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IMPULSIVITY TRAITS AND THE LONGITUDINAL PREDICTION OF ADDICTIVE BEHAVIORS DURING THE TRANSITION FROM ELEMENTARY TO MIDDLE SCHOOL

Leila Guller

University of Kentucky, leilaguller@gmail.com

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Leila Guller, Student

Dr. Gregory T. Smith, Major Professor

Dr. David T. R. Berry, Director of Graduate Studies

IMPULSIVITY TRAITS AND THE LONGITUDINAL
PREDICTION OF ADDICTIVE BEHAVIORS DURING THE
TRANSITION FROM ELEMENTARY TO MIDDLE SCHOOL

THESIS

A thesis submitted in partial fulfillment of the
requirements for the degree of Master of Sciences in the
College of Arts and Sciences
at the University of Kentucky

By

Leila Guller

Lexington, Kentucky

Director: Dr. Gregory T. Smith, Professor of Psychology

Lexington, Kentucky

2012

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ABSTRACT OF THESIS

IMPULSIVITY TRAITS AND THE LONGITUDINAL PREDICTION OF ADDICTIVE BEHAVIORS DURING THE TRANSITION FROM ELEMENTARY TO MIDDLE SCHOOL

The aim of this study was to test for prospective relationships between personality factors measured in elementary school and drinking, smoking, and binge eating during the first year of middle school. Data were collected among adolescents drawn from 23 elementary schools and 15 middle schools in central Kentucky. In a two-wave study, 1,906 children completed questionnaire measures in the spring of 5th grade and the spring of 6th grade. After controlling for sex, pubertal status, and prior engagement in addictive behaviors, it was found that urgency at wave 1 predicted drinking, smoking, and binge eating at wave 2, and low conscientiousness at wave 1 predicted drinking and smoking at wave 2. Risky behaviors during the first year of middle school predict subsequent life problems and subsequent diagnosable addictive disorders. The finding that those behaviors can be predicted by personality factors measured in elementary school indicates the value, for risk researchers and prevention specialists, of focusing efforts on children prior to the onset of adolescence.

KEYWORDS: Personality, Longitudinal, Drinking, Smoking, Binge Eating

Leila Guller

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By

Leila Guller

Gregory T. Smith

Director of Thesis

David T. R. Berry

Director of Graduate Studies

July 19, 2012

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Chapter One: Introduction

In this paper we report the results of an investigation of whether individual differences in personality among elementary school children predict involvement in addictive behaviors across the transition into middle school. As we describe below, involvement in addictive behaviors at the start of middle school or in early adolescence is highly predictive of subsequent diagnoses and life difficulties. Thus, past research has focused profitably on the phenomenon of addictive behavior during early middle school as a predictor of future problems. Due to the success of this research, there is now a clear need to understand the precursors to such early involvement in addictive behaviors. In the present study, we tested whether individual differences in the personality traits of elementary school children predict which children will engage in behaviors such as drinking alcohol, smoking, and binge eating during the first year of middle school.

To introduce this empirical investigation, we first briefly discuss the developmental importance of the transition from elementary school to middle school. We then review research indicating that middle school, or early adolescent, involvement in alcohol use, smoking, and binge eating each predict subsequent life dysfunction and subsequent diagnosable addictive disorders. We then consider the role of personality in the risk process for early involvement in these addictive behaviors, including recent advances in the ability to measure high-risk personality traits in pre-adolescent children. We then introduce the specifics of the current investigation.

The Transition from Elementary School to Middle School

In the school districts participating in this study, elementary school ends with 5th grade; the typical child is 11 years old. Middle school goes from 6th grade to 8th grade.

The transition into middle school represents a key part of the contextual change associated with the move from childhood to adolescence. Middle school children encounter larger, more impersonal school contexts (Barber & Olsen, 2004; Eccles, Wigfield, Harold, & Blumenfeld, 1993) and they experience a new level of personal autonomy; they become much more independent of parents than they were in elementary school (Eccles & Midgley, 1989). Even if they have not experienced pubertal onset themselves, the bulk of middle schoolers have, which contributes to a context in which the needs and drives associated with physically mature bodies are manifest. As a result, this transition has been described as a potential turning point in development (Graber & Brooks-Gunn, 1996; Rutter, 1994); that is, a period characterized by significant behavioral and developmental change. To understand early adolescent behavior, and in particular risky behavior, it is important to understand the characteristics of elementary school children that influence the nature of the transition into middle school.

Early Addictive Behaviors Predict Subsequent Dysfunction

Alcohol use. A small but significant portion of adolescents already engage in substantial alcohol use before age 12 (Abroms, Simons -Morton, Haynie, & Chen, 2005; Chassin, Presson, Pitts, & Sherman, 2000; Colder et al., 2001; Tucker, Ellickson, Orlando, Martino, & Klein, 2005; White, Pandina, & Chen, 2002, Gunn & Smith, 2010), and from ages 11 to 15, the prevalence of adolescent alcohol use rises from the low single digits to rates indicating that a large portion of the adolescent population drinks regularly (Johnston, O'Malley, & Bachman, 1998; Wills, Gibbons, Gerrard, Murray, & Brody, 2003; Wills & Stoolmiller, 2002). In addition, 8 to 16% of adolescents meet criteria for alcohol abuse or dependence (Harrison, Fulkerson, and Beebe, 1998). Individuals who

drink in adolescence are likely to continue to do so in young adulthood (Bachman, Wadsworth, O'Malley, & Johnston, 1997). Early onset of alcohol use is important because it is associated with a breadth of negative outcomes such as (a) increased risk for accidents or sexually transmitted diseases (DiClemente, Hansen, & Ponton, 1996); (b) longer periods of exposure to risk (Hawkins et al., 1997; Wills, Sandy, Yaeger, Cleary, & Shinar 2001); and (c) increased prognosis for substance use problems over time (Anthony & Petronis, 1995; Wills, Sandy, & Yaeger, 2000). Because earlier alcohol use is associated with worsened outcomes, and adolescent prevention efforts have had marginal success in the past (Ellickson, Bell, & McGuigan, 1993), there is a clear need to identify risk factors for this early onset. Successful identification of risk factors can have important implications for both prevention and treatment of this problem.

Tobacco use. As is true with alcohol use, a small percentage of children have smoked cigarettes before age 12 (Abroms et al., 2005; Chassin et al., 2000; Colder et al., 2001; Combs, Spillane, Caudill, Stark, & Smith, 2012; White et al., 2002), and the rates of adolescents who smoke regularly increases across the adolescent years (Chassin, Presson, Sherman, & Edwards, 1990). This early use is important because it means a longer timeframe of exposure to the health damaging effects of nicotine (Wills et al., 2001), an increased likelihood of tobacco addiction during adolescence and adulthood (Chassin et al., 2000), and, for girls, stunted physical growth (Stice & Martinez, 2005). There is a clear need to identify risk factors for early tobacco use.

Binge eating. Diagnosable eating disorders, subclinical eating disorders (which have comparable negative consequences to clinical disorders: Cotrufo, Barretta, & Monteleone, 1997; Franko & Omori, 1999), and preoccupations with weight, dieting, and

body image are substantially present at the beginning of adolescence for girls (Beato-Fernandez, Rodriguez-Cano, & Belmonte-Llario, 2004; Bryant-Waugh & Lask, 1995; Cotrufo et al., 1997; Franko & Omori, 1999; Gardner, Stark, Friedman, & Jackson, 2000; Halvarsson, Lunner, Westerberg, Anteson, & Sjoden, 2002; Killen et al., 1994; Shisslak et al., 1998; Smith et al., 2007). These symptoms, including binge eating, then predict later, diagnosable disorders. Kotler et al. (2001) correlated anorexia and bulimia symptoms at the beginning of adolescence and during adulthood, and r exceeded .40 for both analyses. Diagnosable bulimia nervosa at the beginning of adolescence is associated with a 9-fold increase in bulimia nervosa during late adolescence, and a 20-fold increase in anorexia nervosa during late adolescence (Kotler, Cohen, Davies, Pine, & Walsh, 2001). Killen et al. (1994) found a 12% incidence of symptom onset from age 12 to 15 among high-risk adolescent girls. Eating disorder diagnosis during adolescence is also associated with a broad range of physical and mental health problems during early adulthood (Johnson, Cohen, Kasen, & Brook, 2002). Again, because worsened outcomes are associated with earlier onset of disordered eating, there is incentive to identify risk factors for early initiation of these behaviors.

The Role of Personality Dispositions

It is no doubt the case that risk for adolescent addictive behavior involvement is a function of many different factors (Cicchetti, 2006). In this study, we focused on one set of risk factors: personality dispositions to engage in rash or impulsive action. We did so because personality can influence transactions with the environment and subsequent developmental trajectories (Caspi, 1993; Caspi & Roberts, 2001). There have been two important advances in understanding of personality dispositions to rash or impulsive

behaviors. The first involves the recognition that there are several different personality pathways to such behaviors. Following the seminal work of Whiteside and Lynam (2001), Cyders and Smith (2007) presented a hierarchical model of impulsivity-related personality traits. Through factor analysis and multitrait, multimethod designs, they identified three domains of such traits: (1) Urgency is the tendency to act rashly when experiencing intense emotion. It can be broken down into the two facets of positive and negative urgency (the tendencies to act rashly when experiencing intense positive or intense negative emotion, respectively); (2) Low Conscientiousness includes the two facets of lack of planning (the tendency to act without forethought) and lack of perseverance (the inability to stay focused on a task); and (3) Sensation Seeking is the tendency to seek out novel, thrilling stimulation.

The three trait domains have different relationships from each other with respect to addictive behaviors, including drinking, smoking, and binge eating. This has been demonstrated both cross-sectionally and longitudinally in adults, as well as cross-sectionally in pre-adolescent samples. In adults, urgency correlates with problematic levels of alcohol use, whereas sensation seeking correlates with frequency, not problematic levels, of alcohol use (Anestis, Selby, & Joiner, 2007; Cyders & Smith, 2007; Fischer & Smith, 2008; Miller, Flory, Lynam, & Leukefeld, 2003; Smith et al., 2007). Urgency is also positively associated with cigarette craving (Billieux, Van der Linden, & Ceschi, 2007), as well as disordered eating, including binge eating and purging (Fischer, Smith, & Cyders, 2008). Sensation seeking is associated with higher odds of current smoker status, whereas urgency has been shown to be associated with significantly higher levels of nicotine dependence (Spillane, Smith, & Kahler, 2010).

These relationships have also been supported in prospective studies using UPPS-P traits to predict drinking, smoking, and binge eating (Cyders, Flory, Rainer, & Smith, 2009; Settles, Cyders, & Smith, 2010; Zapolski, Cyders, & Smith, 2009). Low conscientiousness is sometimes associated with drinking behavior (Miller et al., 2003), but often that relationship is not present when urgency is considered as well.

The second advance has been to show that these trait domains can be measured in preadolescent samples as young as 10 years old. Zapolski, Stairs, Fried-Settles, Combs, and Smith (2010) found good internal consistency, high reliability across multiple raters, and good convergent and discriminant validity as evidenced by multitrait multimethod analysis for a child measure of the traits. In cross-sectional research, the three trait domains have different relationships with preadolescent involvement in addictive behaviors. Urgency, low conscientiousness, and sensation seeking all related to drinker status (Gunn & Smith, 2010). Urgency was also associated with eating pathology, including binge eating, in both preadolescent girls (Combs, Pearson, & Smith, 2011) and boys (Pearson, Combs, & Smith, 2010), and with preadolescent smoking (Combs et al. 2012), but neither low conscientiousness nor sensation seeking correlated with preadolescent smoking.

As important as these cross-sectional studies of pre-adolescents are, it is crucial to know whether elementary school levels of urgency, low conscientiousness, and sensation seeking predict subsequent, middle school involvement in these addictive behaviors. Specifically, do these traits predict (a) middle school drinker status, smoker status, and binge eater status above and beyond prediction from those behaviors during elementary school; (b) the frequency of engagement in these behaviors; and (c) the onset of these

behaviors across the first year of middle school for those children not engaged in the behaviors during elementary school?

The Current Study

Because the focus of the current study was on whether elementary school impulsivity-related personality traits predicted middle school addictive behavior involvement, we used a simple two wave prospective design. We measured the three personality trait domains, the addictive behaviors of drinking, smoking, and binge eating, pubertal status, and biological sex in the spring of 5th grade and then pubertal status and each of the three addictive behaviors again one year later, at the end of 6th grade, the first year of middle school.

No prior prospective data relating these traits in elementary school to middle school outcomes exists; we therefore did not have a firm basis for a priori hypotheses. We proceeded as follows. First, using structural equation modeling (SEM), we tested three separate models. In each one, we predicted each 6th grade addictive behavior from the corresponding 5th grade behavior, pubertal status, and sex. Each model involved a test of the incremental predictive power of one trait domain: the first model tested the predictive value of urgency beyond those other variables, the second low conscientiousness, and the third sensation seeking. We used zero inflated poisson regression modeling (known as ZIP models) to predict both the dichotomous criterion of presence or absence of the behavior and the interval scale criterion of the frequency of involvement in each addictive behavior. We then conducted a fourth model test in which we included each trait predictor that had significantly predicted any addictive behavior

involvement in the three, independent tests. This fourth test allowed us to test the incremental predictive power of each trait over the other traits.

In addition to these tests, we examined whether 5th grade levels of urgency, low conscientiousness, and sensation seeking predicted the onset of drinking, smoking, and binge eating during the first year of middle school. For each behavior, we studied all the children who had not engaged in the behavior during 5th grade and tested whether the three traits predicted onset of the behavior during 6th grade. We believe it is important to study onset in addition to overall change as the two variables may reflect different processes in the trajectory of engagement in risky behaviors. Delineating onset of and subsequent increases in risky behaviors may have unique implications for prevention and treatment of these behaviors.

Chapter Two: Methods

Participants

Participants at wave 1 of the study (n =1906) consisted of 5th grade students from urban, rural, and suburban backgrounds, all from public school systems. The sample was equally divided between boys (50.1%) and girls (49.9%). The breakdown of students by ethnicity was 61.6% European American, 17.0% African American, 6.9% Hispanic/Latino, 3% Asian American, and 11.5% of students reporting other ethnic backgrounds. The majority of the fifth graders at wave 1 were 11 years old (66.8%) and 99.8 % were aged 10-12.

Measures

Demographic and background questionnaire. This measure provided the assessment of the demographic information reported above. Participants were asked the circle their sex, write in their current age (in years), and indicate which label(s) best described their ethnic background.

The Pubertal Development Scale (PDS; Petersen, Crockett, Richards, & Boxer, 1988). This scale consists of five questions for boys (“do you have facial hair yet?”) and five questions for girls (“have you begun to have your period?”) Evidence for reliability and validity are strong (Brooks-Gunn, Warren, Rosso, & Gargiulo, 1987; Coleman & Coleman, 2002). We used the common dichotomous classification of the PDS (Culbert, Burt, McGue, Iacono, & Klump, 2009) as pre- pubertal or pubertal, with mean scores above 2.5 indicative of pubertal onset.

The UPPS-P-Child Version (Zapolski et al., 2010) measures the three trait domains of urgency, low conscientiousness, and sensation seeking, as well as the facets

of each domain. Item responses are on a four-point Likert-type scale, ranging from “not at all like me” to “very much like me.” Preliminary analyses indicated that, for these young children, the traits within a common domain correlated very highly with each other (positive and negative urgency: $r = .63$; lack of planning and lack of perseverance: $r = .44$, $p < .001$ for both). In addition, prospective relationships did not differ between facets within a domain. Accordingly, we used the three domain scores, rather than individual facet scores, as predictors. Internal consistency reliability estimates for the three domains in the current sample were .91 for urgency, .77 for low conscientiousness, and .79 for sensation seeking.

The Drinking Styles Questionnaire (Smith, McCarthy, & Goldman, 1995) was used to measure self-reported drinking. Youth were classified as positive for drinking if they reported ever having consumed at least one drink, where a drink was defined as follows: “. . . a ‘drink’ is more than just a sip or a taste. (A sip or a taste is just a small amount or part of someone else’s drink or only a swallow or two. A drink would be more than that.)” Frequency of drinking was measured at levels ranging from 1-4 times in one’s life to almost daily. This assessment method has proven stable over time and there is good evidence for its validity (Settles, Cyders, & Smith, 2010).

Smoking Behavior was measured using a single item. Youth were classified as smoking if they had consumed 1 or more cigarettes in their lives. Frequency of smoking again ranged from 1-4 times to almost daily. Numerous brief measures of self-reported cigarette smoking have been used successfully in prospective studies of adolescents (Chassin et al., 2000; Colder et al., 2001; Wills et al., 2002); many of which use a single item as we did here.

The Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994), a self-report version of the Eating Disorders Examination semistructured interview (Cooper & Fairburn, 1993), was used to assess binge eater status. Following recommendations for childhood assessment (Carter, Stewart, & Fairburn, 2001), the EDE-Q questions were modified to define terms, use age-appropriate wording, and to assess binge eating behavior over the past 14 days, rather than the past 28 days (the latter is done with adults). Binge eater status was defined by an affirmative answer on each of two separate EDE-Q questions, one asking about the frequency of having eaten a large amount of food while feeling out of control over the past 2 weeks and the other defining binge eating and asking if the participant had ever engaged in the behavior. The frequency of binge eating ranged from 1-2 days in the past 14 days to every day in the past 14 days.

Procedure

The questionnaires were administered in 23 public elementary schools at wave 1 during school hours and again in 15 middle schools at wave 2 during school hours (in addition, children who had moved completed the measures by mail). The procedure took 60 minutes or less. This procedure was approved by the University's IRB and by the participating school systems.

Data Analytic Method

Test of school-specific effects. We calculated intraclass correlation coefficients for each study variable, using elementary school membership, $n = 23$, as the nesting variable.

Tests of Prospective Prediction by Personality. We tested each prospective prediction in two ways. First, we used maximum likelihood estimation robust to violations of normality to assess predictive relationships within an SEM framework, using Mplus (Muthén & Muthén, 2007). We then repeated each test using ZIP modeling, which allowed for separate predictions of (a) the presence or absence of the behavior and (b) the frequency of the behavior. In each SEM model, we modeled autoregressive relationships between each addictive behavior in 5th grade and the same behavior in 6th grade. We also modeled prediction of each 6th grade behavior from 5th grade pubertal status and biological sex. We allowed all variables measured at 5th grade to covary and all variables measured at 6th grade to covary. The first three SEM models each included the addition of one of the three 5th grade trait domains (urgency, low conscientiousness, and sensation seeking). The fourth model involved prediction from multiple 5th grade trait domains (we included any trait that significantly predicted any addictive behavior in the first, independent analyses).

To measure model fit, we relied on four fit indices available from the overall, maximum likelihood models: the Comparative Fix Index (CFI), the Tucker-Lewis Index (TLI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). Guidelines for what constitutes good fit vary. Typically, CFI and TLI values above either .90 or .95 are thought to represent very good fit (Hu & Bentler, 1999; Kline; 2005). RMSEA values of .06 or lower are thought to indicate a close fit, .08 a fair fit, and .10 a marginal fit (Hu & Bentler, 1999; Browne & Cudeck, 1993), and SRMR values of approximately .09 or lower are thought to indicate good fit (Muthén & Muthén, 2007).

In light of the large sample size, we used $p < .001$ to determine whether individual pathways were significantly greater than zero in our overall, maximum likelihood model test. When using ZIP modeling the criterion is divided into two variables (presence versus absence and frequency), each of which includes less variance than the overall criterion. For the ZIP models, we used $p < .01$, to avoid exaggerated Type II error. Use of both standard, maximum likelihood models and ZIP models enabled us to obtain overall path coefficients and estimates of model fit (from the standard models) as well as prediction of both presence/absence and frequency of each addictive behavior (from the ZIP models).

For the prediction of behavioral onset across the longitudinal period, for each behavior we selected all the children who had not engaged in the behavior at wave 1, during the spring of 5th grade. For each behavior, we tested whether each trait predicted onset over the following year. We again used maximum likelihood SEM, robust to violations of normality and then ZIP models. For these analyses, we used $p < .01$. We felt the design choice to eliminate all children who had already tried each behavior by 5th grade, and only predict onset over the 6th grade year, was a conservative test and we chose to avoid

Chapter Three: Results

Participation Attrition

Individuals who participated in both waves of the study did not differ from those who participated in only one wave on any demographic, criterion, or trait variable. Therefore, it was concluded that data were missing at random. Under that assumption, we used maximum likelihood estimation in Mplus and thus were able to use all data (Muthén & Muthén, 2007).

Tests of School-Specific Effects

There were no significant effects on any variable based on school membership. Intraclass correlations ranged from 0.03 to 0.00.

Descriptive Statistics

Table 3.1 summarizes the descriptive statistics for the sample. As the table shows, participants reported increases in drinking and smoking, but a drop in binge eating, over the one year period. This pattern, including the drop in binge eating, is consistent with prior research (Donovan, 2007; Tanofsky-Kraff et al., 2011). The drop may reflect improved control over one's eating behavior (Pearson, Combs, Zapolski, & Smith, 2012).

Correlations

Correlations among study variables are presented in table 3.2. As depicted in the table, the three trait domains were only modestly correlated, sharing between 2% and 10% of their variance. Urgency correlated with all three addictive behaviors at both time points. Low conscientiousness correlated with drinker status and smoker status at both time points, and sensation seeking correlated with drinker status at both time points and

binge eating at time 1. Drinker and smoker status were more highly correlated with each other than either was with binge eating.

Test of the Models

Tests of Each Individual Trait Predictor. In each of the following tests, we examined whether a given personality trait, measured in fifth grade, predicted drinking, smoking, and binge eating one year later, above and beyond prediction from the same behaviors measured in fifth grade, biological sex, and fifth grade pubertal status. We tested each of the three traits separately to determine whether each had a predictive effect across the transition to middle school, uncorrected for overlap with the other traits.

In the maximum likelihood urgency-only model (CFI = 1.0; TLI .99, RMSEA = .01, SRMR = .01), urgency at wave 1 predicted drinking, smoking, and binge eating at wave 2 above and beyond prediction of each wave 2 behavior from the same behavior at wave 1. Sex (female) was a significant predictor of binge eating at wave 2. Significant pathways and maximum likelihood path estimates are presented in figure 1a. When we repeated the analysis using ZIP modeling, we found the following. Urgency did not predict presence or absence of drinking at wave 2, but it did predict the frequency of drinking ($z = 2.47, p < .01$). Urgency did predict the smoker status ($z = 3.46, p < .001$), but did not predict smoking frequency. Similarly, urgency predicted binge eater status ($z = 4.91, p < .001$) but not binge eating frequency.

In the low conscientiousness-only model (CFI = .99, TLI = .98, RMSEA = .01, SRMR = .01), low conscientiousness at wave 1 predicted drinking and smoking but not binge eating at wave 2, above and beyond prediction from those behaviors at wave 1. Significant pathways and maximum likelihood path estimates are presented for the low

conscientiousness model in figure 1b. In both analyses, pubertal onset at wave 2 covaried with drinking, but not the other target behaviors, at wave 2. ZIP model analyses indicated the following. Low conscientiousness predicted drinker status ($z = 3.31, p < .001$), but not drinking frequency. Low conscientiousness also predicted smoker status ($z = 3.41, p < .001$) but not smoking frequency.

Our third test evaluated whether fifth grade sensation seeking predicted the target behaviors in sixth grade. The model fit well (CFI = .99, TLI = .98, RMSEA = .02, SRMR = .01), but sensation seeking at wave 1 did not predict any of the three behaviors above and beyond the autoregressive predictions.

Test of Prediction from both Urgency and Low Conscientiousness. We next tested a model in which we included the two traits, urgency and low conscientiousness, that prospectively predicted addictive behavior involvement independently. Fit indices suggested a good fit (CFI = 1.0, TLI = .99, RMSE = .01, SRMR = .01). As was true in the uncorrected model, urgency measured at wave 1 predicted drinking, smoking, and binge eating at wave 2, above and beyond wave 1 involvement in the behaviors, sex, pubertal status and low conscientiousness. Also as was true in the uncorrected model, low conscientiousness measured at wave 1 predicted drinking and smoking at wave 2, above and beyond wave 1 involvement in the behaviors, sex, pubertal status, and urgency. Sex (female) remained a significant predictor of binge eating at wave 2 and wave 2 pubertal status covaried with wave 2 drinking but not with the other behaviors. Significant pathways and maximum likelihood path estimates for the combined model are presented in figure 2.

Test of onset of drinking, smoking, and binge eating. We also tested whether the three traits predicted onset of risky behaviors between spring of 5th and 6th grades. To do this, we selected participants with “0” responses for each behavior at wave 1 (i.e. no engagement in risky behavior prior to spring of 5th grade), and ran maximum likelihood models for each of the three traits individually. The maximum likelihood models yielded the following results. In predicting drinking onset from urgency, the model fit well (CFI = 1.0, TLI = 1.0, RMSEA = .00, SRMR = .01), and urgency predicted onset ($b = .06, p < .001$). In predicting smoking onset from urgency, the model again fit well (CFI = .96, TLI = .87, RMSEA = .03, SRMR = .01), and urgency did predict smoking onset ($b = .07, p < .001$).

Each of the three predictive models using low conscientiousness fit well (for drinking onset: CFI = 1.0, TLI = 1.0, RMSEA = .00, SRMR = .00; for smoking onset: CFI = .96, TLI = .87, RMSEA = .03, SRMR = .01; for binge eating onset: CFI = 1.0, TLI = 1.0, RMSEA = .00, SRMR = .01). Low conscientiousness predicted the onset of drinking ($b = .09, p < .001$), the onset of smoking ($b = .08, p < .01$), and the onset of binge eating ($b = .09, p < .001$). Lastly, sensation seeking measured in 5th grade was not predictive of any of the behavioral outcomes in 6th grade.

The model tests including both urgency and low conscientiousness each fit as well as the individual models; we found similar patterns of results as in the independent tests of the traits predicting onset. That is, urgency marginally predicted onset of drinking ($b = .04, p < .03$) and predicted smoking ($p = .05, p < .01$), and low conscientiousness predicted onset of drinking ($b = .07, p < .01$), smoking ($b = .07, p < .01$), and binge eating ($p = .09, p < .001$).

We ran ZIP models only for those traits that significantly predicted onset of risky behaviors in the maximum likelihood models (i.e. urgency predicting drinking and smoking; and low conscientiousness predicting drinking, smoking, and binge eating). ZIP models yielded the following results: Urgency measured in 5th grade (a) did not predict drinking status or frequency, and (b) predicted smoking status ($z = 3.55, p < .001$), but not frequency. Low conscientiousness measured in 5th grade (a) predicted drinking status ($z = 3.36, p < .001$), but not frequency, (b) predicted smoking status ($z = 3.15, p = .001$), but not frequency, and (c) did not predict binge eating status or frequency. We did not use the ZIP model to analyze sensation seeking, as it did not significantly predict onset of any of the risky behaviors at wave 2 in the maximum likelihood model. When significant values are found in maximum likelihood models, but are not found in status or frequency estimates of ZIP models, it is likely that the predictive power of the maximum likelihood model relied on the full variance in the outcome variable being measured. In our case, this suggests that the predictive power of urgency in predicting drinking onset, and low conscientiousness in predicting binge eating onset was due to the full variance in each of those outcome variables at wave 2. Table 3.3 presents a summary of results from both the maximum likelihood and ZIP models.

Table 3.1. *Descriptive Statistics for Drinking, Smoking, Binge Eating, and Pubertal Status by Wave*

	Wave 1 n (%)	Wave 2 n (%)
Drink	234 (12.3%)	280 (14.7%)
Smoke	106 (5.6%)	158 (8.3%)
Binge	281 (14.7%)	171 (9.0%)
Pubertal Onset	473 (24.8%)	756 (39.7%)

Table 3.2. *Bivariate Correlation Matrix*

	U	LC	SS	Pub1	Pub2	D1	D2	S1	S2	B1	B2
U	-	.22*	.32*	.15*	.09*	.22*	.15*	.21*	.16*	.22*	.15*
LC		-	-.07	.04	.03	.17*	.13*	.14*	.14*	.07	.03
SS			-	.09*	.04	.13*	.12*	.04	.06	.10*	.01
Pub1				-	.37*	.14*	.12*	.15*	.10*	.07	.05
Pub2					-	.09*	.14*	.06	.08*	.04	.08*
D1						-	.34*	.55*	.24*	.10*	.02
D2							-	.23*	.51*	.07	.10*
S1								-	.38*	.08*	.03
S2									-	.04	.07
B1										-	.23*
B2											-

n=1906. U: urgency; LC: low conscientiousness; SS: sensation seeking; Pub: pubertal onset; D: drinking onset; S: smoking onset; B: binge eating onset; 1: wave 1; 2: wave 2.

Table 3.3. Summary of Findings from Maximum Likelihood and Zero Inflated Poisson Regression Models

Traits	Outcome	Maximum Likelihood			Zero Inflated Poisson		
		Drink	Smoke	Binge	Drink	Smoke	Binge
Urgency	Behavior Change	Yes	Yes	Yes	Freq ^a	Status ^b	Status ^b
	Onset	Yes	Yes	No	No	Status ^b	-
Low Conscient.	Behavior Change	Yes	Yes	No	Status ^b	Status ^b	-
	Onset	Yes	Yes	Yes	Status ^b	Status ^b	No
Sensation seeking	Behavior Change	No	No	No	-	-	-
	Onset	No	No	No	-	-	-
Urgency + Low Conscient.	Behavior Change	Yes ^c	Yes ^c	Yes ^d	-	-	-
	Onset	Yes ^c	Yes ^c	Yes ^e	-	-	-

^a Trait predicted frequency but not status of outcome variable in ZIP model

^b Trait predicted status but not frequency of outcome variable in ZIP model

^c Behavior was predicted by both urgency and low conscientiousness in the combined model

^d Behavior was predicted only by urgency in the combined model

^e Behavior was predicted only by low conscientiousness in the combined model

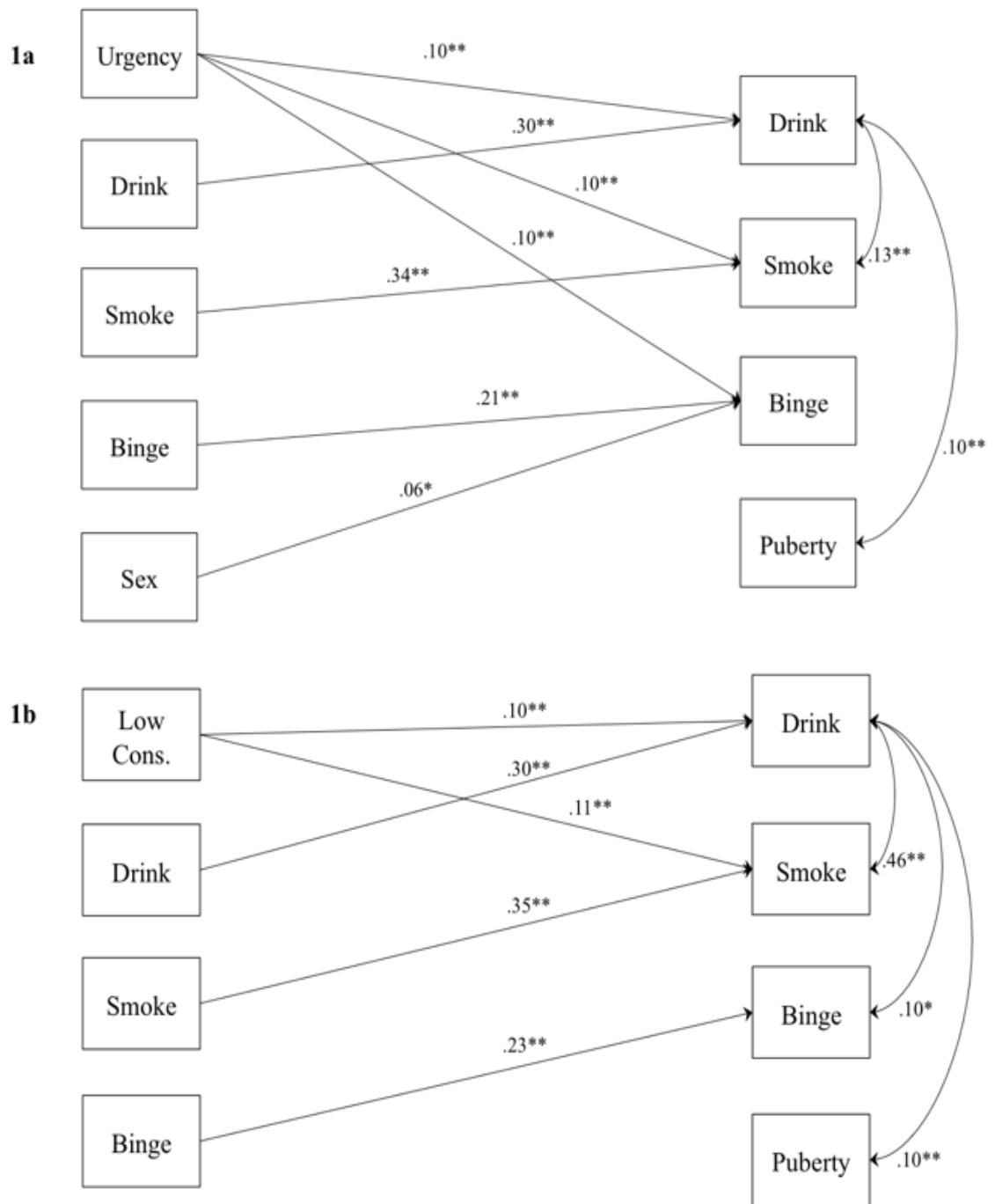


Figure 3.1a-b. SEM Independent Model. Depiction of structural models testing the independent pathways from urgency (1a) and low conscientiousness (1b) at wave 1 to risky behaviors at wave 2. Only hypothesized pathways, each significant at * $p < .01$, ** $p < .001$ are presented. Not included in the figure, for ease of presentation, are correlations among variables at wave 1.

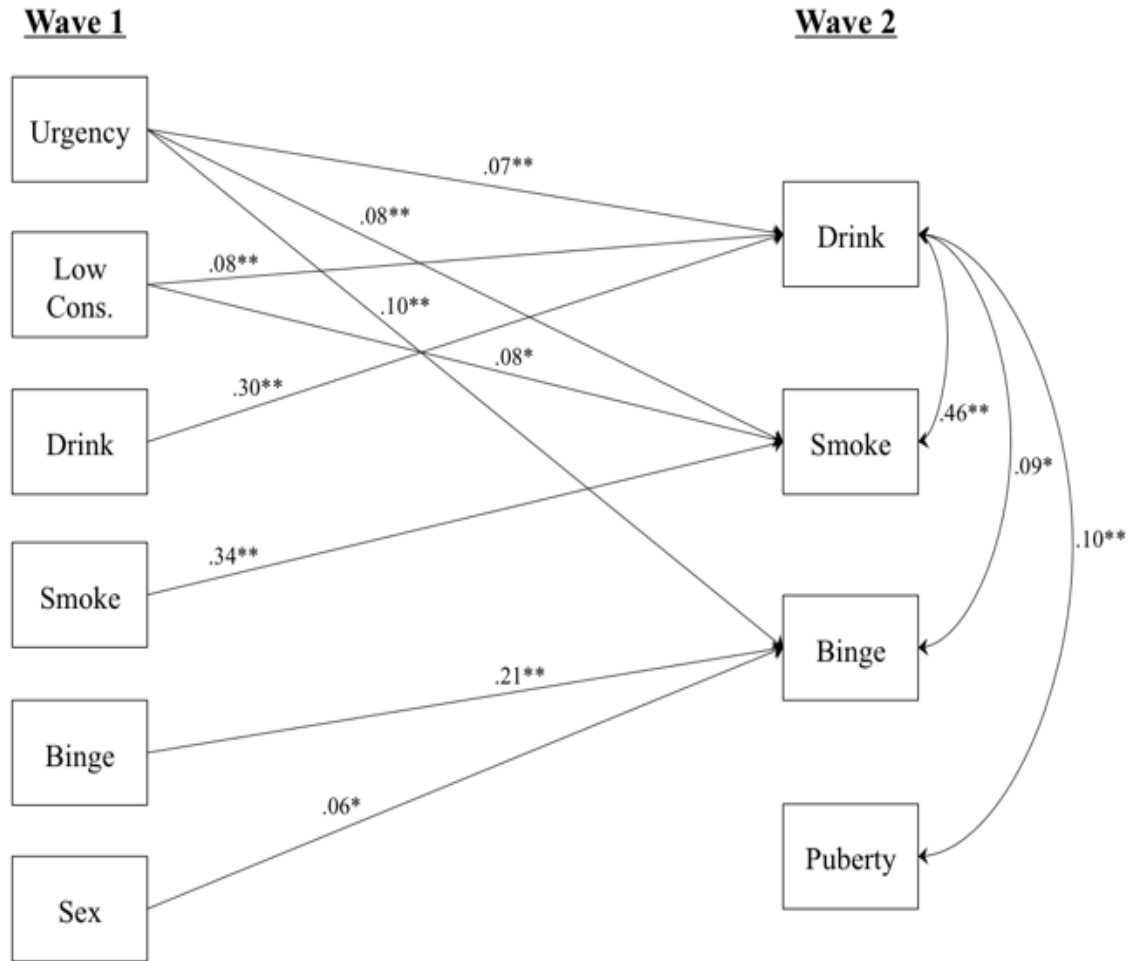


Figure 3.2. SEM Combined Model. Depiction of combined structural model testing the pathways from urgency and low conscientiousness at time 1 to risky behaviors at wave 2. Only hypothesized pathways, each significant at $*p < .01$, $**p < .001$ are presented. Not included in the figure, for ease of presentation, are correlations among variables at wave 1.

Chapter Four: Discussion

The central finding from this study is that involvement in addictive behaviors early in middle school, which has historically been used to predict subsequent dysfunction, can itself be predicted by characteristics of children during their elementary school years. Individual differences in elementary school children's personalities predict their drinking, smoking, and binge eating behavior at the end of their first year of middle school. In particular, elementary school levels of urgency, the tendency to act rashly when experiencing intense affect, appear to increase risk for all three problem behaviors. Low conscientiousness in elementary school children increased risk for both drinking and smoking one year later. High levels of urgency and low levels of conscientiousness may influence children's developmental trajectories by increasing the likelihood of involvement in addictive behaviors that are associated with negative outcomes in later adolescence and adulthood. The two traits appeared to have an additive effect in the prediction of subsequent drinking and smoking.

At least with respect to 6th grade drinking behavior, it also appears to be the case that urgency and low conscientiousness play different roles. Fifth grade urgency did not predict the presence or absence of 6th grade drinking; it predicted the frequency of drinking. It is possible, and consistent with urgency theory (Cyders & Smith, 2008), that high urgency youth are more likely to experience negative reinforcement from drinking (for example, their distress or anxiety is reduced when they drink) than are other youth. As a result, their earliest drinking experiences are more likely to be followed up with additional occasions in which they drink. This process would not apply in the same way to youth low in conscientiousness, because their failure to plan ahead, although

increasing the likelihood that they would try alcohol, would not necessarily lead to increased frequency of drinking because of the absence of negative reinforcement.

An additional interesting finding of this study is that unique patterns of prediction may be seen specifically for onset of drinking, smoking, and binge eating. This may indicate that separate processes are involved in the onset and maintenance of risky behaviors, with individual differences in personality factors contributing to the unique manifestation of each of these processes. For example, the current study found that urgency predicts increases in, but not onset of binge eating between 5th and 6th grades. Conversely, low conscientious predicts onset of, but not increases in binge eating during this same time period. This may perhaps be due to differences in the core aspects of each of these traits. For example, someone who is low in conscientiousness may be more likely to engage in binge eating simply because of an inability to plan ahead or persist in healthy eating habits. However, if the individual does not find the experience rewarding, he or she may not become any more likely to binge eat in the future. Alternatively, individuals high on urgency may find binge eating to be highly rewarding (again, feelings of anxiety may be reduced by consuming large quantities of food), and are therefore more likely to subsequently increase frequency of binge eating after its initiation. However, urgency may not put these individuals at particularly higher risk for initiating the behavior in the first place. This example highlights the importance of differentiating onset and changes in risky behaviors when studying their relationship with personality factors across time.

Interestingly, sensation seeking, which is consistently predictive of drinking and smoking in older age groups (Smith et al., 2007; Spillane et al., 2010; Zuckerman, 1994),

did not predict either of those behaviors prospectively in this age group. In part, this may be because age-appropriate, or at least age-accessible, alternative options actually exist for sensation seekers, whereas they do not for individuals who are high in urgency or low in conscientiousness. For example, a child high in sensation seeking may meet his or her need for novelty by skateboarding down a large hill without a helmet rather than drinking alcohol. However, adolescents who act out when distressed or fail to plan ahead cannot replace risky behaviors with alternative options, as they do not have the same distinct need to be met (as is true for sensation seeking). In a sense, there are no alternative “fixes” for emotion-driven rash action, poor planning, or low persistence. However, dangerous sensation seeking can be “replaced” by more adaptive behaviors that are novel in nature. This idea is supported by prior research, which shows reduction in substance use among high sensation seeking adolescents after being provided with high sensation value messages and guides to local thrill-seeking adventures in their local areas (Everett & Palmgreen, 1995; Lorch, Palmgreen, & Donohew, 1994; Palmgreen, Donohew, Lorch, Hoyle, & Stephenson, 2001, 2002; Palmgreen & Donohew, 1993; Stephenson, 2003; Stephenson, et al., 1999; Stephenson, Morgan, & Lorch, 2002). Also consistent with this possibility, Zapolski et al. (2010) found that sensation seeking concurrently predicted the risky behaviors of riding roller coasters and jumping out of trees in elementary school children.

There were several limitations to the current study. Although the narrow focus of the study on the transition from elementary school to middle school is a strength of the research, because it permitted a test of the role of personality traits in predicting behavior across an important developmental transition, it is also a weakness. We have no

information on the degree to which elementary school personality predicted different developmental trajectories of addictive behavior involvement across adolescence, nor do we know whether the roles of the individual traits vary as a function of age. In addition, administering self-report questionnaires restricted our ability to clarify certain items or address questions participants had during completion of the measures. Studying broad personality variables as predictors in our analyses provided no information about the mechanism by which traits lead to addictive behavior. Possibilities such as the acquired preparedness model of risk (Combs et al., 2011, 2012; Gunn & Smith, 2010; Pearson et al., 2010), which specifies a process by which personality increases risk due to its influence on the learning process, were not tested in this study. Lastly, it is important to realize that although the model was predictive in nature, our prospective findings are not a rigorous test of causality; that is, it cannot be concluded that elementary school personality characteristics cause middle school addictive behavior involvement.

In sum, the current study offers valuable information regarding the relationship between personality measured in elementary school and risky behaviors in middle school. The likelihood that individual differences in children's personalities help shape subsequent developmental trajectories with respect to addictive behaviors may prove useful to both efforts to develop comprehensive models of risk and efforts to construct targeted, effective prevention programs.

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LEILA GULLER

VITA
Department of Psychology
University of Kentucky

Place of Birth: New York, New York

Date of Birth: June 22, 1987

EDUCATION

University of Maryland, College Park, MD

B.S. in Psychology

Date of Completion: December 2008

HONORS & AWARDS

National Institute of Drug Abuse Pre-doctoral Traineeship, 2012-2013

Daniel R. Reedy Quality Achievement Fellowship, University of Kentucky, 2010-2013

PUBLICATIONS

Matusiewicz, A. K., Macatee, R. J., **Guller, L.**, & Lejuez, C. W. Impulsivity and addiction in parents and adolescents (in press). In: L. C. Mayes & A. Gessel (Eds.), *Parenting and Substance Addiction: Developmental Approaches to Intervention*. New York: Oxford University Press.

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Chen, K. W., Banducci, A. N., **Guller, L.**, Macatee, R. J., Lavelle, A., Daughters, S. B., & Lejuez, C. W. (2011). An examination of psychiatric comorbidities as a function of gender and substance type within an inpatient substance use treatment program. *Drug and Alcohol Dependence*, 118, 92-99.

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PROFESSIONAL POSITIONS

2011-Present **Department of Psychology, University of Kentucky**
Research Assistant

2011-Present **Jesse G. Harris Psychological Services Center, University of Kentucky**
Therapist

2011-2012 **Counseling Center, University of Kentucky**
Student Therapist

2008-2010 **Center for Addictions, Personality, and Emotion Research, University of Maryland**
Research Assistant