paulussen-Hoogeboom, Stams, Hermanns, Peetsma, & van den Wittenboer, 2008; Rinaldi & Howe, 2012; Suldo & Huebner, 2004; L. R. Williams et al., 2009). Thus, the pot-valiant effects associated with maternal enhancement drinking motives may lead to better children's outcomes due to a corresponding increase in parental engagement and decrease in parental avoidance.

––––––––––––––––––––––––

[1]A decreased sensitivity to negative cues may even extend to ratings of their children's behaviors. Just as depressed mothers have been shown to overreport problems in their children (Chilcoat, Breslau, et al., 1997; Clarke-Stewart, Allhusen, McDowell, Thelen, & Call, 2003; Gartstein, Bridgett, Dishion, & Kaufman, 2009; Najman, G. M. Williams, et al., 2000; Najman, G. Williams, et al., 2001), it is possible that enhancement motives may be associated with underreporting of children's problems. The evidence for this latter hypothesis will have to be assessed in a future study.

Clinical Implications

> "It is 2:30 a.m., Mom and Dad are still staggering around, screaming at each other. The last guest just left. I helped shove her out the door. Before leaving she managed to drop her drink in the vestibule and I had to clean up the broken glass. My parents were too smashed to notice.
>
> I am writing because I know I won't be able to sleep until dawn. After a party like this Mom and Dad fight all night. She accuses him of making passes at other women and he says she is crazy and he is going to put her in a mental institution…"
>
> — Landers, 1967

The above quotation comes from a young man who wrote to an advice columnist complaining about his "social drinker" parents. The recounting of his parents' intoxicated behavior provides anecdotal evidence that social drinking motives are not always innoxious and may in fact be quite detrimental to children's psychological adjustment. There has long been the realization that to truly understand how alcohol influences human behavior, we must take into account sociocultural factors (Heath, 1981). One of the most unexpected findings in our study was that maternal social drinking motives were the *strongest* predictor of adjustment problems. Our meta-analysis of the DMQ (Appendix 4.4) suggests that social drinking motives may be more harmful than previously thought. Not only are social drinking motives strongly correlated to both drinking quantity and frequency, they are more highly correlated to binge drinking/heavy episodic drinking than coping motives ($r = .38$, 95% HDI[.32, .44)] versus $r = .24$, 95% HDI[.20, .29)]). Social drinking motives are the most prevalent type of drinking motive (E. Kuntsche, Knibbe, Gmel, & Engels, 2006) and are less likely to be coupled with acknowledgement that alcohol impairs one's functioning. One recent study found that drinking in the context of social facilitation was significantly predictive of alcohol abuse while drinking in other contexts (e.g., emotional pain, family, and peer-acceptance) was not predictive of alcohol abuse after accounting for the influence of social facilitation (Beck, Caldeira, Vincent, & Arria, 2013).

Social drinking motives have recently been highlighted as a neglected target for treatment of alcohol use disorders (Van Damme et al., 2013). Our findings suggest that social drinking motives, *especially maternal social drinking motives*, may be important to address as intervention targets when young children remain in the home. One way in

which social motives could be addressed within a clinical context is by challenging perceived subjective norms for consuming alcohol (see A. D. Berkowitz, 2005). Previous interventions have had some success in reducing drinking behavior by correcting exaggerated norms of alcohol consumption (Kypri et al., 2004); however, norms of consumption rates may not be as important as perceived injunctive norms supporting alcohol use (e.g., Trockel, Williams, & Reis, 2003) and alcohol-related group identity norms (Rimal & Real, 2005) when it comes to predicting alcohol-related problems.

One useful target for norms-based interventions may be to focus on correcting misconceptions surrounding the term "social drinker." This unfortunate classification is often used both popularly and in research to refer to either (a) someone who drinks in moderation, (b) someone who drinks with others, (c) someone who is socially motivated to drink, and (d) someone who behaves more socially while under the influence of alcohol. The confounding of drinking motives, context, quantity, and outcome is problematic because these facets of alcohol consumption behavior are not always positively correlated (see Appendix 4.4). This conflation can have a negative impact because being a "social drinker" has a responsible connotation that is contrasted with the irresponsible or pathological connotation associated with being classified as a "problem drinker" (Gusfield, 1984). Given the reduced level of stigmatization associated with being a social drinker (Kilty, 1981), it is not surprising that individuals with alcohol use disorders typically describe themselves as social drinkers despite their problematic alcohol use (Daeppen, 1999).

Limitations and Future Directions

Previous research has highlighted the limitations of parental and family influences in predicting adverse child outcomes (Mesman & Koot, 2001). However, before addressing the current study's limitations, it is worth highlighting some of the study's strengths. First, the study utilized Bayesian data analytic procedures which have numerous advantages over traditional NHST and its reliance on *p*-values (see *Rationale for Bayesian Approach* section above). Second, the sample size of 288 parents was slightly larger than average for a study of its kind. Third, we were able to examine the influence of both fathers' and mothers' drinking motives separately. Finally, we were able to analyze a variety of well-validated measures using multiple statistical techniques (e.g., mediator analysis, longitudinal analysis, etc.).

In spite of these strengths, the results of our study must be interpreted with consideration of its limitations. One such limitation is that we were not able to adequately

delineate the process by which drinking motives influence children's internalizing and externalizing behaviors. While we identified potential mediating variables between maternal enhancement drinking motives and children's positive adjustment including collaborative conflict resolution and maternal depression, the actual indirect effects for these variables were not credibly different from zero. Thus, the mechanisms by which maternal drinking motives influence their children's adjustment remain equivocal and necessitate further research into other possible mediators. While we tested a simple mediation model in the current study, the actual relation between drinking motives and parents' behavior, environment, and personality is likely complex and, in many cases, bidirectional and causally multiplicative (see Cui, Donnellan, & Conger, 2007). Future studies may provide additional insight by implementing more complex statistical analyses that take multiple mediators into account simultaneously and also factor in the measurement error associated with each construct. While the studies included in the present study generally had high internal reliabilities, there were some notable exceptions such as the AUDIT-consumption subscale. The ability of measurement error to attenuate the observed relation between corresponding constructs is well documented (e.g., Fan, 2003; Muchinsky, 1996; Schmidt & Hunter, 1996) and may have contributed to the relative absence of credible associations observed in the present study.

Other limitations stem from the non-representativeness of our sample. For example, we only included participants who had something resembling a nuclear family (i.e., couples who had been together for at least two years and a dependent child). The research base on the influence of family structure on children's adjustment is vast and, at times, discordant. While some studies have found that family structural differences are less important than family processes in predicting children's adjustment (Amato & Gilbreth, 1999; Lansford, Ceballo, Abbey, & Stewart, 2001; Vandewater & Lansford, 1998), there is evidence that fathers' involvement with their children can be very important in terms of their adjustment (e.g., Bauserman et al., 2002) and that early parental divorce is predictive of worse adjustment (e.g., Lansford, Malone, et al., 2006). Regardless of the impact of family structure, the requirement for participants to have a partner or spouse does limit the generalizability of the findings. Other concerns with our sample include generally low levels of parental problematic drinking (see above) as well as an average level of education considerably higher than the national average.

Conclusion

The current study is notable for a number of *'firsts'*: the first effort to apply Bayesian data analytic techniques to the study of drinking motives and the first empirical study of the relation between parents' drinking motives and the psychological adjustment of their children (as well as the first meta-analysis of the drinking motives questionnaire; see Appendix 4.4). We found that in the case of maternal drinking behavior, drinking motives were predictive of children's adjustment while drinking consumption and drinking problems were not. Admittedly, in some cases our hypotheses were wrong — drinking in order to cope was not uniquely maladaptive, and drinking for social reasons was not as benign as previously thought. Moreover, future research will need to determine whether our finding that maternal enhancement motives were inversely related to children's adjustment problems is reliable and to try to understand the processes that would lead to this seemingly counter-intuitive relation. In spite of some limitations, our findings may have important clinical implications. Researchers should reconsider the assumption that social drinking motives are less damaging than other types of drinking motives, and clinicians should not neglect social drinking motives while attempting to treat the harmful downstream effects of maternal alcohol use.

Appendix A: DMQ Meta-analysis

Meta-analytic techniques are incredibly useful for succinctly reviewing large amounts of research and work intuitively within a Bayesian framework. Specifically, Bayesian inference provides a coherent way to combine *prior* information with new data to derive a *posterior* estimate of one's parameters. Such a posterior is a natural and obvious prior for the next set of data. This daisy chaining process is often referred to as 'Bayesian updating.' Meta-analysis is both a logical application of Bayesian updating and an excellent way to derive an estimate of the prior probability of parameter values before analyzing one's own data. Our meta-analysis of drinking motives, presented below, was inspired by a desire to assess the support for Cox and Klinger's Motivational Model of Alcohol Use (1988) and assess the psychometric profile of the *Drinking Motives Questionnaire* (DMQ) and its derivatives (M. L. Cooper, 1994; M. L. Cooper, Russell, et al., 1992).

Hypotheses

First, we predicted that the intercorrelations between different drinking motives would be consistent with Cox and Klinger's four-factor motivational model with orthogonal motives having lower intercorrelations than adjacent motives. ***Second***, we hypothesized that positively valenced drinking motives (i.e., *social* and *enhancement*) would be positively correlated with extroversion and negatively correlated with neuroticism, anxiety, and depression. We also expected the opposite pattern with respect to negatively valenced drinking motives (i.e., *coping* and *conformity*). ***Third***, and finally, we hypothesized that coping motives would have the strongest correlation with alcohol-related problems and social motives would have the weakest. This last hypothesis stems from several researchers' arguments that coping motives are the most deleterious of all the drinking motives (Park & Levenson, 2002; Rousseau et al., 2011). For example, several studies have found significant associations between coping drinking motives and alcohol-related problems even after controlling for frequency and amount of alcohol consumed (Carey & Correia, 1997; Goldstein & Flett, 2009; V. V. Grant, Stewart, & Mohr, 2009; E. Kuntsche, Stewart, & Cooper, 2008; Lyvers et al., 2010; Park & Levenson, 2002; Simons, Correia, & Carey, 2000).

Methods

Drinking Motives Questionnaire (DMQ)

　　The original DMQ is a 15-item measure of the relative frequency of three categories of drinking motives including *social motives* (e.g., "because it helps you enjoy a party"), *enhancement motives* (e.g., "to get high"), and *coping motives* (e.g., "to forget your problems;" M. L. Cooper, Russell, et al., 1992). Responses are recorded on a 1–4 Likert scale where 1 = *never* and 4 = *almost always* and drinking motive subscale scores are derived by computing the average from the corresponding questions. Cooper later revised the measure (*Drinking Motives Questionnaire–Revised*; DMQ-R) by adding 5 questions designed to measure *conformity motives* (e.g., "so you won't feel left out") and changing the response scale from 1–4 to 1–5 (1994). More recently, Kuntsche and Kuntsche created the *Drinking Motive Questionnaire Revised Short Form* (DMQ-R SF), which reduced the 20-item measure down to 12 items with 3 items measuring each type of motive (2009) and changed the response scale to 1–3. Finally, Blackwell and colleagues created the *Modified Drinking Motives Questionnaire–Revised* (MDMQ-R), which divided the Coping subscale into two components (Coping-anxiety and Coping-depression) and added 8 additional items measuring the two types of coping motives (V. V. Grant, Stewart, O'Connor, et al., 2007).

Search Strategy

　　A comprehensive literature search was conducted for empirical studies utilizing the DMQ or one of its derivatives by way of the PsycINFO and OpenGrey data bases. To be considered for inclusion, studies needed to report either (a) the intercorrelations between different motives or (b) correlations between drinking motives and personality traits and/or drinking behaviors. In each of the covered databases, titles, subjects, and keywords were searched from the source's inception through March 2013 using the following search terms: *(drink* and motiv* and questionn*) or DMQ or DMQ-R*. Note that an asterisk here is a wild card character used in many scholarly databases that will match with any number of letters within the same words, thus facilitating the search of a word stem with multiple affixes. For example, motiv* matches motive, motives, motivations, motivating, etc. Limiters were used to narrow the search results from PsycINFO. Specifically, results were filtered to include only empirical studies with human participants published in the English language.

Analyses

All effect sizes were converted to correlation coefficients (*r*; Borenstein, 2009). In order to account for dependencies introduced by studies with multiple-endpoints, *r*s were aggregated according to procedures outlined by Gleser and Olkin (2009), which take into account the correlation between the multiple measures. When the correlation between measures was not available, a default correlation of .5 was used to aggregate within-study effects (see Wampold, Moody, Stich, Benson, & Ahn, 1997). Prior to the analyses, all *r*s underwent Fisher's variance stabilizing and normalizing transformation r-to-z (Fisher, 1921). Results were subsequently transformed back to r prior to interpretation. Studies were weighted by the inverse of their variances (Shadish & Haddock, 2009) and analyzed using a random-effects model. The following priors were used for the meta-analysis:

$$\theta \sim Normal(0, 0.01)T(-1, 1) \tag{1}$$

$$\tau \sim Gamma(0.001, 0.001) \tag{2}$$

where θ is the mean value of the correlation distributed normally with mean 0 and precision 0.01 truncated to be within the range of -1 to 1, and τ is the precision of the effect size estimate distributed as a gamma distribution with shape and rate parameters set to 0.001. For additional details regarding the implementation of the Bayesian meta-analysis included herein please refer to Appendix 4.4, which includes the BUGS code and sampling details.

Results

Comprehensive literature searches revealed 319 initial results. Title and abstract review revealed 150 results that were not relevant or failed to meet the inclusion criteria (e.g., qualitative studies). After obtaining the full text for the remaining 169 results, 66 additional studies were excluded because they did not include empirical measurement of drinking motives (*k* = 16), did not utilize a variant of the DMQ (*k* = 27), failed to report the relevant statistics (*k* = 13), or duplicated data published elsewhere already included in the meta-analysis (*k* = 10). In total, the meta-analysis included 93 published reports consisting of 345 effect sizes across 100 independent samples.

Mean weighted intercorrelations between DMQ subscales from 67 independent samples (*N* = 41,714) are presented in Table A.1. Mean weighted correlations between DMQ subscales and drinking behaviors and personality traits are displayed in Table A.2. Studies that reported the relation between drinking motives and drinking behaviors were unsurprisingly more prevalent than studies reporting correlations between drinking

Table A.1: Mean Weighted Correlations between Drinking Motives

	1	2	3	4
1. Cope	-	67 (41,714)	50 (32,187)	37 (21,967)
2. Enhance	.499 [.462, .533]	-	49 (31,934)	36 (21,183)
3. Social	.448 [.411, .489]	.693 [.660, .727]	-	36 (21,183)
4. Conform	.408 [.371, .447]	.285 [.236, .337]	.382 [.337, .423]	-

Notes. Mean weighted correlations along with 95% highest density intervals are reported below the diagonal; number of independent samples *k* and combined sample size used to calculate estimates (*N*) are reported above the diagonal.

Table A.2: Drinking Motive Correlates

Construct	Coping	Enhancement	Social	Conformity	$N^\dagger$	$k^\dagger$
Drinking Quantity	.23 [.19, .28]	.38 [.33, .43]	.33 [.27, .40]	.07 [.00, .13]	15,979	31
Drinking Frequency	.23 [.18, .29]	.33 [.26, .40]	.33 [.26, .40]	.04 [-.04, .11]	19,998	21
Alcohol Consumption	.28 [.21, .35]	.42 [.33, .53]	.41 [.27, .55]	.10 [.01, .19]	5,858	14
Alcohol-related Problems	.38 [.33, .42]	.40 [.35, .45]	.32 [.23, .41]	.15 [.09, .22]	7,229	19
Binge Drinking	.24 [.20, .29]	.41 [.37, .45]	.38 [.32, .44]	.13 [.04, .22]	15,170	22
Alcohol Dependence	.35 [.27, .42]	.38 [.27, .48]	.30 [-.05, .83]	.11 [-.28, .48]	4,731	6
AUDIT	.36 [.27, .44]	.47 [.38, .56]	.42 [.33, .51]	.15 [.01, .30]	3,128	10
RAPI	.45 [.39, .50]	.38 [.28, .47]	.33 [.20, .44]	.28 [.19, .38]	6,630	17
Anxiety	.31 [.24, .37]	.07 [.01, .13]	.07 [.01, .13]	.29 [.18, .39]	3,313	9
Depression	.21 [.06, .36]	.03 [-.07, .12]	.02 [-.08, .12]	.10 [-.20, .42]	5,981	12
Positive Affect	-.04 [-.29, .19]	.12 [-.03, .30]	.15 [-.04, .35]	-.03 [-.22, .14]	2,150	8
Negative Affect	.23 [.12, .33]	.12 [-.00, .24]	.11 [-.06, .28]	.16 [-.00, .28]	2,265	10
Sensation Seeking	.19 [.10, .27]	.35 [.24, .46]	.41 [.34, .49]	.08 [-.31, .52]	5,376	7
Self-Control	.02 [-.37, .40]	.04 [-.37, .39]	.06 [-.48, .62]	-.05 [-.80, .71]	4,152	4
Childhood Abuse/Trauma	.19 [.05, .32]	.12 [-.04, .28]	.07 [-.32, .45]	.14 [-.21, .54]	1,611	5
Hostility	.25 [.11, .41]	.18 [-.39, .83]	.26 [-.12, .61]	.14 [-.23, .42]	3,153	4
Risky Behaviors	.19 [.09, .28]	.16 [.06, .27]	.09 [-.37, .49]	.11 [-.03, .27]	3,810	4
Extraversion	-.09 [-.20, .05]	.13 [.05, .21]	.12 [-.02, .26]	-.12 [-.31, .07]	1,686	6
Agreeableness	-.17 [-.28, -.06]	-.05 [-.13, .03]	-.02 [-.13, .09]	-.08 [-.28, .09]	4,539	5
Conscientiousness	-.15 [-.21, -.08]	-.13 [-.22, -.03]	-.07 [-.19, .08]	-.09 [-.21, .05]	5,213	7
Neuroticism	.30 [.22, .36]	.06 [.00, .12]	.11 [-.06, .32]	.19 [-.09, .47]	5,198	7
Openness	-.04 [-.15, .09]	.09 [-.03, .19]	.01 [-.10, .11]	-.13 [-.33, .10]	1,093	4
Age	.01 [-.04, .07]	-.02 [-.09, .06]	.02 [-.07, .10]	-.02 [-.10, .04]	15,257	13
Male	.05 [.00, .10]	.09 [.05, .13]	.10 [.05, .15]	.09 [.00, .17]	11,852	12

Notes. † The reported combined sample size, *N*, and number of samples, *k*, represent the maximum value across the various drinking motives. In many instances, correlations were only reported for two or three motives. AUDIT = Alcohol Use Disorders Identification Test; RAPI = Rutgers Alcohol Problem Index.

motives and personality traits. Male gender was positively correlated with each drinking motive. Age, however, was not reliably correlated with drinking motive scores. Given the popularity of the *Alcohol Use Disorders Identification Test* (AUDIT) and *Rutgers Alcohol Problem Index* (RAPI), correlations were reported separately for these measures instead of being included in the "Alcohol Problems" category.

Discussion

Overall, our meta-analysis of the DMQ and its derivatives provide moderate support for Cox and Klinger's motivational model of alcohol use (1988). As is apparent in Table A.1, the intercorrelations between drinking motives vary from moderate in size to quite large in size. Consistent with Cox and Klinger's (1988, 2011) motivational model of alcohol use and our primary hypothesis, the positive reinforcing drinking motives (social and enhancement) had the highest average correlation ($\bar{r}$ = .69, 95% HDI[.66, .73]), while the lowest correlation was between the orthogonal motives of enhancement (positive–internal) and conformity (negative–external; $\bar{r}$ = .29, 95% HDI[.24, .34]). The pattern of intercorrelations was not perfectly consistent with Cox and Kilnger's model however—the correlation between coping motives and social motives was substantial ($\bar{r}$ = .45, 95% CI[.41, .49]) despite these motives' supposed orthogonal relationship.

Our second hypothesis regarding the personality correlates of drinking motives was also moderately supported by the results of the meta-analysis. Mean weighted correlations between enhancement and social motives and extroversion were both positive (r = .13 and r = .12) while the opposite pattern held for coping and conformity motives (r = -.09 and r = -.12). Mean weighted correlations with neuroticism were positive for coping and conformity motives (r = .3 and r = .19) and not reliably different from zero for enhancement and social motives. Only coping motives were correlated to depression ($\bar{r}$ = .21) whereas all four drinking motives were positively correlated to anxiety.

Our third hypothesis–that coping motives would have the strongest correlation with drinking problems– was not supported by our analyses. Social and enhancement motives had the largest mean weighted correlations with indices of drinking quantity, frequency, and total consumption ranging between $\bar{r}$ = .33 to $\bar{r}$ = .42. Coping motives had noticeably smaller mean correlations ($\bar{r}$ = .23 – .28) and conformity motives were hardly correlated to amount of alcohol consumed ($\bar{r}$ = .04–.1). These same patterns were evident when examining heavy episodic drinking/binge drinking with enhancement motives having the strongest mean correlation ($\bar{r}$ = .41) followed by social motives ($\bar{r}$ = .38), then coping motives ($\bar{r}$ = .24) and conformity motives ($\bar{r}$ = .13). The pattern of findings was slightly different with respect to alcohol problems where enhancement motives had the strongest mean correlations ($\bar{r}$ = .38–.47), followed by coping motives ($\bar{r}$ = .36–.45), social motives ($\bar{r}$ = .32–.42), then conformity motives ($\bar{r}$ = .15–.18). Thus, coping motives did not appear to be uniquely maladaptive compared to other motives. Furthermore, social motives did not appear to be uniquely benign. When examining Table A.2, it is apparent that conformity drinking motives tended to have much smaller correlations with drinking

variables than other motives.

The basic proposition that drinking motives provide insight into the context and personality of the person drinking is supported by an overview of the correlations between different drinking motives and various psychological constructs as is presented in Table A.2. Moreover, the generally high correlations between different categories of drinking motives, coupled with the above cited research, suggests that the motives underlying alcohol consumption can be both dynamic and complex.

Included Studies

* Adams, Z. W., Kaiser, A. J., Lynam, D. R., Charnigo, R. J., & Milich, R. (2012). Drinking motives as mediators of the impulsivity-substance use relation: Pathways for negative urgency, lack of premeditation, and sensation seeking. *Addictive Behaviors*, *37*(7), 848–855. doi:10.1016/j.addbeh.2012.03.016

* Anderson, D. A., Simmons, A. M., Martens, M. P., Ferrier, A. G., & Sheehy, M. J. (2006). The relationship between disordered eating behavior and drinking motives in college-age women. *Eating Behaviors*, *7*(4), 419–422. doi:10.1016/j.eatbeh.2005.12.001

* Anderson, K. G., Grunwald, I., Bekman, N., Brown, S. A., & Grant, A. (2011). To drink or not to drink: Motives and expectancies for use and nonuse in adolescence. *Addictive Behaviors*, *36*(10), 972–979. doi:10.1016/j.addbeh.2011.05.009

* Arbeau, K. J., Kuiken, D., & Wild, T. C. (2011, December). Drinking to enhance and to cope: A daily process study of motive specificity. *Addictive Behaviors*, *36*(12), 1174–1183. doi:10.1016/j.addbeh.2011.07.020

* Armeli, S., Conner, T. S., Covault, J., Tennen, H., & Kranzler, H. R. (2008, November). A serotonin transporter gene polymorphism (5-HTTLPR), drinking-to-cope motivation, and negative life events among college students. *Journal of Studies on Alcohol & Drugs*, *69*(6), 814–823

* Armeli, S., Conner, T. S., Cullum, J., & Tennen, H. (2010, March). A longitudinal analysis of drinking motives moderating the negative affect-drinking association among college students. *Psychology of Addictive Behaviors*, *24*(1), 38–47. doi:10.1037/a0017530

* Bruce, G., Curren, C., & Williams, L. (2012, March). Alexithymia and alcohol consumption: The mediating effects of drinking motives. *Addictive Behaviors*, *37*(3), 350–352. doi:10.1016/j.addbeh.2011.11.024

* Buckner, J. D., Eggleston, A. M., & Schmidt, N. B. (2006). Social anxiety and

problematic alcohol consumption: The mediating role of drinking motives and situations. *Behavior Therapy*, *37*(4), 381–391. doi:10.1016/j.beth.2006.02.007

* Carey, K. B. & Correia, C. J. (1997, January). Drinking motives predict alcohol-related problems in college students. *Journal of Studies on Alcohol*, *58*(1), 100–105

* Clerkin, E. M. & Barnett, N. (2012, May). The separate and interactive effects of drinking motives and social anxiety symptoms in predicting drinking outcomes. *Addictive Behaviors*, *37*(5), 674–677. doi:10.1016/j.addbeh.2012.01.005

* Cooper, M. L., Russell, M., Skinner, J. B., & Windle, M. (1992). Development and validation of a three-dimensional measure of drinking motives. *Psychological Assessment*, *4*(2), 123–132

* Cooper, M. L. (1994). Motivations for alcohol use among adolescents: Development and validation of a four-factoractor model. *Psychological Assessment*, *6*, 117–128

* Cooper, M. L., Frone, M. R., Russell, M., & Mudar, P. (1995, November). Drinking to regulate positive and negative emotions: A motivational model of alcohol use. *Journal of Personality and Social Psychology*, *69*(5), 990–1005

* Curcio, A. L. & George, A. M. (2011, October). Selected impulsivity facets with alcohol use/problems: The mediating role of drinking motives. *Addictive Behaviors*, *36*(10), 959–964. doi:10.1016/j.addbeh.2011.05.007

* Daugherty, T. K. & McLarty, L. M. (2003, April). Religious coping, drinking motivation, and sex. *Psychological Reports*, *92*(2), 643–647

* Engels, R. C., Wiers, R., Lemmers, L., & Overbeek, G. (2005). Drinking motives, alcohol expectancies, self-efficacy, and drinking patterns. *Journal of Drug Education*, *35*(2), 147–166. Retrieved from http://baywood.metapress.com/index/6Q6B3LMAVMVAL312.pdf

* Fossos, N., Kaysen, D., Neighbors, C., Lindgren, K. P., & Hove, M. C. (2011). Coping motives as a mediator of the relationship between sexual coercion and problem drinking in college students. *Addictive Behaviors*, *36*(10), 1001–1007. doi:10.1016/j.addbeh.2011.06.001

* Galen, L. W. & Rogers, W. M. (2004, July). Religiosity, alcohol expectancies, drinking motives and their interaction in the prediction of drinking among college students. *Journal of Studies on Alcohol*, *65*(4), 469–476

* Goldsmith, A. A., Tran, G. Q., Smith, J. P., & Howe, S. R. (2009). Alcohol expectancies and drinking motives in college drinkers: Mediating effects on the relationship between generalized anxiety and heavy drinking in negative-affect situations. *Addictive Behaviors*, *34*(6-7), 505–513. doi:10.1016/j.addbeh.2009.01.003

* Goldstein, A. L. & Flett, G. L. (2009, March). Personality, alcohol use, and drinking

motives: A comparison of independent and combined internal drinking motives groups. *Behavior Modification*, *33*(2), 182–198. doi:10.1177/0145445508322920

* Goldstein, A. L., Flett, G. L., & Wekerle, C. (2010, June). Child maltreatment, alcohol use and drinking consequences among male and female college students: An examination of drinking motives as mediators. *Addictive Behaviors*, *35*(6), 636–639. doi:10.1016/j.addbeh.2010.02.002

* Gonzalez, V. M., Collins, R. L., & Bradizza, C. M. (2009). Solitary and social heavy drinking, suicidal ideation, and drinking motives in underage college drinkers. *Addictive Behaviors*, *34*(12), 993–999. doi:10.1016/j.addbeh.2009.06.001

* Grant, V. V., Stewart, S. H., O'Connor, R. M., Blackwell, E., & Conrod, P. J. (2007, November). Psychometric evaluation of the five-factor Modified Drinking Motives Questionnaire–Revised in undergraduates. *Addictive Behaviors*, *32*(11), 2611–2632. doi:10.1016/j.addbeh.2007.07.004

* Grant, V. V., Stewart, S. H., & Mohr, C. D. (2009, June). Coping-anxiety and coping-depression motives predict different daily mood-drinking relationships. *Psychology of Addictive Behaviors*, *23*(2), 226–237. doi:10.1037/a0015006

* Grayson, C. E. & Nolen-Hoeksema, S. (2005). Motives to drink as mediators between childhood sexual assault and alcohol problems in adult women. *Journal of Traumatic Stress*, *18*(2), 137–145. doi:10.1002/jts.20021

* Graziano, F., Bina, M., Giannotta, F., & Ciairano, S. (2012). Drinking motives and alcoholic beverage preferences among Italian adolescents. *Journal of Adolescence*. doi:10.1016/j.adolescence.2011.11.010

* Halim, A., Hasking, P., & Allen, F. (2012). The role of social drinking motives in the relationship between social norms and alcohol consumption. *Addictive Behaviors*. doi:10.1016/j.addbeh.2012.07.004

* Ham, L. S., Bonin, M., & Hope, D. A. (2007). The role of drinking motives in social anxiety and alcohol use. *Journal of Anxiety Disorders*, *21*(8), 991–1003. doi:10.1016/j.janxdis.2006.10.014

* Ham, L. S., Zamboanga, B. L., Bacon, A. K., & Garcia, T. A. (2009). Drinking motives as mediators of social anxiety and hazardous drinking among college students. *Cognitive Behaviour Therapy*, *38*(3), 133–145. doi:10.1080/16506070802610889

* Hasking, P., Lyvers, M., & Carlopio, C. (2011, May). The relationship between coping strategies, alcohol expectancies, drinking motives and drinking behaviour. *Addictive Behaviors*, *36*(5), 479–487. doi:10.1016/j.addbeh.2011.01.014

* Hauck-Filho, N., Teixeira, M. A. P., & Cooper, M. L. (2012, April). Confirmatory factor analysis of the Brazilian version of the Drinking Motives Questionnaire-Revised

(DMQ-R). *Addictive Behaviors*, *37*(4), 524–527. doi:10.1016/j.addbeh.2011.11.023

* Howell, A. N., Leyro, T. M., Hogan, J., Buckner, J. D., & Zvolensky, M. J. (2010). Anxiety sensitivity, distress tolerance, and discomfort intolerance in relation to coping and conformity motives for alcohol use and alcohol use problems among young adult drinkers. *Addictive Behaviors*

* Hussong, A. M. (2003). Social influences in motivated drinking among college students. *Psychology of Addictive Behaviors*, *17*(2), 142. doi:10.1037/0893-164X.17.2.142

* Hussong, A. M., Galloway, C. A., & Feagans, L. A. (2005). Coping motives as a moderator of daily mood-drinking covariation. *Journal of Studies on Alcohol & Drugs*, *66*(3), 344. Retrieved from http://www.jsad.com/jsad/link/66/344

* Kaysen, D., Dillworth, T. M., Simpson, T., Waldrop, A., Larimer, M. E., & Resick, P. A. (2007). Domestic violence and alcohol use: Trauma-related symptoms and motives for drinking. *Addictive Behaviors*, *32*(6), 1272–1283. doi:10.1016/j.addbeh.2006.09.007

* Koyama, C. & Belli, G. (2011). Alcohol use, acculturative stress, and drinking motivation among international community college students. *Journal of Multicultural Counseling and Development*, *39*(4), 229–240. doi:10.1002/j.2161-1912.2011.tb00637.x

* Kristjansson, S. D., Agrawal, A., Lessov-Schlaggar, C. N., Madden, P. A., Lynne Cooper, M., Bucholz, K. K., . . . & Heath, A. C. (2011). The relationship between rs3779084 in the Dopa Decarboxylase (DDC) gene and alcohol consumption is mediated by drinking motives in regular smokers. *Alcoholism: Clinical and Experimental Research*, *36*(1), 162–170. doi:10.1111/j.1530-0277.2011.01596.x

* Kuntsche, E., Knibbe, R., Engels, R., & Gmel, G. (2007). Drinking motives as mediators of the link between alcohol expectancies and alcohol use among adolescents. *Journal of Studies on Alcohol & Drugs*, *68*(1), 76. Retrieved from http://www.jsad.com/jsad/article/Drinking_Motives_as_Mediators_of_the_Link_Between_Alcohol_Expectancies_and_/1556.html

* Kuntsche, E. & Kuntsche, S. (2009). Development and validation of the Drinking Motive Questionnaire Revised Short Form (DMQ–R SF). *Journal of Clinical Child & Adolescent Psychology*, *38*(6), 899–908. doi:10.1080/15374410903258967

* Labrie, J. W., Lac, A., Kenney, S. R., & Mirza, T. (2011, April). Protective behavioral strategies mediate the effect of drinking motives on alcohol use among heavy drinking college students: Gender and race differences. *Addictive Behaviors*, *36*(4), 354–361. doi:10.1016/j.addbeh.2010.12.013

* LaBrie, J. W., Ehret, P. J., Hummer, J. F., & Prenovost, K. (2011). Poor adjustment to college life mediates the relationship between drinking motives and alcohol

consequences: A look at college adjustment, drinking motives, and drinking outcomes. *Addictive Behaviors*, *37*(4), 379–386. doi:10.1016/j.addbeh.2011.11.018

* Lewis, M. A., Phillippi, J., & Neighbors, C. (2007). Morally based self-esteem, drinking motives, and alcohol use among college students. *Psychology of Addictive Behaviors*, *21*(3), 398

* Lewis, M. A., Hove, M. C., Whiteside, U., Lee, C. M., Kirkeby, B. S., Oster-Aaland, L., … & Larimer, M. E. (2008). Fitting in and feeling fine: Conformity and coping motives as mediators of the relationship between social anxiety and problematic drinking. *Psychology of Addictive Behaviors*, *22*(1), 58

* Lindgren, K. P., Neighbors, C., Blayney, J. A., Mullins, P. M., & Kaysen, D. (2011). Do drinking motives mediate the association between sexual assault and problem drinking? *Addictive Behaviors*. doi:10.1016/j.addbeh.2011.10.009

* Littlefield, A. K., Agrawal, A., Ellingson, J. M., Kristjansson, S., Madden, P. A., Bucholz, K. K., … & Sher, K. J. (2011). Does variance in drinking motives explain the genetic overlap between personality and alcohol use disorder symptoms? A twin study of young women. *Alcoholism: Clinical and Experimental Research*, *35*(12), 2242–2250. doi:10.1111/j.1530-0277.2011.01574.x

* Littlefield, A. K., Jackson, K. M., & Talley, A. E. (2012). Coping motives, negative moods, and time-to-drink: Exploring alternative analytic models of coping motives as moderator of daily mood-drinking covariation. *Addictive Behaviors*. doi:10.1016/j.addbeh.2012.05.020

* Lyvers, M., Hasking, P., Hani, R., Rhodes, M., & Trew, E. (2010, February). Drinking motives, drinking restraint and drinking behaviour among young adults. *Addictive Behaviors*, *35*(2), 116–122. doi:10.1016/j.addbeh.2009.09.011

* MacLean, M. G. & Lecci, L. (2000, March). A comparison of models of drinking motives in a university sample. *Psychology of Addictive Behaviors*, *14*(1), 83–87

* Martens, M. P., Cox, R. H., Beck, N. C., & Heppner, P. P. (2003). Measuring motivations for intercollegiate athlete alcohol use: A confirmatory factor analysis of the Drinking Motives Measure. *Psychological Assessment*, *15*(2), 235

* Martens, M. P., Ferrier, A. G., & Cimini, M. D. (2007, January). Do protective behavioral strategies mediate the relationship between drinking motives and alcohol use in college students? *Journal of Studies on Alcohol & Drugs*, *68*(1), 106–114

* Martens, M. P., Rocha, T. L., Martin, J. L., & Serrao, H. F. (2008). Drinking motives and college students: Further examination of a four-factor model. *Journal of Counseling Psychology*, *55*(2), 289–295. doi:10.1037/0022-0167.55.2.289

* Martens, M. P., Pedersen, E. R., Smith, A. E., Stewart, S. H., & O'Brien, K. (2011).

Predictors of alcohol-related outcomes in college athletes: The roles of trait urgency and drinking motives. *Addictive Behaviors*, *36*(5), 456–464. doi:10.1016/j.addbeh.2010.12.025

* Mazzardis, S., Vieno, A., Kuntsche, E., & Santinello, M. (2010, October). Italian validation of the Drinking Motives Questionnaire Revised Short Form (DMQ-R SF). *Addictive Behaviors*, *35*(10), 905–908

* McNally, A. M., Palfai, T. P., Levine, R. V., & Moore, B. M. (2003). Attachment dimensions and drinking-related problems among young adults the meditational role of coping motives. *Addictive Behaviors*

* Merrill, J. E. & Read, J. P. (2010, December). Motivational pathways to unique types of alcohol consequences. *Psychology of Addictive Behaviors*, *24*(4), 705–711. doi:10.1037/a0020135

* Mezquita, L., Stewart, S. H., & Ruipérez, M. Á. (2010). Big-five personality domains predict internal drinking motives in young adults. *Personality and Individual Differences*, *49*(3), 240–245. doi:10.1016/j.paid.2010.03.043

* Mezquita Guillamón, L., Stewart, S. H., Ibáñez Ribes, M. I., Ruipérez Rodrguez, M. Á., Villa Martn, E., Moya Higueras, J., & Ortet i Fabregat, G. (2011). Drinking motives in clinical and general populations. *European Addiction Research*, *17*, 250–261. doi:10.1159/000328510

* Moeller, S. J. & Crocker, J. (2009). Drinking and desired self-images: Path models of self-image goals, coping motives, heavy-episodic drinking, and alcohol problems. *Psychology of Addictive Behaviors*, *23*(2), 334

* Mohr, C. D., Armeli, S., Tennen, H., Temple, M., Todd, M., Clark, J., & Carney, M. A. (2005). Moving beyond the keg party: a daily process study of college student drinking motivations. *Psychology of Addictive Behaviors*, *19*(4), 392

* Neighbors, C., Larimer, M. E., Geisner, I. M., & Knee, C. R. (2004). Feeling controlled and drinking motives among college students: Contingent self-esteem as a mediator. *Self and Identity*, *3*(3), 207–224. doi:10.1080/13576500444000029

* Németh, Z., Kuntsche, E., Urbán, R., Farkas, J., & Demetrovics, Z. (2010). Why do festival goers drink? Assessment of drinking motives using the DMQ-R SF in a recreational setting. *Drug and Alcohol Review*, *30*(1), 40–46. doi:10.1111/j.1465-3362.2010.00193.x

* Németh, Z., Urbán, R., Kuntsche, E., Pedro, E. M. S., Nieto, J. G. R., Farkas, J., … & Demetrovics, Z. (2011). Drinking motives among Spanish and Hungarian young adults: A cross-national study. *Alcohol and Alcoholism*, *46*(3), 261–269. doi:10.1093/alcalc/agr019

* Ostafin, B. D. & Brooks, J. J. (2011). Drinking for relief: Negative affect increases automatic alcohol motivation in coping-motivated drinkers. *Motivation and Emotion*, *35*(3), 285–295. doi:10.1007/s11031-010-9194-5

* Palfai, T. P., Ralston, T. E., & Wright, L. L. (2011). Understanding university student drinking in the context of life goal pursuits: The mediational role of enhancement motives. *Personality and Individual Differences*, *50*(2), 169–174. doi:10.1016/j.paid.2010.09.020

* Patrick, M. E., Lee, C. M., & Larimer, M. E. (2011). Drinking motives, protective behavioral strategies, and experienced consequences: Identifying students at risk. *Addictive Behaviors*, *36*(3), 270–273. doi:10.1016/j.addbeh.2010.11.007

* Peirce, R. S., Frone, M. R., Russell, M., & Cooper, M. L. (1994). Relationship of financial strain and psychosocial resources to alcohol use and abuse: The mediating role of negative affect and drinking motives. *Journal of Health and Social Behavior*, *35*(4), 291–308. Retrieved from http://www.jstor.org/stable/10.2307/2137211

* Simons, J., Correia, C. J., & Carey, K. B. (2000). A comparison of motives for marijuana and alcohol use among experienced users. *Addictive Behaviors*, *25*(1), 153–160. doi:10.1016/S0306-4603(98)00104-X

* Siviroj, P., Peltzer, K., Pengpid, S., Yungyen, Y., & Chaichana, A. (2012). Drinking motives, sensation seeking, and alcohol use among Thai high school students. *Social Behavior and Personality*, *40*(8), 1255–1262. Retrieved from http://www.ingentaconnect.com/content/sbp/sbp/2012/00000040/00000008/art00004

* Stewart, S. H., Zeitlin, S. B., & Samoluk, S. B. (1996). Examination of a three-dimensional drinking motives questionnaire in a young adult university student sample. *Behaviour Research and Therapy*, *34*(1), 61–71. doi:10.1016/0005-7967(95)00036-W

* Stewart, S. H. & Chambers, L. (2000). Relationships between drinking motives and drinking restraint. *Addictive Behaviors*, *25*(2), 269–274. doi:10.1016/S0306-4603(99)00014-3

* Stewart, S. H. & Devine, H. (2000). Relations between personality and drinking motives in young adults. *Personality and Individual Differences*, *29*(3), 495–511. doi:10.1016/S0191-8869(99)00210-X

* Stewart, S. H., Loughlin, H. L., & Rhyno, E. (2001). Internal drinking motives mediate personality domain—drinking relations in young adults. *Personality and Individual Differences*, *30*(2), 271–286. doi:10.1016/S0191-8869(00)00044-1

* Stewart, S. H., Hall, E., Wilkie, H., & Birch, C. (2002). Affective priming of alcohol schema in coping and enhancement motivated drinkers. *Cognitive Behaviour Therapy*,

31(2), 68–80. doi:10.1080/16506070252959508

* Stewart, S. H., Morris, E., Mellings, T., & Komar, J. (2006). Relations of social anxiety variables to drinking motives, drinking quantity and frequency, and alcohol-related problems in undergraduates. *Journal of Mental Health*, *15*(6), 671–682. doi:10.1080/09638230600998904

* Theakston, J. A., Stewart, S. H., Dawson, M. Y., Knowlden-Loewen, S. A. B., & Lehman, D. R. (2004). Big-Five personality domains predict drinking motives. *Personality and Individual Differences*, *37*(5), 971–984. doi:10.1016/j.paid.2003.11.007

* Topper, L. R., Castellanos-Ryan, N., Mackie, C., & Conrod, P. J. (2011). Adolescent bullying victimisation and alcohol-related problem behaviour mediated by coping drinking motives over a 12 month period. *Addictive Behaviors*, *36*(1-2), 6–13. doi:10.1016/j.addbeh.2010.08.016

* Tragesser, S. L., Sher, K. J., Trull, T. J., & Park, A. (2007). Personality disorder symptoms, drinking motives, and alcohol use and consequences: cross-sectional and prospective mediation. *Experimental and Clinical Psychopharmacology*, *15*(3), 282

* Tragesser, S. L., Trull, T. J., Sher, K. J., & Park, A. (2008). Drinking motives as mediators in the relation between personality disorder symptoms and alcohol use disorder. *Journal of Personality Disorders*, *22*(5), 525

* Urbán, R., Kökönyei, G., & Demetrovics, Z. (2008). Alcohol outcome expectancies and drinking motives mediate the association between sensation seeking and alcohol use among adolescents. *Addictive Behaviors*, *33*(10), 1344–1352. doi:10.1016/j.addbeh.2008.06.006

* Van Tyne, K., Zamboanga, B. L., Ham, L. S., Olthuis, J. V., & Pole, N. (2011). Drinking motives as mediators of the associations between alcohol expectancies and risky drinking behaviors among high school students. *Cognitive Therapy and Research*, 1–12. doi:10.1007/s10608-011-9400-0

* Wild, T. C., Hinson, R., Cunningham, J., & Bacchiochi, J. (2001). Perceived vulnerability to alcohol-related harm in young adults: Independent effects of risky alcohol use and drinking motives. *Experimental and Clinical Psychopharmacology*, *9*(1), 117

* Willem, L., Bijttebier, P., Claes, L., & Uytterhaegen, A. (2012). Temperament and problematic alcohol use in adolescence: An examination of drinking motives as mediators. *Journal of Psychopathology and Behavioral Assessment*, *34*, 1–11. doi:10.1007/s10862-012-9279-4

* Windle, M. & Windle, R. (2012). Testing the specificity between social anxiety disorder

and drinking motives. *Addictive Behaviors*, *37*(9), 1003–1008.
doi:10.1016/j.addbeh.2012.04.009

* Woldt, B. D. & Bradley, J. R. (2002). Structural equation modeling of drinking motives
in male DUI offenders. *Journal of Drug Education*, *32*(1), 69–79. Retrieved from
http://baywood.metapress.com/index/5v04f8rfwdtjxnnn.pdf

* Yurasek, A. M. et al., Murphy, J. G. et al., Dennhardt, A. A., et al., Skidmore, J. R.,
et al., Buscemi, J., et al., McCausland, C., et al., Martens, M. P., et al. (2011).
Drinking motives mediate the relationship between reinforcing efficacy and alcohol
consumption and problems. *Journal of Studies on Alcohol & Drugs*, *72*(6), 991.
Retrieved from http://ukpmc.ac.uk/abstract/MED/22051213

Appendix B: Analysis Implementation

Software

Analyses will be conducted using `JAGS` (Just Another Gibbs Sampler; Plummer, 2012) and `WinBUGS` accessed by way of the `R` language and environment for statistical computation and graphics (R Core Team, 2012) using the `rjags` (Plummer, 2011), `R2jags` (Su & Yajima, 2012), `rbugs` (Yan & Prates, 2012), and `R2WinBUGS` (Sturtz, Ligges, & Gelman, 2005) packages. `JAGS` (mcmc-jags.sourceforge.net), `OpenBUGS` (http://www.openbugs.info) and `R` (www.r-project.org) are freely available, cross-platform (Windows, Mac OS X, Unix, and Linux), open-source programs licensed under the Free Software Foundation's GNU General Public License.

`JAGS` is designed to facilitate the analysis of Bayesian models using MCMC methods (Plummer, 2012). `JAGS`, in many respects, is a successor to the popular `WinBUGS` program (http://www.mrc-bsu.cam.ac.uk/bugs/winbugs/contents.shtml) and is similar to the `OpenBUGS` program in that it uses the `BUGS` scripting language. MCMC diagnostics and output analyses will be conducted using the `CODA` package (Convergence Diagnosis and Output Analysis; Plummer, Best, Cowles, & Vines, 2006). Figures will be created using `R` and the `ggplot2` package (Wickham, 2009), which is an implementation of Wilkinson's Grammar of Graphics (2005).

The `R` platform has numerous advantages over other platforms such as SAS and IBM's SPSS, both of which, incidentally, allow for `R` integration. Not only is `R` freely available, it has become the *lingua franca* of statistical computing (Everitt, 2010; Theul, Ligges, & Hornik, 2010), including in the social sciences (Martin, Quinn, & Park, 2011), is widely used in industry (e.g., Google, Pfizer, Merck, Bank of America, Shell, etc.; Vance, 2009), and has been on the forefront of the reproducible research movement (e.g., Koenker & Zeileis, 2009; Leisch, Eugster, & Hothorn, 2011; R. D. Peng, 2009, 2011).[2] Furthermore, community resources available for learning `R` are far greater than for alternative platforms. For example, Stack Overflow (stackoverflow.com), a free programming Q & A site has over 14,000 active `R` questions compared to a mere 650 for `SAS` and 123 for `SPSS`. On the free statistics Q & A site Cross Validated (stats.stackexchange.com), there are over 2,100 questions relating to `R`, of which, less than 400 are currently unanswered. `SPSS` on the other hand has only 215 total questions, and `SAS` has a total of only 131.

The scientific community's "culture of replication" can be augmented by a "culture of reproducibility." Short of full replication, the gold standard in *reproducible research* is publishing one's results with linked and executable code and data (R. D. Peng, 2011).

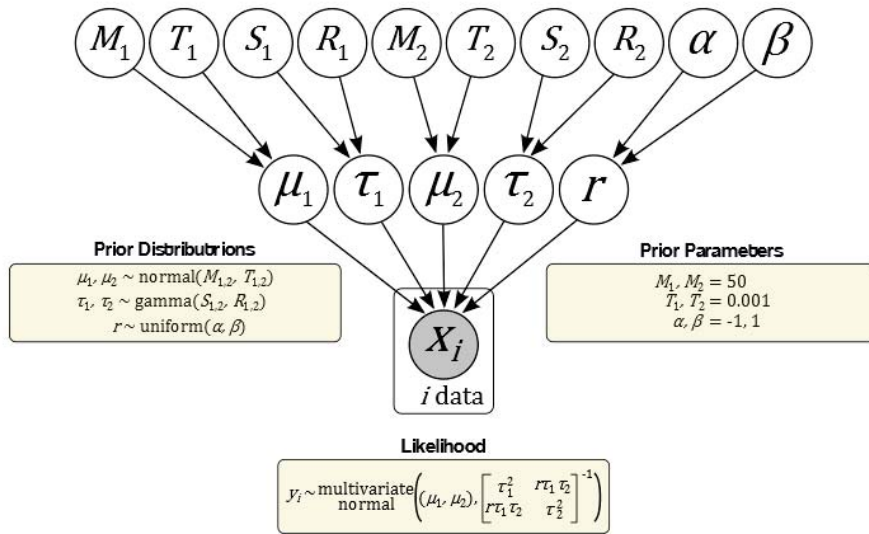[2]For information on current trends in statistical computing platforms see Muenchen, 2012.

Figure B.1: Graphical Model of Pearson Correlation Model Dependencies

This task is greatly facilitated in R through the knitr package (Xie, 2012), which allows for dynamic report generation (i.e., embedding statistical analyses within the text of a report). The importance of making one's data and methods transparent cannot be overemphasized as failing to do so is increasingly considered unethical (Gelman, 2011; Simonsohn, 2012). The current article is typeset using LATEX, the *de facto* standard for publication of scientific documents (www.latex-project.org).

BUGS Code

Bayesian inference using Gibbs sampling is facilitated by several popular (and freely available) software packages, which implement the BUGS language, and acronym for Bayesian inference Using Gibbs Sampling. For the present study, the BUGS code used to calculate the correlations between variables of interest was adapted from M. D. Lee and Wagenmakers (2012) and appears below. Note that in the BUGS scripting language, the number sign ('#') at the beginning of a line comments out that line (i.e., it is skipped over by the compiler), the two-character sequence '<-' is the assignment operator (similar to '=' in many scripting languages), and the tilde operator ($\sim$) follows probability theory convention and is read as '*is distributed as*.' The entire BUGS model is contained within the curly braces following the model keyword (i.e., model {*}) or wrapped inside of an R function using the R2jags package. Indices are subset using square brackets ([&]) and repeated calculations are contained within a for loop. Note that the functions for the

```
# BUGS code for Pearson correlation
correlation_model <- function() {
    # Data
    for (i in 1:n) {
        x[i, 1:2] ~ dmnorm(mu[], tauI[, ])
    }
    # Priors
    mu[1] ~ dnorm(0, 0.001)
    mu[2] ~ dnorm(0, 0.001)
    lambda[1] ~ dgamma(0.001, 0.001)
    lambda[2] ~ dgamma(0.001, 0.001)
    r ~ dunif(-1, 1)
    # Reparameterization
    sigma[1] <- 1/sqrt(lambda[1])
    sigma[2] <- 1/sqrt(lambda[2])
    tau[1, 1] <- 1/lambda[1]
    tau[1, 2] <- r * sigma[1] * sigma[2]
    tau[2, 1] <- r * sigma[1] * sigma[2]
    tau[2, 2] <- 1/lambda[2]
    tauI[1:2, 1:2] <- inverse(tau[1:2, 1:2])
}
```

Figure B.2: BUGS Code for Pearson Correlation

```
# BUGS code for regression model
regression_model = function() {
    for (i in 1:n) {
        y[i] ~ dnorm(mu[i], tau)
        mu[i] <- b0 + inprod(b[], x[i, ])
    }
    tau ~ dgamma(0.01, 0.01)
    b0 ~ dnorm(0, 0.001)
    for (j in 1:k) {
        b[j] ~ dnorm(0, 0.01)
    }
}
```

Figure B.3: BUGS Code for Multiple Linear Regression

normal and multivariate normal distributions in BUGS use a *precision* parameter as opposed to standard deviation. Precision is merely the inverse of the variance; thus, a 'vague' prior would be computed using a low precision value (equivalent to large variance).

```
# BUGS code for Mediation Analysis Adapted from Yuan & MacKinnon, 2009
mediation_model = function() {

    # PRIORS
    alpha ~ dnorm(0, 1e-04)
    beta ~ dnorm(0, 1e-04)
    beta2 ~ dnorm(0, 1e-04)
    beta3 ~ dnorm(0, 1e-04)
    tau.prime ~ dnorm(0, 1e-04)
    prec.y ~ dgamma(0.001, 0.001)
    prec.m ~ dgamma(0.001, 0.001)
    theta <- alpha * beta
    # LIKELIHOOD
    for (i in 1:length(x)) {
        m[i] ~ dnorm(mean.m[i], prec.m)
        mean.m[i] <- beta3 + beta * m[i] + tau.prime * x[i]
        y[i] ~ dnorm(mean.y[i], prec.y)
        mean.y[i] <- beta3 + beta * m[i] + tau.prime * x[i]
    }
}
```

Figure B.4: BUGS Code for Bayesian mediation analysis

```
# BUGS code for meta-analysis
meta_model = function() {
    # Priors
    theta ~ dnorm(0, 0.01)  #T(-.99,.99)
    precision.tau ~ dgamma(0.001, 0.001)
    tau <- sqrt(1/precision.tau)
    # Likelihood
    for (i in 1:length(r)) {
        r[i] ~ dnorm(mu[i], r.precision[i])
        r.precision[i] <- 1/r.variance[i]
        mu[i] ~ dnorm(theta, precision.tau)
        # Assess model fit
        predicted[i] <- mu[i]  # Predicted Values
        residual[i] <- r[i] - predicted[i]  # Residuals for observed data
        sq[i] <- pow(residual[i], 2)  # Squared residuals for observed data
        # Generate Replicate Data and Compute Fit Stats for Them One new data set
        # at each MCMC iteration
        r.new[i] ~ dnorm(mu[i], r.precision[i])  #T(-1,1)
        # Squared residuals for new data
        sq.new[i] <- pow(r.new[i] - predicted[i], 2)
    }
    # Assess model fit using a sums-of-squares-type discrepancy
    fit <- sum(sq[])  # Sum of squared residuals for actual data set
    fit.new <- sum(sq.new[])  # Sum of squared residuals for new data set
    test <- step(fit.new - fit)  # Test whether new data set more extreme
    bpvalue <- mean(test)  # Bayesian p-value
}
```

Figure B.5: BUGS Code for Meta-analysis

References

Achenbach, T. M. (1991). *Manual for the Child Behavior Checklist/4–18 and 1991 profile*. Burlington, VT: University of Vermont, Department of Psychiatry.

Achenbach, T. M., & Rescorla, L. (2001). *Manual for the aseba school-age forms & profiles: an integrated system of multi-informant assessment*. Burlington, VT: University of Vermont, Research Center for Children, Youth & Families.

Adams, Z. W., Kaiser, A. J., Lynam, D. R., Charnigo, R. J., & Milich, R. (2012). Drinking motives as mediators of the impulsivity-substance use relation: Pathways for negative urgency, lack of premeditation, and sensation seeking. *Addictive Behaviors*, *37*(7), 848–855. doi:10.1016/j.addbeh.2012.03.016

Allen, J. P., Litten, R. Z., Fertig, J. B., & Babor, T. (1997, June). A review of research on the Alcohol Use Disorders Identification Test (AUDIT). *Alcoholism: Clinical and Experimental Research*, *21*(4), 613–619.

Amato, P. R., & Gilbreth, J. G. (1999). Nonresident fathers and children's well-being: A meta-analysis. *Journal of Marriage and the Family*, *61*(3), 557–573. doi:10.2307/353560

Anderson, D. A., Simmons, A. M., Martens, M. P., Ferrier, A. G., & Sheehy, M. J. (2006). The relationship between disordered eating behavior and drinking motives in college-age women. *Eating Behaviors*, *7*(4), 419–422. doi:10.1016/j.eatbeh.2005.12.001

Anderson, K. G., Grunwald, I., Bekman, N., Brown, S. A., & Grant, A. (2011). To drink or not to drink: Motives and expectancies for use and nonuse in adolescence. *Addictive Behaviors*, *36*(10), 972–979. doi:10.1016/j.addbeh.2011.05.009

Ang, R. (2006). Fathers do matter: Evidence from an Asian school-base aggressive sample. *American Journal of Family Therapy*, *34*(1), 79–93. doi:10.1080/01926180500301485

Arbeau, K. J., Kuiken, D., & Wild, T. C. (2011, December). Drinking to enhance and to cope: A daily process study of motive specificity. *Addictive Behaviors*, *36*(12), 1174–1183. doi:10.1016/j.addbeh.2011.07.020

Armeli, S., Conner, T. S., Covault, J., Tennen, H., & Kranzler, H. R. (2008, November). A serotonin transporter gene polymorphism (5-HTTLPR), drinking-to-cope motivation, and negative life events among college students. *Journal of Studies on Alcohol & Drugs*, *69*(6), 814–823.

Armeli, S., Conner, T. S., Cullum, J., & Tennen, H. (2010, March). A longitudinal analysis of drinking motives moderating the negative affect-drinking association

among college students. *Psychology of Addictive Behaviors*, *24*(1), 38–47. doi:10.1037/a0017530

Armstrong, J. S. (2007). Significance tests harm progress in forecasting. *International Journal of Forecasting*, *23*(2), 321–327.

Aviles, F. E., Earleywine, M., Pollock, V., Stratton, J., & Miller, N. (2005). Alcohol's effect on triggered displaced aggression. *Psychology of Addictive Behaviors*, *19*(1), 108–111. doi:10.1037/0893-164X.19.1.108

Bakan, D. (1966). The test of significance in psychological research. *Psychological Bulletin*, *66*(6), 423–437. doi:10.1037/h0020412

Bauserman, R. et al. (2002). Child adjustment in joint-custody versus sole-custody arrangements: A meta-analytic review. *Journal of Family Psychology*, *16*(1), 91–102. doi:10.1037/0893-3200.16.1.91

Beck, K. H., Caldeira, K. M., Vincent, K. B., & Arria, A. M. (2013). Social contexts of drinking and subsequent alcohol use disorder among college students. *The American Journal of Drug and Alcohol Abuse*, *39*(1), 38–43. doi:10.3109/00952990.2012.694519

Belsky, J., & Barends, N. (2002). Personality and parenting. In M. H. Bornstein (Ed.), *Handbook of parenting: volume 3 - being and becoming a parent* (pp. 415–438). New York: Psychology Press.

Berg, I., Lucas, C., & McGuire, R. (1992). Measurement of behaviour difficulties in children using standard scales administered to mothers by computer: Reliability and validity. *European Child and Adolescent Psychiatry*, *1*(1), 14–23. doi:10.1007/BF02084430

Berkowitz, A. D. (2005). An overview of the social norms approach. In *Changing the culture of college drinking: A socially situated health communication campaign* (pp. 193–214). New York: Hampton Press.

Berkowitz, A., & Perkins, H. W. (1988, April). Personality characteristics of children of alcoholics. *Journal of Consulting and Clinical Psychology*, *56*(2), 206–209.

Berkowitz, L. et al. (1989). Frustration-aggression hypothesis: Examination and reformulation. *Psychological Bulletin*, *106*(1), 59–73.

Berner, M. M., Kriston, L., Bentele, M., & Härter, M. (2007, May). The alcohol use disorders identification test for detecting at-risk drinking: A systematic review and meta-analysis. *Journal of Studies on Alcohol & Drugs*, *68*(3), 461–473.

Bingham, C. R., Loukas, A., Fitzgerald, H. E., & Zucker, R. A. (2003, June). Parental ratings of son's behavior problems in high-risk families: Convergent validity, internal

structure, and interparent agreement. *Journal of Personality Assessment*, *80*(3), 237–251. doi:10.1207/S15327752JPA8003_03

Birnbaum, A. (1962). On the foundations of statistical inference. *Journal of the American Statistical Association*, *57*(298), 269–306.

Bollen, K. A., & Stine, R. (1990). Direct and indirect effects: Classical and bootstrap estimates of variability. *Sociological Methodology*, *20*(1), 115–140.

Borenstein, M. (2009). Effect sizes for continuous data. In H. Cooper, L. V. Hedges & J. C. Valentine (Eds.), *The handbook of research synthesis and meta-analysis* (2nd, pp. 221–235). New York: Russell Sage Foundation.

Bradley, K. A., Bush, K. R., McDonell, M. B., Malone, T., & Fihn, S. D. (1998, June). Screening for problem drinking: Comparison of CAGE and AUDIT. *Journal of General Internal Medicine*, *13*(6), 379–388. doi:10.1001/archinte.158.16.1789

Brooks, S. P. (2003, December). Bayesian computation: A statistical revolution. *Philosphical Transactions*, *361*(1813), 2681–2697. doi:10.1098/rsta.2003.1263

Bruce, G., Curren, C., & Williams, L. (2012, March). Alexithymia and alcohol consumption: The mediating effects of drinking motives. *Addictive Behaviors*, *37*(3), 350–352. doi:10.1016/j.addbeh.2011.11.024

Buckner, J. D., Eggleston, A. M., & Schmidt, N. B. (2006). Social anxiety and problematic alcohol consumption: The mediating role of drinking motives and situations. *Behavior Therapy*, *37*(4), 381–391. doi:10.1016/j.beth.2006.02.007

Burger, G. K., & Armentrout, J. A. (1971). A factor analysis of fifth and sixth graders' reports of parental child-rearing behavior. *Developmental Psychology*, *4*(3), 483. doi:10.1037/h0030981

Bushman, B. J. et al., Cooper, H. M. et al. (1990). Effects of alcohol on human aggression: An integrative research review. *Psychological Bulletin*, *107*(3), 341–354. doi:10.1037/0033-2909.107.3.341

Butler, J. M., Skinner, M., Gelfand, D., Berg, C. A., & Wiebe, D. J. (2007). Maternal parenting style and adjustment in adolescents with type I diabetes. *Journal of Pediatric Psychology*, *32*(10), 1227–1237. doi:10.1093/jpepsy/jsm065

Carey, K. B., & Correia, C. J. (1997, January). Drinking motives predict alcohol-related problems in college students. *Journal of Studies on Alcohol*, *58*(1), 100–105.

Carver, R. P. (1978). The case against statistical significance testing. *Harvard Education Review*, 378–399.

Chilcoat, H. D. et al., Breslau, N. et al. (1997). Does psychiatric history bias mothers' reports? An application of a new analytic approach. *Journal of the American Academy of Child & Adolescent Psychiatry*, *36*(7), 971–979.

Claeskens, G., & Hjort, N. L. (2008). *Model selection and model averaging (Cambridge Series in Statistical and Probabilistic Mathematics)*. New York: Cambridge University Press.

Clarke-Stewart, K. A., Allhusen, V. D., McDowell, D. J., Thelen, L., & Call, J. D. (2003). Identifying psychological problems in young children: How do mothers compare with child psychiatrists? *Journal of Applied Developmental Psychology*, *23*(6), 589–624. doi:10.1016/S0193-3973(03)00006-6

Clark, L. A., Kochanska, G., & Ready, R. (2000). Mothers' personality and its interaction with child temperament as predictors of parenting behavior. *Journal of Personality and Social Psychology*, *79*(2), 274–285. doi:10.10371/0022-3514.79.2.274

Clerkin, E. M., & Barnett, N. (2012, May). The separate and interactive effects of drinking motives and social anxiety symptoms in predicting drinking outcomes. *Addictive Behaviors*, *37*(5), 674–677. doi:10.1016/j.addbeh.2012.01.005

Cohen, J. (1994). The Earth is round (p < .05). *American Psychologist*, *49*(12), 997–1003.

Connell, A. M., & Goodman, S. H. (2002, September). The association between psychopathology in fathers versus mothers and children's internalizing and externalizing behavior problems: A meta-analysis. *Psychological Bulletin*, *128*(5), 746–773.

Cooper, M. L., Frone, M. R., Russell, M., & Mudar, P. (1995, November). Drinking to regulate positive and negative emotions: A motivational model of alcohol use. *Journal of Personality and Social Psychology*, *69*(5), 990–1005.

Cooper, M. L. (1994). Motivations for alcohol use among adolescents: Development and validation of a four-factoractor model. *Psychological Assessment*, *6*, 117–128.

Cooper, M. L., Krull, J. L., Agocha, V. B., Flanagan, M. E., Orcutt, H. K., Grabe, S., … Jackson, M. (2008, August). Motivational pathways to alcohol use and abuse among Black and White adolescents. *Journal of Abnormal Psychology*, *117*(3), 485–501. doi:10.1037/a0012592

Cooper, M. L., Russell, M., Skinner, J. B., & Windle, M. (1992). Development and validation of a three-dimensional measure of drinking motives. *Psychological Assessment*, *4*(2), 123–132.

Coskunpinar, A., & Cyders, M. A. (2012, July). Mediation-moderation analysis of problematic alcohol use: The roles of urgency, drinking motives, and risk/benefit perception. *Addictive Behaviors*, *37*(7), 880–883. doi:10.1016/j.addbeh.2012.03.014

Cox, W. M., & Klinger, E. (1988, May). A motivational model of alcohol use. *Journal of Abnormal Psychology*, *97*(2), 168–180.

Cox, W. M., & Klinger, E. (2011). A motivational model of alcohol use: Determinants of use and change. In W. M. Cox & E. Klinger (Eds.), *Handbook of motivational counseling: goal-based approaches to assessment and intervention with addiction and other problems* (Chap. 6, pp. 131–158). John Wiley & Sons, Ltd. doi:10.1002/9780470979952

Cui, M., Donnellan, M. B., & Conger, R. D. (2007). Reciprocal influences between parents' marital problems and adolescent internalizing and externalizing behavior. *Developmental Psychology*, *43*(6), 1544. doi:10.1037/0012-1649.43.6.1544

Cumming, G. (2008). Replication and p intervals: p values predict the future only vaguely, but confidence intervals do much better. *Perspectives on Psychological Science*, *3*(4), 286–300.

Curcio, A. L., & George, A. M. (2011, October). Selected impulsivity facets with alcohol use/problems: The mediating role of drinking motives. *Addictive Behaviors*, *36*(10), 959–964. doi:10.1016/j.addbeh.2011.05.007

Daeppen, J.-B. (1999, September). How would you label your own drinking pattern overall? An evaluation of answers provided by 181 high functioning middle-aged men. *Alcohol and Alcoholism*, *34*(5), 767–772. doi:10.1093/alcalc/34.5.767

Daugherty, T. K., & McLarty, L. M. (2003, April). Religious coping, drinking motivation, and sex. *Psychological Reports*, *92*(2), 643–647.

De Bellis, M. D., Broussard, E. R., Herring, D. J., Wexler, S., Moritz, G., & Benitez, J. G. (2001, July). Psychiatric co-morbidity in caregivers and children involved in maltreatment: a pilot research study with policy implications. *Child Abuse & Neglect*, *25*(7), 923–944. doi:10.1016/S0145-2134(01)00247-2

Denson, T. F., Aviles, F. E., Pollock, V. E., Earleywine, M., Vasquez, E. A., & Miller, N. (2008). The effects of alcohol and the salience of aggressive cues on triggered displaced aggression. *Aggressive Behavior*, *34*(1), 25–33. doi:10.1002/ab.20177

Denson, T. F., White, A. J., & Warburton, W. A. (2009). Trait displaced aggression and psychopathy differentially moderate the effects of acute alcohol intoxication and rumination on triggered displaced aggression. *Journal of Research in Personality*, *43*(4), 673–681. doi:10.1016/j.jrp.2009.04.003

Dickson, J. M., & MacLeod, A. K. (2004a). Approach and avoidance goals and plans: Their relationship to anxiety and depression. *Cognitive Therapy and Research*, *28*(3), 415–432. doi:10.1023/B%3ACOTR.0000031809.20488.ee

Dickson, J. M., & MacLeod, A. K. (2004b). Brief report anxiety, depression and approach and avoidance goals. *Cognition and Emotion*, *18*(3), 423–430. doi:10.1080/02699930341000013

Dube, S. R., Anda, R. F., Felitti, V. J., Croft, J. B., Edwards, V. J., & Giles, W. H. (2001, December). Growing up with parental alcohol abuse: exposure to childhood abuse, neglect, and household dysfunction. *Child Abuse & Neglect*, *25*(12), 1627–1640.

Dutra, L., Campbell, L., & Westen, D. (2004, January). Quantifying clinical judgment in the assessment of adolescent psychopathology: Reliability, validity, and factor structure of the Child Behavior Checklist for clinician report. *Journal of Clinical Psychology*, *60*(1), 65–85. doi:10.1002/jclp.10234

Edwards, J. R. (2008). To prosper, organizational psychology should . . . overcome methodological barriers to progress. *Journal of Organizational Behavior*, *29*(4), 469–491.

Efron, B. (1986). Why isn't everyone a Bayesian? *The American Statistician*, *40*(1), 1–5. doi:10.2307/2683105

Efron, B. (2010, May). The future of indirect evidence. *Statistical Science*, *25*(2), 145–157. doi:10.1214/09-STS308

Eiden, R. D., Edwards, E. P., & Leonard, K. E. (2007, September). A conceptual model for the development of externalizing behavior problems among kindergarten children of alcoholic families: Role of parenting and children's self-regulation. *Developmental Psychology*, *43*(5), 1187–1201. doi:10.1037/0012-1649.43.5.1187

Elliot, A. J. (2006). The hierarchical model of approach-avoidance motivation. *Motivation and Emotion*, *30*(2), 111–116. doi:10.1007/s11031-006-9028-7

Engels, R. C., Wiers, R., Lemmers, L., & Overbeek, G. (2005). Drinking motives, alcohol expectancies, self-efficacy, and drinking patterns. *Journal of Drug Education*, *35*(2), 147–166. Retrieved from http://baywood.metapress.com/index/6Q6B3LMAVMVAL312.pdf

Everitt, B. (2010). *A handbook of statistical analyses using R* (2nd ed.). Boca Raton, FL: Taylor & Francis Group.

Exum, M. L. (2006). Alcohol and aggression: An integration of findings from experimental studies. *Journal of Criminal Justice*, *34*(2), 131–145. doi:10.1016/j.jcrimjus.2006.01.008

Falk, R., & Greenbaum, C. W. (1995). Significance tests die hard: The amazing persistence of a probabilistic misconception. *Theory & Psychology*, *5*, 75–98.

Fanti, K. A., & Henrich, C. C. (2010, September). Trajectories of pure and co-occurring internalizing and externalizing problems from age 2 to age 12: findings from the national institute of child health and human development study of early child care. *Developmental Psychology*, *46*(5), 1159–1175. doi:10.1037/a0020659

Fan, X. (2003). Two approaches for correcting correlation attenuation caused by measurement error: Implications for research practice. *Educational and Psychological Measurement*, *63*(6), 915–930. doi:10.1177/0013164403251319

Farrell, M. P., Barnes, G. M., & Banerjee, S. (1995, December). Family cohesion as a buffer against the effects of problem-drinking fathers on psychological distress, deviant behavior, and heavy drinking in adolescents. *Journal of Health and Social Behavior*, *36*(4), 377–385.

Fisher, R. A. (1921). On the "probable error" of a coefficient of correlation deduced from a small sample. *Metron*, *1*, 1–32.

Foran, H. M. et al., O'Leary, K. D. et al. (2008). Alcohol and intimate partner violence: A meta-analytic review. *Clinical Psychology Review*, *28*(7), 1222–1234. doi:10.1016/j.cpr.2008.05.001

Fossos, N., Kaysen, D., Neighbors, C., Lindgren, K. P., & Hove, M. C. (2011). Coping motives as a mediator of the relationship between sexual coercion and problem drinking in college students. *Addictive Behaviors*, *36*(10), 1001–1007. doi:10.1016/j.addbeh.2011.06.001

Friendrich, W. N., Olafson, E., & Connelly, L. (2004). Child abuse and family assessment: Strategies and inventories. In L. Sperry (Ed.), *Assessment of couples and families: contemporary and cutting-edge strategies* (pp. 179–216). New York: Brunner-Routledge.

Galambos, N. L., Barker, E. T., & Almeida, D. M. (2003). Parents do matter: Trajectories of change in externalizing and internalizing problems in early adolescence. *Child Development*, *74*(2), 578–594. doi:10.1111/1467-8624.7402017

Galen, L. W., & Rogers, W. M. (2004, July). Religiosity, alcohol expectancies, drinking motives and their interaction in the prediction of drinking among college students. *Journal of Studies on Alcohol*, *65*(4), 469–476.

Gallup. (2010). U.S. drinking rates edge up slightly to 25-year high. Retrieved from http://www.gallup.com/poll/141656/drinking-rate-edges-slightly-year-high.aspx

Gallup. (2011). Alcohol and drinking Jul 7–10. Retrieved from http://www.gallup.com/poll/1582/Alcohol-Drinking.aspx

Gartstein, M. A., Bridgett, D. J., Dishion, T. J., & Kaufman, N. K. (2009). Depressed mood and maternal report of child behavior problems: Another look at the depression–distortion hypothesis. *Journal of Applied Developmental Psychology*, *30*(2), 149–160. doi:10.1016/j.appdev.2008.12.001

Gelman, A. (2007, August). Comment: Bayesian checking of the second levels of hierarchical models. *Statistical Science*, *22*(3), 349–352. doi:10.1214/07-STS235A

Gelman, A. (2010). Bayesian statistics then and now. *Statistical Science*, *25*(2), 162–165. doi:10.1214/09-STS308

Gelman, A. (2011). Ethics and statistics: Open data and open methods. *Chance*, *24*(4), 51–53.

Gelman, A., Carlin, J. B., Stern, H., & Rubin, D. B. (2003). *Bayesian data analysis* (2nd ed.). London: Chapman and Hall.

Gelman, A., Hill, J., & Yajima, M. (2012). Why we (usually) don't have to worry about multiple comparisons. *Journal of Research on Educational Effectiveness*, *5*, 189–211.

Gelman, A., & Jakulin, A. (2007). Bayes: Radical, liberal, or conservative? *Statistica Sinica*, *17*, 422–426.

Gelman, A., & Robert, C. P. (2012). ''not only defended but also applied'': The perceived absurdity of Bayesian inference. *The American Statistician*. Retrieved from http://arxiv.org/abs/1006.5366v5

Giancola, P. R. (2002a, November). Alcohol-related aggression in men and women: the influence of dispositional aggressivity. *Journal of Studies on Alcohol*, *63*(6), 696–708.

Giancola, P. R. (2002b, September). The influence of trait anger on the alcohol-aggression relation in men and women. *Alcoholism, Clinical and Experimental Research*, *26*(9), 1350–1358. doi:10.1097/01.ALC.0000030842.77279.C4

Giancola, P. R., Godlaski, A. J., & Parrott, D. J. (2005, November). ''so i can't blame the booze?'': Dispositional aggressivity negates the moderating effects of expectancies on alcohol-related aggression. *Journal of Studies on Alcohol*, *66*(6), 815–824.

Giancola, P. R., Helton, E. L., Osborne, A. B., Terry, M. K., Fuss, A. M., & Westerfield, J. A. (2002, January). The effects of alcohol and provocation on aggressive behavior in men and women. *Journal of Studies on Alcohol*, *63*(1), 64–73.

Giancola, P. R., Parrott, D. J., Silvia, P. J., Dewall, C. N., Bègue, L., Subra, B., . . . Bushman, B. J. (2012, February). The disguise of sobriety: unveiled by alcohol in persons with an aggressive personality. *Journal of Personality*, *80*(1), 163–185. doi:10.1111/j.1467-6494.2011.00726.x

Gill, J. (1999). The insignificance of null hypothesis significance testing. *Political Science Quarterly*, *52*(3), 647–674.

Gilman, S. E., & Abraham, H. D. (2001). A longitudinal study of the order of onset of alcohol dependence and major depression. *Drug and Alcohol Dependence*, *63*(3), 277–286. doi:10.1016/S0376-8716(00)00216-7

Gire, J. T. (2002, January). A cross-national study of motives for drinking alcohol. *Substance Use & Misuse*, *37*(2), 215–223.

Gleser, L. J., & Olkin, I. (2009). Stochastically dependent effect sizes. In H. Cooper, L. V. Hedges & J. C. Valentine (Eds.), *The handbook of research synthesis and meta-analysis* (2nd ed., pp. 357–376). New York: Russell Sage Foundation.

Glover, S., & Dixon, P. (2004, October). Likelihood ratios: A simple and flexible statistic for empirical psychologists. *Psychonomic Bulletin & Review*, *11*(5), 791–806.

Gmel, G., Heeb, J.-L., & Rehm, J. (2001). Is frequency of drinking an indicator of problem drinking? A psychometric analysis of a modified version of the alcohol use disorders identification test in Switzerland. *Drug and Alcohol Dependence*, *64*(2), 151–163. doi:10.1016/S0376-8716(01)00117-X

Goldsmith, A. A., Tran, G. Q., Smith, J. P., & Howe, S. R. (2009). Alcohol expectancies and drinking motives in college drinkers: Mediating effects on the relationship between generalized anxiety and heavy drinking in negative-affect situations. *Addictive Behaviors*, *34*(6-7), 505–513. doi:10.1016/j.addbeh.2009.01.003

Goldstein, A. L., & Flett, G. L. (2009, March). Personality, alcohol use, and drinking motives: A comparison of independent and combined internal drinking motives groups. *Behavior Modification*, *33*(2), 182–198. doi:10.1177/0145445508322920

Goldstein, A. L., Flett, G. L., & Wekerle, C. (2010, June). Child maltreatment, alcohol use and drinking consequences among male and female college students: An examination of drinking motives as mediators. *Addictive Behaviors*, *35*(6), 636–639. doi:10.1016/j.addbeh.2010.02.002

Gonzalez, V. M., Collins, R. L., & Bradizza, C. M. (2009). Solitary and social heavy drinking, suicidal ideation, and drinking motives in underage college drinkers. *Addictive Behaviors*, *34*(12), 993–999. doi:10.1016/j.addbeh.2009.06.001

Goodman, S. H. (2007). Depression in mothers. *Annual Review of Clinical Psychology*, *3*, 107–135. doi:10.1146/annurev.clinpsy.3.022806.091401

Goodman, S. H., Rouse, M. H., Connell, A. M., Broth, M. R., Hall, C. M., & Heyward, D. (2011). Maternal depression and child psychopathology: A meta-analytic review. *Clinical Child and Family Psychology Review*, *14*(1), 1–27. doi:10.1007/s10567-010-0080-1

Goodman, S. N. (1999a, June). Toward evidence-based medical statistics. 1: The p value fallacy. *Annals of Internal Medicine*, *130*(12), 995–1004.

Goodman, S. N. (1999b, June). Toward evidence-based medical statistics. 2: The Bayes factor. *Annals of Internal Medicine*, *130*(12), 1005–1013.

Grant, B. F. (2000, January). Estimates of US children exposed to alcohol abuse and dependence in the family. *American Journal of Public Health*, *90*(1), 112–115.

Grant, V. V., Stewart, S. H., & Mohr, C. D. (2009, June). Coping-anxiety and coping-depression motives predict different daily mood-drinking relationships. *Psychology of Addictive Behaviors*, *23*(2), 226–237. doi:10.1037/a0015006

Grant, V. V., Stewart, S. H., O'Connor, R. M., Blackwell, E., & Conrod, P. J. (2007, November). Psychometric evaluation of the five-factor Modified Drinking Motives Questionnaire–Revised in undergraduates. *Addictive Behaviors*, *32*(11), 2611–2632. doi:10.1016/j.addbeh.2007.07.004

Gray, J. A. (1970, August). The psychophysiological basis of introversion-extraversion. *Behaviour Research and Therapy*, *8*(3), 249–266.

Grayson, C. E., & Nolen-Hoeksema, S. (2005). Motives to drink as mediators between childhood sexual assault and alcohol problems in adult women. *Journal of Traumatic Stress*, *18*(2), 137–145. doi:10.1002/jts.20021

Graziano, F., Bina, M., Giannotta, F., & Ciairano, S. (2012). Drinking motives and alcoholic beverage preferences among Italian adolescents. *Journal of Adolescence*. doi:10.1016/j.adolescence.2011.11.010

Gusfield, J. R. (1984). *The culture of public problems*. Chicago: University of Chicago.

Halim, A., Hasking, P., & Allen, F. (2012). The role of social drinking motives in the relationship between social norms and alcohol consumption. *Addictive Behaviors*. doi:10.1016/j.addbeh.2012.07.004

Haller, H., & Krauss, S. (2002). Misinterpretations of significance: A problem students share with their teachers? *Methods of Psychological Research Online*, *7*, 1–20.

Ham, L. S., Bonin, M., & Hope, D. A. (2007). The role of drinking motives in social anxiety and alcohol use. *Journal of Anxiety Disorders*, *21*(8), 991–1003. doi:10.1016/j.janxdis.2006.10.014

Ham, L. S., Zamboanga, B. L., Bacon, A. K., & Garcia, T. A. (2009). Drinking motives as mediators of social anxiety and hazardous drinking among college students. *Cognitive Behaviour Therapy*, *38*(3), 133–145. doi:10.1080/16506070802610889

Harlow, L. L., Muliak, S. A., & Steiger, J. H. (1997). *What if there were no significance tests?* Mahwah, NJ: Lawrence Erlbaum.

Hasking, P., Lyvers, M., & Carlopio, C. (2011, May). The relationship between coping strategies, alcohol expectancies, drinking motives and drinking behaviour. *Addictive Behaviors*, *36*(5), 479–487. doi:10.1016/j.addbeh.2011.01.014

Hauck-Filho, N., Teixeira, M. A. P., & Cooper, M. L. (2012, April). Confirmatory factor analysis of the Brazilian version of the Drinking Motives Questionnaire-Revised (DMQ-R). *Addictive Behaviors*, *37*(4), 524–527. doi:10.1016/j.addbeh.2011.11.023

Heath, D. B. (1981). Determining the sociocultural context of alcohol use. *Journal of Studies on Alcohol & Drugs*, (9), 9–17.

Howell, A. N., Leyro, T. M., Hogan, J., Buckner, J. D., & Zvolensky, M. J. (2010). Anxiety sensitivity, distress tolerance, and discomfort intolerance in relation to coping and conformity motives for alcohol use and alcohol use problems among young adult drinkers. *Addictive Behaviors*.

Howson, C., & Urbach, P. (2006). *Scientific reasoning: the Bayesian approach* (3rd ed.). Chicago: Open Court Publishing Company.

Hubbard, R. (2004). Alphabet soup: Blurring the distinctions between p's and α's in psychological research. *Theory & Psychology*, *14*(3), 295–327.

Hubbard, R., & Armstrong, J. S. (2006). Why we don't really know what "statistical significance" means: A major educational failure. *Journal of Marketing Education*, *28*, 114–120.

Hubbard, R., & Bayarri, M. J. (2003). *P values are not error probabilities*. Retrieved from http://www.uv.es/sestio/TechRep/tr14-03.pdf

Hubbard, R., & Lindsay, R. M. (2008). Why *p* values are not a useful measure of evidence in statistical significance testing. *Theory Psychology*, *18*, 69. doi:10.1177/0959354307086923

Hubbard, R., & Ryan, P. A. (2000). The historical growth of statistical significance testing in psychology—and its future prospects. *Educational and Psychological Measurement*, *60*, 661–681.

Hunter, J. E. (1997). Needed: A ban on the significance test. *Psychological Science*, *8*(1), 3–7.

Hussong, A. M. (2003). Social influences in motivated drinking among college students. *Psychology of Addictive Behaviors*, *17*(2), 142. doi:10.1037/0893-164X.17.2.142

Hussong, A. M., Galloway, C. A., & Feagans, L. A. (2005). Coping motives as a moderator of daily mood-drinking covariation. *Journal of Studies on Alcohol & Drugs*, *66*(3), 344. Retrieved from http://www.jsad.com/jsad/link/66/344

Ioannidis, J. P. A. (2005, August). Why most published research findings are false. *PLoS Med*, *2*(8), e124. doi:10.1371/journal.pmed.0020124

Ito, T. A. et al., Miller, N. et al., Pollock, V. E., et al. (1996). Alcohol and aggression: A meta-analysis on the moderating effects of inhibitory cues, triggering events, and self-focused attention. *Psychological Bulletin*, *120*, 60–82.

Jacob, T., Krahn, G. L., & Leonard, K. (1991, February). Parent-child interactions in families with alcoholic fathers. *Journal of Consulting and Clinical Psychology*, *59*(1), 176–81, discussion 183.

Jaynes, E. T. (2003). *Probability theory: the logic of science*. Cambridge, UK: Cambridge University Press.

Johansson, T. (2011, April). Hail the impossible: p-values, evidence, and likelihood. *Scandinavian Journal of Psychology*, *52*(2), 113–125. doi:10.1111/j.1467-9450.2010.00852.x

Johnson, D. R. (2001). Measuring marital relations. In J. Touliatos, B. F. Perlmutter & G. W. Holden (Eds.), *Handbook of family measurement techniques: abstract* (pp. 73–86). Thousand Oaks, California: Sage Publications, Inc.

Jones, D. C., & Houts, R. (1992, January). Parental drinking, parent-child communication, and social skills in young adults. *Journal of Studies on Alcohol*, *53*(1), 48–56.

Kane, P. et al., Garber, J. et al. (2004). The relations among depression in fathers, children's psychopathology, and father–child conflict: A meta-analysis. *Clinical Psychology Review*, *24*(3), 339–360.

Kaysen, D., Dillworth, T. M., Simpson, T., Waldrop, A., Larimer, M. E., & Resick, P. A. (2007). Domestic violence and alcohol use: Trauma-related symptoms and motives for drinking. *Addictive Behaviors*, *32*(6), 1272–1283. doi:10.1016/j.addbeh.2006.09.007

Keller, P. S., Cummings, E. M., & Davies, P. T. (2005, September). The role of marital discord and parenting in relations between parental problem drinking and child adjustment. *Journal of Child Psychology and Psychiatry*, *46*(9), 943–951. doi:10.1111/j.1469-7610.2004.00399.x

Keller, P. S., Cummings, E. M., Davies, P. T., & Mitchell, P. M. (2008). Longitudinal relations between parental drinking problems, family functioning, and child adjustment. *Development and Psychopathology*, *20*(1), 195–212. doi:10.1017/S0954579408000096

Keller, P. S., Gilbert, L. R., Koss, K. J., Cummings, E. M., & Davies, P. T. (2011, September). Parental problem drinking, marital aggression, and child emotional insecurity: a longitudinal investigation. *Journal of Studies on Alcohol & Drugs*, *72*(5), 711–722.

Kerig, P. K. (1996). Assessing the links between interparental conflict and child adjustment: The conflicts and problem-solving scales. *Journal of Family Psychology*, *10*(4), 454–473.

Kerig, P. K. (1998). Gender and appraisals as mediators of adjustment in children exposed to interparental violence. *Journal of Family Violence*, *13*(4), 345–363. doi:10.1023/A:1022871102437

Kilty, K. M. (1981). Drinking status and somatization. *The American Journal of Drug and Alcohol Abuse*, *8*(1), 107–116. doi:10.3109/00952998109016922

Kim, W., Wiechelt, S. A., & Kim, S. (2010, April). The evolution of drinking motivations among Korean women with alcohol dependence. *Health Care for Women International*, *31*(4), 327–344. doi:10.1080/07399330903215627

Kmetz, J. L. (2011a). *Fifty lost years: Why international business scholars must not emulate the US social-science research model*. Retrieved from http://www.wbiconpro.com/422%20KMETZ.pdf

Kmetz, J. L. (2011b). *GASSSP the destroyer*. Retrieved from http://sites.udel.edu/mjs/gassspp-the-destroyer

Koch, K.-R. (2007). *Introduction to bayesian statistics* (2nd ed.). New York: Springer.

Koenker, R., & Zeileis, A. (2009). On reproducible econometric research. *Journal of Applied Econometrics*, *24*(5), 833–847. doi:doi:10.1002/jae.1083

Koyama, C., & Belli, G. (2011). Alcohol use, acculturative stress, and drinking motivation among international community college students. *Journal of Multicultural Counseling and Development*, *39*(4), 229–240. doi:10.1002/j.2161-1912.2011.tb00637.x

Kristjansson, S. D., Agrawal, A., Lessov-Schlaggar, C. N., Madden, P. A., Lynne Cooper, M., Bucholz, K. K., ... Heath, A. C. (2011). The relationship between rs3779084 in the Dopa Decarboxylase (DDC) gene and alcohol consumption is mediated by drinking motives in regular smokers. *Alcoholism: Clinical and Experimental Research*, *36*(1), 162–170. doi:10.1111/j.1530-0277.2011.01596.x

Kruschke, J. K. (2010a). *Doing Bayesian data analysis: a tutorial with R and BUGS*. Burlington, MA: Academic Press.

Kruschke, J. K. (2010b, July). What to believe: Bayesian methods for data analysis. *Trends in Cognitive Sciences*, *14*(7), 293–300. doi:10.1016/j.tics.2010.05.001

Kruschke, J. K. (2011). Bayesian assessment of null values via parameter estimation and model comparison. *Perspectives on Psychological Science*, *6*(3), 299–312. doi:10.1177/1745691611406925

Kuntsche, E., Knibbe, R., Engels, R., & Gmel, G. (2007). Drinking motives as mediators of the link between alcohol expectancies and alcohol use among adolescents. *Journal of Studies on Alcohol & Drugs*, *68*(1), 76. Retrieved from

http://www.jsad.com/jsad/article/Drinking_Motives_as_Mediators_of_the_Link_
Between_Alcohol_Expectancies_and_/1556.html

Kuntsche, E., Knibbe, R., Gmel, G., & Engels, R. (2006, October). Who drinks and why?
A review of socio-demographic, personality, and contextual issues behind the
drinking motives in young people. *Addictive Behaviors*, *31*(10), 1844–1857.
doi:10.1016/j.addbeh.2005.12.028

Kuntsche, E., & Kuntsche, S. (2009). Development and validation of the Drinking Motive
Questionnaire Revised Short Form (DMQ–R SF). *Journal of Clinical Child &
Adolescent Psychology*, *38*(6), 899–908. doi:10.1080/15374410903258967

Kuntsche, E., Stewart, S. H., & Cooper, M. L. (2008, May). How stable is the
motive-alcohol use link? A cross-national validation of the Drinking Motives
Questionnaire Revised among adolescents from Switzerland, Canada, and the United
States. *Journal of Studies on Alcohol & Drugs*, *69*(3), 388–396.

Kypri, K., Saunders, J. B., Williams, S. M., McGee, R. O., Langley, J. D.,
Cashell-Smith, M. L., & Gallagher, S. J. (2004). Web-based screening and brief
intervention for hazardous drinking: A double-blind randomized controlled trial.
Addiction, *99*(11), 1410–1417. doi:10.1111/j.1360-0443.2004.00847.x

LaBrie, J. W., Ehret, P. J., Hummer, J. F., & Prenovost, K. (2011). Poor adjustment to
college life mediates the relationship between drinking motives and alcohol
consequences: A look at college adjustment, drinking motives, and drinking
outcomes. *Addictive Behaviors*, *37*(4), 379–386. doi:10.1016/j.addbeh.2011.11.018

Labrie, J. W., Lac, A., Kenney, S. R., & Mirza, T. (2011, April). Protective behavioral
strategies mediate the effect of drinking motives on alcohol use among heavy
drinking college students: Gender and race differences. *Addictive Behaviors*, *36*(4),
354–361. doi:10.1016/j.addbeh.2010.12.013

Lambdin, C. (2012). Significance tests as sorcery: Science is empirical—significance tests
are not. *Theory & Psychology*, *22*, 67–90. doi:10.1177/0959354311429854

Landers, A. (1967, August 3). 'social drinker' parents ruin lives of children through
irresponsibility. *Cape Girardeau Southeast Missourian*, p. 9. Retrieved from
http://news.google.com/newspapers?nid=1893&dat=19670803&id=
7LcfAAAAIBAJ&sjid=qtcEAAAAIBAJ&pg=1116,3004046

Lansford, J. E., Ceballo, R., Abbey, A., & Stewart, A. J. (2001). Does family structure
matter? A comparison of adoptive, two-parent biological, single-mother, stepfather,
and stepmother households. *Journal of Marriage and family*, *63*(3), 840–851.
doi:10.1111/j.1741-3737.2001.00840.x

Lansford, J. E., Malone, P. S., Castellino, D. R., Dodge, K. A., Pettit, G. S., & Bates, J. E. (2006). Trajectories of internalizing, externalizing, and grades for children who have and have not experienced their parents' divorce or separation. *Journal of Family Psychology*, *20*(2), 292.

Lee, H. H., & Cranford, J. A. (2008, August). Does resilience moderate the associations between parental problem drinking and adolescents' internalizing and externalizing behaviors? a study of Korean adolescents. *Drug and Alcohol Dependence*, *96*(3), 213–221. doi:10.1016/j.drugalcdep.2008.03.007

Lee, M. D., & Wagenmakers, E.-J. (2012). *Bayesian modeling for cognitive science: A practical course*. Cambridge University Press. Retrieved from http://bayescourse.socsci.uva.nl/book_code/BayesBookWeb.pdf

Leisch, F., Eugster, M., & Hothorn, T. (2011). Executable papers for the R community: the R2 platform for reproducible research. *Procedia Computer Science*, *4*, 618 –626. doi:10.1016/j.procs.2011.04.065

Levine, T. R., Weber, R., Hullett, C., Park, H. S., & Linsey, L. L. M. (2008). A critical assessment of null hypothesis significance testing in quantitative communication research. *Human Communication Research*, *34*(2), 171–187.

Lewis, M. A., Hove, M. C., Whiteside, U., Lee, C. M., Kirkeby, B. S., Oster-Aaland, L., . . . Larimer, M. E. (2008). Fitting in and feeling fine: Conformity and coping motives as mediators of the relationship between social anxiety and problematic drinking. *Psychology of Addictive Behaviors*, *22*(1), 58.

Lewis, M. A., Phillippi, J., & Neighbors, C. (2007). Morally based self-esteem, drinking motives, and alcohol use among college students. *Psychology of Addictive Behaviors*, *21*(3), 398.

Lindgren, K. P., Neighbors, C., Blayney, J. A., Mullins, P. M., & Kaysen, D. (2011). Do drinking motives mediate the association between sexual assault and problem drinking? *Addictive Behaviors*. doi:10.1016/j.addbeh.2011.10.009

Lindley, D. V. (1975). The future of statistics: A Bayesian 21st century. *Advances in Applied Probability*, *7*, 106–115.

Littlefield, A. K., Agrawal, A., Ellingson, J. M., Kristjansson, S., Madden, P. A., Bucholz, K. K., . . . Sher, K. J. (2011). Does variance in drinking motives explain the genetic overlap between personality and alcohol use disorder symptoms? A twin study of young women. *Alcoholism: Clinical and Experimental Research*, *35*(12), 2242–2250. doi:10.1111/j.1530-0277.2011.01574.x

Littlefield, A. K., Jackson, K. M., & Talley, A. E. (2012). Coping motives, negative moods, and time-to-drink: Exploring alternative analytic models of coping motives

as moderator of daily mood-drinking covariation. *Addictive Behaviors*. doi:10.1016/j.addbeh.2012.05.020

Little, R. (2006). Calibrated Bayes: A Bayes/frequentist roadmap. *The American Statistician*, *60*(3), 1–11. doi:10.1198/000313006X117837

Loftus, G. R. (1996). Psychology will be a much better science when we change the way we analyze data. *Current Directions in Psychological Science*, *5*, 161–171.

Lorber, M. F. (2004). Psychophysiology of aggression, psychopathy, and conduct problems: A meta-analysis. *Psychological Bulletin*, *130*(4), 531. doi:10.1037/0033-2909.130.4.531

Lovejoy, M. C., Graczyk, P. A., O'Hare, E., & Neuman, G. (2000). Maternal depression and parenting behavior: A meta-analytic review. *Clinical Psychology Review*, *20*(5), 561–592. doi:10.1016/S0272-7358(98)00100-7

Lowe, L. A. (1998). Using the Child Behavior Checklist in assessing conduct disorder: Issues of reliability and validity. *Research on Social Work Practice*, *8*(3), 286–301. doi:10.1177/104973159800800303

Lyvers, M., Hasking, P., Hani, R., Rhodes, M., & Trew, E. (2010, February). Drinking motives, drinking restraint and drinking behaviour among young adults. *Addictive Behaviors*, *35*(2), 116–122. doi:10.1016/j.addbeh.2009.09.011

MacKinnon, D. P., & Dwyer, J. H. (1993). Estimating mediated effects in prevention studies. *Evaluation Review*, *17*(2), 144–158. doi:10.1177/0193841X9301700202

MacLean, M. G., & Lecci, L. (2000, March). A comparison of models of drinking motives in a university sample. *Psychology of Addictive Behaviors*, *14*(1), 83–87.

MacPherson, P. S., Stewart, S. H., & McWilliams, L. A. (2001). Parental problem drinking and anxiety disorder symptoms in adult offspring: Examining the mediating role of anxiety sensitivity components. *Addictive Behaviors*, *26*(6), 917–934.

Marcus-Newhall, A., Pedersen, W. C., Carlson, M., & Miller, N. (2000). Displaced aggression is alive and well: A meta-analytic review. *Journal of Personality and Social Psychology*, *78*(4), 670. Retrieved from http://psycnet.apa.org/?fa=main.doiLanding&uid=2000-08135-005

Margolies, P. J., & Weintraub, S. (1977, April). The revised 56-item CRPBI as a research instrument: Reliability and factor structure. *Journal of Clinical Psychology*, *33*(2), 472–476. doi:10.1002/1097-4679(197704)33:2<472::AID-JCLP2270330230>3.0.CO;2-S

Martens, M. P., Cox, R. H., Beck, N. C., & Heppner, P. P. (2003). Measuring motivations for intercollegiate athlete alcohol use: A confirmatory factor analysis of the Drinking Motives Measure. *Psychological Assessment*, *15*(2), 235.

Martens, M. P., Ferrier, A. G., & Cimini, M. D. (2007, January). Do protective behavioral strategies mediate the relationship between drinking motives and alcohol use in college students? *Journal of Studies on Alcohol & Drugs*, *68*(1), 106–114.

Martens, M. P., Pedersen, E. R., Smith, A. E., Stewart, S. H., & O'Brien, K. (2011). Predictors of alcohol-related outcomes in college athletes: The roles of trait urgency and drinking motives. *Addictive Behaviors*, *36*(5), 456–464. doi:10.1016/j.addbeh.2010.12.025

Martens, M. P., Rocha, T. L., Martin, J. L., & Serrao, H. F. (2008). Drinking motives and college students: Further examination of a four-factor model. *Journal of Counseling Psychology*, *55*(2), 289–295. doi:10.1037/0022-0167.55.2.289

Martin, A. D., Quinn, K. M., & Park, J. H. (2011, June). MCMCpack: Markov Chain Monte Carlo in R. *Journal of Statistical Software*, *42*(9), 1–21. Retrieved from http://www.jstatsoft.org/v42/i09

Mazzardis, S., Vieno, A., Kuntsche, E., & Santinello, M. (2010, October). Italian validation of the Drinking Motives Questionnaire Revised Short Form (DMQ-R SF). *Addictive Behaviors*, *35*(10), 905–908.

McCloskey, D. N. (1992). The bankruptcy of statistical significance. *Eastern Economic Journal*, *18*, 359–361.

McKee, L., Colletti, C., Rakow, A., Jones, D. J., & Forehand, R. (2008, June). Parenting and child externalizing behaviors: Are the associations specific or diffuse? *Aggression and Violent Behavior*, *13*(3), 201–215. doi:10.1016/j.avb.2008.03.005

McLaughlin, K. A., Gadermann, A. M., Hwang, I., Sampson, N. A., Al-Hamzawi, A., Andrade, L. H., . . . Kessler, R. C. (2012, April). Parent psychopathology and offspring mental disorders: Results from the WHO World Mental Health Surveys. *British Journal of Psychiatry*, *200*(4), 290–299. doi:10.1192/bjp.bp.111.101253

McNally, A. M., Palfai, T. P., Levine, R. V., & Moore, B. M. (2003). Attachment dimensions and drinking-related problems among young adults the meditational role of coping motives. *Addictive Behaviors*.

Meehl, P. E. (1967). Theory testing in psychology and physics: A methodological paradox. *Philosophy of Science*, *34*, 103–115.

Meehl, P. E. (1978). Theoretical risks and tabular asterisks: Sir Karl, Sir Ronald, and the slow progress of soft psychology. *Journal of Consulting and Clinical Psychology*, *46*, 806–834.

Meehl, P. E. (1990). Why summaries of research on psychological theories are often uninterpretable. *Psychological Reports*, *66*, 195–244.

Merrill, J. E., & Read, J. P. (2010, December). Motivational pathways to unique types of alcohol consequences. *Psychology of Addictive Behaviors*, *24*(4), 705–711. doi:10.1037/a0020135

Mesman, J., & Koot, H. M. (2001, September). Early preschool predictors of preadolescent internalizing and externalizing DSM-IV diagnoses. *Journal of the American Academy of Child & Adolescent Psychiatry*, *40*(9), 1029–1036. doi:10.1097/00004583-200109000-00011

Metcalf, C. J. E., Stephens, D. A., Rees, M., Louda, S. M., & Keeler, K. H. (2009). Using Bayesian inference to understand the allocation of resources between sexual and asexual reproduction. *Journal of the Royal Statistical Society*, *58*(2), 143–170. doi:10.1111/j.1467-9876.2008.00652.x

Mezquita Guillamón, L., Stewart, S. H., Ibáñez Ribes, M. I., Ruipérez Rodrguez, M. Á., Villa Martn, E., Moya Higueras, J., & Ortet i Fabregat, G. (2011). Drinking motives in clinical and general populations. *European Addiction Research*, *17*, 250–261. doi:10.1159/000328510

Mezquita, L., Stewart, S. H., & Ruipérez, M. Á. (2010). Big-five personality domains predict internal drinking motives in young adults. *Personality and Individual Differences*, *49*(3), 240–245. doi:10.1016/j.paid.2010.03.043

Miller, N. E. (1941). The frustration-aggression hypothesis. *Psychological Review*, *48*(4), 337. Retrieved from http://psycnet.apa.org/?fa=main.doiLanding&uid=1941-04185-001

Moeller, S. J., & Crocker, J. (2009). Drinking and desired self-images: Path models of self-image goals, coping motives, heavy-episodic drinking, and alcohol problems. *Psychology of Addictive Behaviors*, *23*(2), 334.

Mohr, C. D., Armeli, S., Tennen, H., Temple, M., Todd, M., Clark, J., & Carney, M. A. (2005). Moving beyond the keg party: a daily process study of college student drinking motivations. *Psychology of Addictive Behaviors*, *19*(4), 392.

Muchinsky, P. M. (1996). The correction for attenuation. *Educational and Psychological Measurement*, *56*(1), 63–75. doi:10.1177/0013164496056001004

Muenchen, R. A. (2012). The popularity of data analysis software. *r4stats.com*. Retrieved from http://r4stats.com/articles/popularity

Murray, M. L. (1993). On the significance of significance (the significance of statistical information). *CPCU Journal*, *46*(2), 67–69.

Mushquash, C. J., Stewart, S. H., Comeau, M. N., & McGrath, P. J. (2008). The structure of drinking motives in First Nations adolescents in Nova Scotia. *American Indian and Alaska Native Mental Health Research*, *15*(1), 33–52.

Najman, J. M., Williams, G. M., Nikles, J., Spence, S., Bor, W., O'Callaghan, M., . . . Andersen, M. J. (2000). Mothers' mental illness and child behavior problems: Cause-effect association or observation bias? *Journal of the American Academy of Child & Adolescent Psychiatry*, *39*(5), 592–602. doi:10.1097/00004583-200005000-00013

Najman, J. M., Williams, G., Nikles, J., Spence, S., Bor, W., O E M Callaghan, M., . . . Shuttlewood, G. J. (2001, July). Bias influencing maternal reports of child behaviour and emotional state. *Social Psychiatry and Psychiatric Epidemiology*, *36*(4), 186–194. doi:10.1007/s001270170062

Neighbors, C., Larimer, M. E., Geisner, I. M., & Knee, C. R. (2004). Feeling controlled and drinking motives among college students: Contingent self-esteem as a mediator. *Self and Identity*, *3*(3), 207–224. doi:10.1080/13576500444000029

Németh, Z., Kuntsche, E., Urbán, R., Farkas, J., & Demetrovics, Z. (2010). Why do festival goers drink? Assessment of drinking motives using the DMQ-R SF in a recreational setting. *Drug and Alcohol Review*, *30*(1), 40–46. doi:10.1111/j.1465-3362.2010.00193.x

Németh, Z., Urbán, R., Kuntsche, E., Pedro, E. M. S., Nieto, J. G. R., Farkas, J., . . . Demetrovics, Z. (2011). Drinking motives among Spanish and Hungarian young adults: A cross-national study. *Alcohol and Alcoholism*, *46*(3), 261–269. doi:10.1093/alcalc/agr019

Nix, T. W., & Barnette, J. J. (1998). The data analysis dilemma: Ban or abandon. A review of null hypothesis significance testing. *Research in the Schools*, *5*(2), 3–14.

O'Hare, T., & Sherrer, M. V. (1999). Validating the Alcohol Use Disorder Identification Test with college first-offenders. *Journal of Substance Abuse Treatment*, *17*(1-2), 113–119.

Omi, Y. (2012, March). Tension between the theoretical thinking and the empirical method: is it an inevitable fate for psychology? *Integrative Psychological and Behavioral Science*, *46*(1), 118–127. doi:10.1007/s12124-011-9185-4

Ortiz, J., & Raine, A. (2004). Heart rate level and antisocial behavior in children and adolescents: A meta-analysis. *Journal of the American Academy of Child & Adolescent Psychiatry*, *43*(2), 154–162. doi:10.1097/00004583-200402000-00010

Ostafin, B. D., & Brooks, J. J. (2011). Drinking for relief: Negative affect increases automatic alcohol motivation in coping-motivated drinkers. *Motivation and Emotion*, *35*(3), 285–295. doi:10.1007/s11031-010-9194-5

Palfai, T. P., Ralston, T. E., & Wright, L. L. (2011). Understanding university student drinking in the context of life goal pursuits: The mediational role of enhancement

motives. *Personality and Individual Differences*, *50*(2), 169–174. doi:10.1016/j.paid.2010.09.020

Park, C. L., & Levenson, M. R. (2002, July). Drinking to cope among college students: Prevalence, problems and coping processes. *Journal of Studies on Alcohol & Drugs*, *63*(4), 486–497.

Patrick, M. E., Lee, C. M., & Larimer, M. E. (2011). Drinking motives, protective behavioral strategies, and experienced consequences: Identifying students at risk. *Addictive Behaviors*, *36*(3), 270–273. doi:10.1016/j.addbeh.2010.11.007

Paulussen-Hoogeboom, M. C., Stams, G. J. J., Hermanns, J. M., Peetsma, T. T., & van den Wittenboer, G. L. (2008). Parenting style as a mediator between children's negative emotionality and problematic behavior in early childhood. *The Journal of Genetic Psychology*, *169*(3), 209–226. doi:10.3200/GNTP.169.3.09-226

Peirce, R. S., Frone, M. R., Russell, M., & Cooper, M. L. (1994). Relationship of financial strain and psychosocial resources to alcohol use and abuse: The mediating role of negative affect and drinking motives. *Journal of Health and Social Behavior*, *35*(4), 291–308. Retrieved from http://www.jstor.org/stable/10.2307/2137211

Peng, C.-Z., Wilsnack, R. W., Kristjanson, A. F., Benson, P., & Wilsnack, S. C. (2012, July). Gender differences in the factor structure of the Alcohol Use Disorders Identification Test in multinational general population surveys. *Drug and Alcohol Dependence*, *124*(1-2), 50–56. doi:10.1016/j.drugalcdep.2011.12.002

Peng, R. D. (2009). Reproducible research and biostatistics. *Biostatistics*, *10*(3), 405–408. doi:10.1093/biostatistics/kxp014

Peng, R. D. (2011, December). Reproducible research in computational science. *Science*, *334*(6060), 1226–1227. doi:10.1126/science.1213847

Plummer, M. (2011). *Rjags: bayesian graphical models using MCMC*. Retrieved from http://CRAN.R-project.org/package=rjags

Plummer, M. (2012, May). JAGS version 3.2.0 user manual. Retrieved from http://iweb.dl.sourceforge.net/project/mcmc-jags/Manuals/3.x/jags_user_manual.pdf

Plummer, M., Best, N., Cowles, K., & Vines, K. (2006). CODA: Convergence Diagnosis and Output Analysis for MCMC. *R News*, *6*(1), 7–11. Retrieved from http://CRAN.R-project.org/doc/Rnews/

Radloff, L. S. (1977, June). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, *1*(3), 385–401. doi:10.1177/014662167700100306

Rafferty, P., & Hartley, P. (2006). Shame about the children: A legacy of distress for adults who have grown up with parental problem drinking and family disharmony? *Journal of Substance Use*, *11*(2), 115–127. doi:10.1080/14659890500237440

R Core Team. (2012). *R: a language and environment for statistical computing*. R Foundation for Statistical Computing. Vienna, Austria. Retrieved from http://www.R-project.org/

Reich, W., Earls, F., & Powell, J. (1988, July). A comparison of the home and social environments of children of alcoholic and non-alcoholic parents. *British Journal of Addiction*, *83*(7), 831–839.

Resnik, P., & Hardisty, E. (2010). *Gibbs sampling for the uninitiated*. UMIACS. Retrieved from http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA523027

Rettew, D. C., Stanger, C., McKee, L., Doyle, A., & Hudziak, J. J. (2006). Interactions between child and parent temperament and child behavior problems. *Comprehensive Psychiatry*, *47*(5), 412–420. doi:10.1016/j.comppsych.2005.12.008

Revelle, W. (2012). *Psych: procedures for psychological, psychometric, and personality research*. R package version 1.2.1. Northwestern University. Evanston, Illinois. Retrieved from http://personality-project.org/r/psych.manual.pdf

Rimal, R. N., & Real, K. (2005). How behaviors are influenced by perceived norms: A test of the theory of normative social behavior. *Communication Research*, *32*(3), 389–414. doi:10.1177/0093650205275385

Rinaldi, C. M., & Howe, N. (2012). Mothers' and fathers' parenting styles and associations with toddlers' externalizing, internalizing, and adaptive behaviors. *Early Childhood Research Quarterly*, *27*(2), 266–273. doi:10.1016/j.ecresq.2011.08.001

Robert, C., & Casella, G. (2004). *Monte carlo statistical methods* (2nd ed.). New York: Springer-Verlag.

Robert, C., & Casella, G. (2010). Gibbs samplers. In *Introducing monte carlo methods with R* (pp. 199–236). Springer New York. doi:10.1007/978-1-4419-1576-4_7

Roberts, R. E. (1980). Reliability of the CES-D scale in different ethnic contexts. *Psychiatry Research*, *2*(2), 125–134. doi:10.1016/0165-1781(80)90069-4

Rodgers, J. L. (2010, January). The epistemology of mathematical and statistical modeling: A quiet methodological revolution. *American Psychologist*, *65*(1), 1–12. doi:10.1037/a0018326

Roosa, M. W., Tein, J.-Y., Groppenbacher, N., Michaels, M., & Dumka, L. (1993). Mothers' parenting behavior and child mental health in families with a problem drinking parent. *Journal of Marriage and Family*, *55*(1), pp. 107–118.

Rousseau, G. S., Irons, J. G., & Correia, C. J. (2011). The reinforcing value of alcohol in a drinking to cope paradigm. *Drug and Alcohol Dependence*, *118*(1), 1–4. doi:10.1016/j.drugalcdep.2011.02.010

Rozeboom, W. W. (1960, September). The fallacy of the null-hypothesis significance test. *Psychological Bulletin*, *57*, 416–428.

SAMHSA. (2012). *More than 7 million children live with a parent with alcohol problems*. Retrieved from http://www.samhsa.gov/data/spotlight/Spot061ChildrenOfAlcoholics2012.pdf

Saunders, J. B., Aasland, O. G., Babor, T. F., de la Fuente, J. R., & Grant, M. (1993, June). Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption–II. *Addiction*, *88*(6), 791–804.

Sayette, M. A., Creswell, K. G., Dimoff, J. D., Fairbairn, C. E., Cohn, J. F., Heckman, B. W., . . . Moreland, R. L. (2012, August). Alcohol and group formation: A multimodal investigation of the effects of alcohol on emotion and social bonding. *Psychological Science*, *23*(8), 869–878. doi:10.1177/0956797611435134

Scaramella, L. V., Conger, R. D., & Simons, R. L. (1999). Parental protective influences and gender-specific increases in adolescent internalizing and externalizing problems. *Journal of Research on Adolescence*, *9*(2), 111–141. doi:10.1207/s15327795jra0902_1

Schludermann, E., & Schludermann, S. (1970). Replicability of factors in children's report of parent behavior (CRPBI). *The Journal of Psychology*, *76*(2), 239–249. doi:10.1080/00223980.1970.9916845

Schmidt, F. L., & Hunter, J. E. (1996). Measurement error in psychological research: Lessons from 26 research scenarios. *Psychological Methods*, *1*(2), 199–223.

Seligman, L. D., Ollendick, T. H., Langley, A. K., & Baldacci, H. B. (2004, September). The utility of measures of child and adolescent anxiety: A meta-analytic review of the Revised Children's Manifest Anxiety Scale, the State-Trait Anxiety Inventory for Children, and the Child Behavior Checklist. *Journal of Clinical Child and Adolescent Psychology*, *33*(3), 557–565. doi:10.1207/s15374424jccp3303_13

Shadish, W. R., & Haddock, C. K. (2009). Combining estimates of effect size. In H. Cooper, L. V. Hedges & J. C. Valentine (Eds.), *The handbook of research synthesis and meta-analysis* (2nd, pp. 257–277). New York: Russell Sage Foundation.

Shafer, A. B. (2006). Meta-analysis of the factor structures of four depression questionnaires: Beck, CES-D, Hamilton, and Zung. *Journal of Clinical Psychology*, *62*(1), 123–146. doi:10.1002/jclp.20213

Shaver, J. P. (1993). What statistical significance testing is, and what it is not. *Journal of Experimental Education*, *61*(4), 293–316.

El-Sheikh, M., & Flanagan, E. (2001, October). Parental problem drinking and children's adjustment: Family conflict and parental depression as mediators and moderators of risk. *Journal of Abnormal Child Psychology*, *29*(5), 417–432.

El-Sheikh, M., & Buckhalt, J. A. (2003, December). Parental problem drinking and children's adjustment: Attachment and family functioning as moderators and mediators of risk. *Journal of Family Psychology*, *17*(4), 510–520. doi:10.1037/0893-3200.17.4.510

Shrout, P. E. (1997). Should significance tests be banned? Introduction to a special section exploring the pros and cons. *Psychological Science*, *8*(1), 1–2.

Sideridis, G. D. (2005). Goal orientation, academic achievement, and depression: Evidence in favor of a revised goal theory framework. *Journal of Educational Psychology*, *97*(3), 366.

Siegfried, T. (2010, March). Odds are, it's wrong: Science fails to face the shortcomings of statistics. *Science News*, *177*, 26–29.

Simmons, J. P., Nelson, L. D., & Simonsohn, U. (2011, November). False-positive psychology: Undisclosed flexibility in data collection and analysis allows presenting anything as significant. *Psychological Science*, *22*(11), 1359–1366. doi:10.1177/0956797611417632

Simons, J., Correia, C. J., & Carey, K. B. (2000). A comparison of motives for marijuana and alcohol use among experienced users. *Addictive Behaviors*, *25*(1), 153–160. doi:10.1016/S0306-4603(98)00104-X

Simonsohn, U. (2012). Just post it: the lesson from two cases of fabricated data detected by statistics alone. Retrieved from http://ssrn.com/abstract=2114571

Siviroj, P., Peltzer, K., Pengpid, S., Yungyen, Y., & Chaichana, A. (2012). Drinking motives, sensation seeking, and alcohol use among Thai high school students. *Social Behavior and Personality*, *40*(8), 1255–1262. Retrieved from http://www.ingentaconnect.com/content/sbp/sbp/2012/00000040/00000008/art00004

Smith, D. K., Johnson, A. B., Pears, K. C., Fisher, P. A., & DeGarmo, D. S. (2007, May). Child maltreatment and foster care: Unpacking the effects of prenatal and postnatal parental substance use. *Child Maltreatment*, *12*(2), 150–160. doi:10.1177/1077559507300129

Smith, M. (2011). Measures for assessing parenting in research and practice. *Child and Adolescent Mental Health*, *16*(3), 158–166. doi:10.1111/j.1475-3588.2010.00585.x

Spiegelhalter, D. J., Best, N. G., Carlin, B. P., & Van Der Linde, A. (2002). Bayesian measures of model complexity and fit. *Journal of the Royal Statistical Society*, *64*(4), 583–639. doi:10.1111/1467-9868.00353

Stang, A., Poole, C., & Kuss, O. (2010, April). The ongoing tyranny of statistical significance testing in biomedical research. *European Journal of Epidemiology*, *25*(4), 225–230. doi:10.1007/s10654-010-9440-x

Steele, C. M., & Josephs, R. A. (1990, August). Alcohol myopia. Its prized and dangerous effects. *American Psychologist*, *45*(8), 921–933.

Stewart, S. H., & Chambers, L. (2000). Relationships between drinking motives and drinking restraint. *Addictive Behaviors*, *25*(2), 269–274. doi:10.1016/S0306-4603(99)00014-3

Stewart, S. H., & Devine, H. (2000). Relations between personality and drinking motives in young adults. *Personality and Individual Differences*, *29*(3), 495–511. doi:10.1016/S0191-8869(99)00210-X

Stewart, S. H., Hall, E., Wilkie, H., & Birch, C. (2002). Affective priming of alcohol schema in coping and enhancement motivated drinkers. *Cognitive Behaviour Therapy*, *31*(2), 68–80. doi:10.1080/16506070252959508

Stewart, S. H., Loughlin, H. L., & Rhyno, E. (2001). Internal drinking motives mediate personality domain—drinking relations in young adults. *Personality and Individual Differences*, *30*(2), 271–286. doi:10.1016/S0191-8869(00)00044-1

Stewart, S. H., Morris, E., Mellings, T., & Komar, J. (2006). Relations of social anxiety variables to drinking motives, drinking quantity and frequency, and alcohol-related problems in undergraduates. *Journal of Mental Health*, *15*(6), 671–682. doi:10.1080/09638230600998904

Stewart, S. H., Zeitlin, S. B., & Samoluk, S. B. (1996). Examination of a three-dimensional drinking motives questionnaire in a young adult university student sample. *Behaviour Research and Therapy*, *34*(1), 61–71. doi:10.1016/0005-7967(95)00036-W

Stone, C. A., & Sobel, M. E. (1990). The robustness of estimates of total indirect effects in covariance structure models estimated by maximum. *Psychometrika*, *55*(2), 337–352. doi:10.1007/BF02295291

Straus, M. A., Hamby, S. L., Finkelhor, D., Moore, D. W., & Runyan, D. (1998). Identification of child maltreatment with the Parent-Child Conflict Tactics Scales:

Development and psychometric data for a national sample of American parents. *Child Abuse & Neglect*, *22*(4), 249–270. doi:10.1016/S0145-2134(97)00174-9

Sturtz, S., Ligges, U., & Gelman, A. (2005). R2winbugs: a package for running winbugs from r. *Journal of Statistical Software*, *12*(3), 1–16. Retrieved from http://www.jstatsoft.org

Suldo, S. M., & Huebner, E. S. (2004). The role of life satisfaction in the relationship between authoritative parenting dimensions and adolescent problem behavior. *Social Indicators Research*, *66*(1-2), 165–195. doi:10.1023/B:SOCI.0000007498.62080.1e

Su, Y.-S., & Yajima, M. (2012). *R2jags: A package for running jags from R*. Retrieved from http://CRAN.R-project.org/package=R2jags

Theakston, J. A., Stewart, S. H., Dawson, M. Y., Knowlden-Loewen, S. A. B., & Lehman, D. R. (2004). Big-Five personality domains predict drinking motives. *Personality and Individual Differences*, *37*(5), 971–984. doi:10.1016/j.paid.2003.11.007

Theul, S., Ligges, U., & Hornik, K. (2010). Prospects and challenges in R package development. *Computational Statistics*, *26*(3), 395–404. doi:10.1007/s00180-010-0205-5

Topper, L. R., Castellanos-Ryan, N., Mackie, C., & Conrod, P. J. (2011). Adolescent bullying victimisation and alcohol-related problem behaviour mediated by coping drinking motives over a 12 month period. *Addictive Behaviors*, *36*(1-2), 6–13. doi:10.1016/j.addbeh.2010.08.016

Tragesser, S. L., Sher, K. J., Trull, T. J., & Park, A. (2007). Personality disorder symptoms, drinking motives, and alcohol use and consequences: cross-sectional and prospective mediation. *Experimental and Clinical Psychopharmacology*, *15*(3), 282.

Tragesser, S. L., Trull, T. J., Sher, K. J., & Park, A. (2008). Drinking motives as mediators in the relation between personality disorder symptoms and alcohol use disorder. *Journal of Personality Disorders*, *22*(5), 525.

Trockel, M., Williams, S. S., & Reis, J. (2003). Considerations for more effective social norms based alcohol education on campus: An analysis of different theoretical conceptualizations in predicting drinking among fraternity men. *Journal of Studies on Alcohol & Drugs*, *64*(1), 50. Retrieved from http://www.jsad.com/jsad/authdownload/Considerations_for_More_Effective_ Social_Norms_Based_Alcohol_Education_on_C/1219.html

Urbán, R., Kökönyei, G., & Demetrovics, Z. (2008). Alcohol outcome expectancies and drinking motives mediate the association between sensation seeking and alcohol use

among adolescents. *Addictive Behaviors*, *33*(10), 1344–1352. doi:10.1016/j.addbeh.2008.06.006

Vance, A. (2009). Data analysts captivated by R's power. *The New York Times*, B6.

Van Damme, J., Maes, L., Clays, E., Rosiers, J. F. M. T., Van Hal, G., & Hublet, A. (2013). Social motives for drinking in students should not be neglected in efforts to decrease problematic drinking. *Health Education Research*, 1–13. doi:10.1093/her/cyt036

Vandewater, E. A., & Lansford, J. E. (1998). Influences of family structure and parental conflict on children's well-being. *Family Relations*, 323–330. Retrieved from http://www.jstor.org/stable/10.2307/585263

Van Tyne, K., Zamboanga, B. L., Ham, L. S., Olthuis, J. V., & Pole, N. (2011). Drinking motives as mediators of the associations between alcohol expectancies and risky drinking behaviors among high school students. *Cognitive Therapy and Research*, 1–12. doi:10.1007/s10608-011-9400-0

Wade, D., Varker, T., O'Donnell, M., & Forbes, D. (2012). Examination of the latent factor structure of the Alcohol Use Disorders Identification Test in two independent trauma patient groups using confirmatory factor analysis. *Journal of Substance Abuse Treatment*, *43*(1), 123–128. doi:10.1016/j.jsat.2011.10.023

Wagenmakers, E.-J. (2007, October). A practical solution to the pervasive problems of p values. *Psychonomic Bulletin & Review*, *14*(5), 779–804.

Wagenmakers, E.-J., Lee, M., Lodewyckx, T., & Iverson, G. (2008). Bayesian versus frequentist inference. In H. Hoijtink, P. A. Boelen & I. Klugkist (Eds.), *Bayesian evaluation of informative hypotheses* (pp. 81–207). New York: Springer. doi:10.1007/978-0-387-09612-4_9

Wampold, B. E., Moody, G. W., Stich, F., Benson, K., & Ahn, H. (1997). A meta-analysis of outcome studies comparing bona fide psychotherapies: Empirically, "all have won and all must have prizes". *Psychological Bulletin*, *122*, 203–215.

Warnick, E. M., Bracken, M. B., & Kasl, S. (2008). Screening efficiency of the Child Behavior Checklist and Strengths and Difficulties Questionnaire: A systematic review. *Child and Adolescent Mental Health*, *13*(3), 140–147. doi:10.1111/j.1475-3588.2007.00461.x

Werner, E. E. (1986, January). Resilient offspring of alcoholics: A longitudinal study from birth to age 18. *Journal of Studies on Alcohol*, *47*(1), 34–40.

West, M. O., & Prinz, R. J. (1987, September). Parental alcoholism and childhood psychopathology. *Psychological Bulletin*, *102*(2), 204–218.

Westover, M. B., Westover, K. D., & Bianchi, M. T. (2011). Significance testing as perverse probabilistic reasoning. *BMC Med*, *9*, 20. doi:10.1186/1741-7015-9-20

Wickham, H. (2009). *Ggplot2: Elegant graphics for data analysis*. Springer New York. Retrieved from http://had.co.nz/ggplot2/book

Widom, C. S., & Hiller-Sturmhöfel, S. (2001). Alcohol abuse as a risk factor for and consequence of child abuse. *Alcohol Research and Health*, *25*(1), 52–57. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/11496967

Wild, T. C., Hinson, R., Cunningham, J., & Bacchiochi, J. (2001). Perceived vulnerability to alcohol-related harm in young adults: Independent effects of risky alcohol use and drinking motives. *Experimental and Clinical Psychopharmacology*, *9*(1), 117.

Wilkinson, L. (2005). *The grammar of graphics* (2nd ed.). New York: Springer-Verlag.

Willem, L., Bijttebier, P., Claes, L., & Uytterhaegen, A. (2012). Temperament and problematic alcohol use in adolescence: An examination of drinking motives as mediators. *Journal of Psychopathology and Behavioral Assessment*, *34*, 1–11. doi:10.1007/s10862-012-9279-4

Williams, L. R., Degnan, K. A., Perez-Edgar, K. E., Henderson, H. A., Rubin, K. H., Pine, D. S., . . . Fox, N. A. (2009, November). Impact of behavioral inhibition and parenting style on internalizing and externalizing problems from early childhood through adolescence. *Journal of Abnormal Child Psychology*, *37*(8), 1063–1075. doi:10.1007/s10802-009-9331-3

Wills, T. A., & Shiffman, S. (1985). Coping and substance use: A conceptual framework. In *Coping and substance use* (pp. 3–24). Orlando, FL: Academic Press.

Wilson, L. C., & Scarpa, A. (2011). The link between sensation seeking and aggression: A meta-analytic review. *Aggressive Behavior*, *37*(1), 81–90. doi:10.1002/ab.20369

Windle, M., & Windle, R. (2012). Testing the specificity between social anxiety disorder and drinking motives. *Addictive Behaviors*, *37*(9), 1003–1008. doi:10.1016/j.addbeh.2012.04.009

Woldt, B. D., & Bradley, J. R. (2002). Structural equation modeling of drinking motives in male DUI offenders. *Journal of Drug Education*, *32*(1), 69–79. Retrieved from http://baywood.metapress.com/index/5v04f8rfwdtjxnnn.pdf

Xie, Y. (2012). *Knitr: A general-purpose package for dynamic report generation in R*. Retrieved from http://CRAN.R-project.org/package=knitr

Yan, J., & Prates, M. (2012). *Rbugs: fusing r and openbugs*. R package version 0.5-6. Retrieved from http://CRAN.R-project.org/package=rbugs

Young, N. K., Boles, S. M., & Otero, C. (2007, May). Parental substance use disorders and child maltreatment: Overlap, gaps, and opportunities. *Child Maltreatment*, *12*(2), 137–149. doi:10.1177/1077559507300322

Yuan, Y., & MacKinnon, D. P. (2009). Bayesian mediation analysis. *Psychological Methods*, *14*(4), 301–322. doi:10.1037/a0016972

Yurasek, A. M. et al., Murphy, J. G. et al., Dennhardt, A. A., et al., Skidmore, J. R., et al., Buscemi, J., et al., McCausland, C., et al., Martens, M. P., et al. (2011). Drinking motives mediate the relationship between reinforcing efficacy and alcohol consumption and problems. *Journal of Studies on Alcohol & Drugs*, *72*(6), 991. Retrieved from http://ukpmc.ac.uk/abstract/MED/22051213

Zeller, M., Boles, R., & Reiter-Purtill, J. (2008). The additive and interactive effects of parenting style and temperament in obese youth seeking treatment. *International Journal of Obesity*, *32*(10), 1474–1480. doi:10.1038/ijo.2008.125

Ziliak, S. T., & McCloskey, D. N. (2007). *The cult of statistical significance: How the standard error costs us jobs, justice, and lives*. Dearborn, MI: University of Michigan Press.

Ziliak, S. T., & McCloskey, D. N. (2009). The cult of statistical significance. In *Jsm proceedings* (pp. 2302–2316).

Zuckerman, M. (1994). *Behavioral expressions and biosocial bases of sensation seeking*. New York: Cambridge University Press.

Zuckerman, M. (1990). The psychophysiology of sensation seeking. *Journal of Personality*, *58*(1), 313–345. doi:10.1111/j.1467-6494.1990.tb00918.x

Aaron Adriel Duke

Place of Birth: Everett, Washington

Education

UNIVERSITY OF KENTUCKY, Lexington, Kentucky
M.S., Clinical Psychology, 2010

BRIGHAM YOUNG UNIVERSITY, Provo, Utah
B.A., Political Science, 2008

Scholastic and Professional Honors

Ruth L. Kirschstein National Research Service Award, NIDA, 2011–2013

Research Challenge Trust Fund Fellowship, University of Kentucky, 2010–2011

Predoctoral Research Award, French National Research Agency (ANR), 2010–2013

Academic Scholarship Award, Brigham Young University, 2007

Brigham Young Bicentennial Scholarship Award, Brigham Young University, 2002–2005

Professional Positions

Invited Grant Reviewer, French National Research Agency (ANR)

Invited Article Reviewer, Journal of Studies on Alcohol and Drugs (JSAD)

Invited Article Reviewer, International Journal of Sport and Exercise Psychology (IJSEP)

Research Award Reviewer, Association for Psychological Science Student Caucus (APSSC)

Individual Therapist, Jesse G. Harris Jr. Psychological Services Center, University of Kentucky, 2009–present

Practicum Therapist, Federal Medical Center Sattelite Prison Camp, Lexington, Kentucky, 2012–2013

Assessment Coordinator, Jesse G. Harris Jr. Psychological Services Center, University of Kentucky, 2011–2012

Psychometrist, C. C. Allen Psychological Services Center, Lexington, Kentucky, 2010–2011

Parenting Skills Group Leader, Salvation Army Transitional Living Center, Lexington, Kentucky, 2010–2011

Behavioral Medicine Resident, Orofacial Pain Clinic, University of Kentucky, 2010

Teaching Assistant, Personality Assessment, Department of Psychology, University of Kentucky, 2010

Japanese Instructor, Brigham Young University, 2005

Mentor, Discovery Academy, Inc., Provo, Utah, 2006–2008

Children's Unit Volunteer, Utah State Hospital, Provo, Utah, 2006–2007

Professional Afilliations

Association for Psychological Science Student Caucus (APSSC)

American Psychological Association of Graduate Students (APAGS)

Kentucky Psychological Association Graduate Students (KPAGS)

Society for the Scientific Study of Religion (SSSR)

International Society for Bayesian Analysis (ISBA)

International Association for Correctional and Forensic Psychology (IACFP)

Professional Publications

Duke, A. A. & Giancola, P. R. (in press). Alcohol reverses religion's prosocial influence on aggression. *Journal for the Scientific Study of Religion.*

Duke, A. A., Bègue, L., Bell, R., & Eisenlohr-Moul, T. (2013, February 4). Revisiting the serotonin-aggression relationship in humans: A meta-analysis. *Psychological Bulletin*. Advance online publication. doi: 10.1037/a0031544

Giancola, P. R., Parrott, D. J., Silva, P. J., DeWall, C. N., Bègue, L., Subra, B., **Duke, A. A.**, & Bushman, B. J., (2012). The disguise of sobriety: Unveiled by alcohol in persons with an aggressive personality. *Journal of Personality, 80* (1), 163185. doi: 10.1111/j.1467-6494.2011.00726.x

Giancola, P. R., **Duke, A. A.**, & Ritz, K. (2011). Alcohol, violence, and the alcohol myopia model: Preliminary findings and implications for prevention. *Addictive Behaviors, 36*, 10191022. doi: 10.1016/j.addbeh.2011.05.006

Duke, A. A., Giancola, P. R., Morris, D. H., Holt, J. C., & Gunn, R. L. (2011). Alcohol dose and aggression: Another reason why drinking more is a bad idea. *Journal of Studies on Alcohol and Drugs, 72*(1), 3443. ***Most cited JSAD article published in 2011.***

Giancola, P. R., Josephs, R. A., Parrott, D. J., & **Duke, A. A.** (2010). Alcohol myopia revisited: Clarifying aggression and other acts of disinhibition through a distorted lens. *Perspectives on Psychological Science*, 5(3), 265278. doi: 10.1177/1745691610369467

Bell, R., **Duke, A. A.**, Lynch, K., & Bègue, L. (manuscript submitted for publication). Lack of effect of the 5-HT3 receptor ligands SR 57227A and MDL 7314EF on murine agonistic behavior.

Poster Presentations

Miskell, S., **Duke, A. A.**, Bi, S., & Keller, P. S. (2013). *The influence of parental drinking motives on children's emotional security.* Poster presented at the Society for Research in Child Development (SRCD) biennial meeting. Seattle, Washington.

Duke, A. A. (2012). *Inadequacy of the serotonin deficiency hypothesis of human aggression: A meta-analysis*. Poster presented at the annual convention of the Association for Psychological Science. Chicago, Illinois.

Duke, A. A. (2012). *Disentangling the relation between serotonin and human aggression.* Poster presented at the annual spring academic conference of the Kentucky Psychological Association Foundation. Lexington, Kentucky. ***Award Winning Poster.***

Bowman, R., Smith, T. B., Hamm, S., Jeppsen, B., & **Duke, A. A.** (2008, April). *The effects of client-therapist racial matching: A meta-analytic review of empirical research.* Presentation at the Rocky Mountain Psychological Association, Boise, Idaho.

Hamm, S. Smith, T. B., Jeppsen, B., **Duke, A. A.**, Medina, E., & Cooper, H. (2008). *Retention of clients of color in psychotherapy: A comparative analysis.* Presentation at the Rocky Mountain Psychological Association, Boise, Idaho.

Duke, A. A., Smith, T. B., Hamm, S. Jeppsen, B., & Medina, E. (2008). *Multicultural competence and its association with client variables and outcomes in*

psychotherapy. Presentation at the Rocky Mountain Psychological Association, Boise, Idaho.

Hamm, S., Alfalava, N., Bowman, R., Cañate, R., Cooper, H., **Duke, A. A.**, & Smith, T. B. (2008). *Multicultural competence in mental-health treatment.* Poster presented at the BYU School of Education mentored research conference, Provo, Utah.