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Stress And Substance Abuse In Homeless And Matched Housed Adolescents: A Longitudinal Model

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**STRESS AND SUBSTANCE ABUSE IN HOMELESS AND MATCHED HOUSED
ADOLESCENTS: A LONGITUDINAL MODEL**

by

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THESIS

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INTRODUCTION

Stress and adolescents

Stress is often conceptualized as an interaction between one's internal characteristics and one's external situational factors, and stress has emotional, cognitive and behavioral aspects (Butler, 1993). Lazarus and Folkman (1984) made the distinction that stress is a person's appraisal of an event as harmful or threatening; due to this appraisal some people may look at an event as stressful and others may look at the same event as not stressful.

Stress is constant throughout the lifespan but adolescence is one developmental period that contains a particularly large number of stressful events. Adolescents' stressors come from a variety of factors which can range from major life events such as a parent's death, to the stress of transitioning to a different school or a different peer group, to daily stressors such as conflicts with family and friends (Unger, Kipke, Simon, Johnson, Montgomery, & Iverson, 1998). Adolescents deal with a myriad of developmental issues during this period such as self-esteem, developing an identity, developing morals, and seeking independence (Irvin, 1996). Additionally, a review by Compas (1987) visually depicted stress as a demand on children and adolescents that can be chronic or acute; within acute events there can be cumulative events (i.e. daily stressors) or specific events, such as school changes or parental divorce. Furthermore, adolescence is an important developmental time for the brain and exposure to stress is related to negative cognitive and behavioral outcomes, such as the development of substance use disorders (Fishbein et al., 2006; Sinha, 2001).

In addition to the "normal" stressors faced by adolescents, homeless youth have several additional stressors. In one study, 54% of homeless people reported being victimized while homeless and the homeless were disproportionately victimized compared to their housed

counterparts (Lee & Schreck, 2005). Homeless adolescents may be involved in gangs or prostitution; they may have dropped out of school; they may be leaving their family's residence due to abusive, absent, or substance abusing parents (Unger et. al, 1998). Furthermore, youth sometimes become homeless due to stressors (e.g., abusive parents, substance abuse) and the stressors may shift, but not decrease, once they have experienced homelessness (Coates & McKenzie-Mohr, 2010). Overall, being homeless presents adolescents with more stressors and different types of stressors compared to housed adolescents.

Substance use and homeless adolescents

Substance use in adolescents is a well-researched topic. The National Institute on Drug Abuse does a yearly survey study on adolescents called Monitoring the Future and publishes the annual results (NIDA, 2011). For example, in 2011, Monitoring the Future found that marijuana and prescription or over-the-counter medication were the most frequently used drugs in high school seniors and 22.4% of the students had reported using marijuana in the past month (NIDA, 2011). While the specific drug and alcohol trends may change from year to year, all forms of adolescent substance use, including alcohol and illicit drugs, have increased since 1990 (Bauman & Phongsavan, 1999). More specifically, among ninth graders, over 40% of the adolescents surveyed had an alcoholic drink in the past month and over 25% reported binge drinking; approximately 40% reported ever having tried marijuana; and by tenth grade 25% reported trying an illicit drug in their lifetime (Bauman & Phongsavan, 1999).

Substance abuse and dependence are less common than experimentation; however, they are still prevalent among adolescents. One in four adolescents report enough symptoms for a diagnosis of substance abuse and 1 in 5 report enough symptoms for a dependence diagnosis, with the most commonly abused substance being alcohol and the most common substance

adolescents become dependent on being marijuana (Young, Corley, Stallings, Rhee, Crowley, & Hewitt, 2002).

While it is developmentally normal for adolescents to experiment with substances like alcohol and marijuana, homeless adolescents have different and more dangerous usage patterns. For example, homeless adolescents use substances at an earlier age and more frequently than housed adolescents (Johnson, Whitbeck, & Hoyt, 2005). Johnson, Whitbeck, and Hoyt (2005) also found that 60.5% of homeless adolescents met lifetime criteria for at least one substance use disorder and almost half met the criteria for a substance use disorder within the last 12 months. It is worth noting that these findings are for actual substance use disorders and are subsequently more severe than general substance use. The prevalence of substance use in the homeless adolescent population is also cause for concern. Findings suggest that homeless adolescents are twice as likely to use substances as their stably housed peers (McCaskill, Toro, & Wolfe, 1998; Thompson, Barczyk, Gomez, Dreyer, & Popham, 2010). Additionally, 65% of young homeless people cannot identify a homeless acquaintance who does not use substances (Klee & Reid, 1998). Substance use and abuse in homeless adolescents is of special concern due to the age at first use, the amount of usage, how prevalent it is, and the reasons adolescents report using substances.

Stress and substance use

Substance use and stress have individual effects on adolescents, particularly homeless adolescents. Additionally, substance use and stress also have a complex relationship with each other. One study found that homeless adolescents with high stress levels who used emotion-focused coping were significantly more likely to develop substance use disorders (Unger et. al, 1998). Unger and colleagues (1998) described emotion-focused coping as attempting to reduce

the negative emotions experienced due to a stressor and this form of coping is often used when the person believes the stressor is too difficult to handle. In a study by King and Chassin (2008) the relationship between stress, internalizing behaviors, and externalizing behaviors was examined. This study found that, with each additional stressor a child endures prior to age 14, the odds of developing a substance dependence disorder increased by 25%. Additionally, 71% of 14 to 25-year-old homeless people said they used drugs to cope with their problems (Klee & Reid, 1998). Another study found that in various categories of “adverse childhood experiences” there was an association with earlier use of alcohol (Dube, Miller, Brown, Giles, Felitti, Dong, & Anda, 2006). Finally, a group of people who suffered from traumatic events in childhood were compared to a group of people who suffered traumatic events as adults; those traumatized in childhood began drinking at an earlier age (Waldrop, Santa Ana, Saladin, McRae, & Brady, 2007). These results suggest that stress may lead to substance abuse in homeless and other youth; however, a different way to conceptualize this relationship is to look at substance use as a precursor to stress. For example, one study found that increases in substance use appear to be a factor in later victimization of the user (Windle, 1994).

One may conceptualize the relationship between stress and substance abuse as bidirectional. Thus, for example, substance use could lead to alleviating current stressors but introduce new stressors which continue the substance use and continue to increase new stressors (O’Doherty, 1991). Longitudinal research can help parse out temporal relationships between stress and substance abuse.

Existing models of stress and substance use

Currently, there are several existing models that depict possible relationships between substance use and stress. More specifically, many models focus on stress being a “motivational”

factor in the initiation of substance use and on the subsequent reinforcing nature of the substance use (Sinha, 2001). The stress coping model states that taking substances eliminates negative affect and produces positive affect in people, thus the substance use is reinforced (Shiffman, 1982). In a study on cigarette smokers, a substance not included in this study, Shiffman (1982) found that 52% of the participants cited stress or affect as a precipitator to a “relapse crisis.” The stress coping model illustrates that people commonly seek substances to cope with stress.

Another model, specific to alcohol use, was first presented by Conger (1956) and is known as the tension reduction model. This model proposes that a person is in a state of tension and responds by drinking alcohol which relieves the tension, thus reinforcing the use of alcohol (Conger, 1956; Levenson, Sher, Grossman, Newman, & Newlin, 1980). These same authors found that alcohol attenuated stress in physiological and psychological measures, meaning one would feel less stress after consuming alcohol. Conger (1956) asserted that as long as the substance reduces the tension in a person seeking an unmet need, the person is likely to repeat the substance using response in future, similar situations.

In addition to the stress coping model and the tension reduction model, the self-medication hypothesis has also received attention. Khantzian (1985) proposed that people addicted to substances become addicted when they attempt to medicate themselves with the substance as a way to cope with their distress and external situations. Furthermore, Cohen, Mannarino, Zhitova, and Capone (2003) added that those who self-medicate are finding a temporary solution. They will eventually have to increase the frequency of substance use, the amount of substances used, or both in order to continue to “achieve” their goal. It has been suggested that self-medication with substances may be especially common among homeless people, given their high levels of stress (Goodman, Saxe, & Harvey, 1991).

Zubin and Spring (1977) developed the stress-vulnerability model which was originally specified to a schizophrenic population, but has expanded to numerous other areas of mental health. This model states that people have a certain level of vulnerability to psychopathology, in this case, substance use disorders. A study using multiple regression found that 13% of the variance in adolescent substance use was accounted for by negative life events and higher rates of negative affect combined with lower rates of positive affect (Wills, Vaccaro, & McNamara, 1992). This provides some evidence that negative life events and stress are impacting the substance use in adolescents.

Current Study

While it is known that there is a relationship among adolescent homelessness, stress, and substance use, the exact nature of this relationship is not known (Klee & Reid, 1998). The purpose of the current, longitudinal study is to examine and understand the temporal relationship between stress and substance abuse over time in a sample of homeless and matched housed adolescents. It is hypothesized that stress will have a temporal impact on substance abuse and substance abuse will also have a temporal impact on stress. The contribution the current study will make to existing literature is adding research using longitudinal data to understand the possible temporal relationships between stress and substance abuse in adolescents. Furthermore, this study may contribute to knowledge on the optimal timing of interventions.

METHOD

Participants

The sample for this study consisted of 254 youth in an urban, Midwestern city. In order for participants' data to be included in the analyses, they had to have at least one variable of interest at both the baseline interview and the 2 year follow-up. Of these 254 participants, 28 were missing some or all of their data at the 5 year follow-up and 38 were missing some or all of their data at the 7 year follow-up.

Of the 254 participants, 135 (53.1%) were homeless and 119 (46.9%) were housed. The participants ranged in age from 13 to 17 years ($M = 14.99$, $SD = 1.268$). For these data analyses, race was dichotomized: 49.6% participants identified as Caucasian and 50.4% participants identified as Non-Caucasian (most of these, 41.7%, were African-American). Finally, 64.2% of participants were female and 35.8% were male.

Procedure

These data were collected as part of a larger study. Within a metropolitan Midwestern city, homeless adolescents were drawn from a variety of settings and agencies including youth shelters. A probability sampling design was used which allowed the researchers to obtain a proportional number of homeless youth (ages 13-17) who sought services at each shelter or other site in the past year (McCaskill, Toro, & Wolfe, 1998).

Previous research has shown that the most effective tracking procedure that limits attrition is collateral contact (Hobden, Forney, Durham, & Toro, 2011). In this procedure, the names, phone numbers and addresses of people who are likely to remain in contact with the adolescent are obtained. If the participant was not able to be reached, these people would be

contacted either to update the participant's contact information or to contact the participant directly for a follow-up interview.

In order to obtain a matched housed sample, homeless adolescents were asked to provide contact information for a list of up to 10 acquaintances from their most recent neighborhood who were the same age, race, and gender (Haber & Toro, 2009). They were asked to exclude friends to eliminate any potential confounding variables.

Different consent procedures were used depending on the youth's housing situation. In shelters, staff members aided in obtaining a legal guardian's consent for homeless youth. For youth who were wards of the state, consent was obtained from the social workers with legal responsibility for the youths. Finally, the parents of housed adolescents were mailed a consent form and a description of the study and were then contacted by phone and asked to give consent for their child to participate.

In addition to written or verbal consent from a legal guardian, each adolescent was asked to provide verbal assent and was given the option to withdraw from participation at any time. Following consent and assent, each participant completed a two to three-hour face-to-face interview with a trained interviewer at baseline. The time of interviews decreased to 1.5-2.5 hours for follow-up interviews, which were attempted at three months, six months, 1 year, 2 years, 5 years, 6 years, and 7 years after baseline.

A staff of paid full-time interviewers conducted a majority of the interviews, with graduate students and advanced undergraduate students completing some of the interviews. New interviewers went through extensive training that included role-playing interviews, shadowing a trained interviewer during interviews, and being observed by experienced interviewers during interviews. The questions were read aloud due to variability in literacy among respondents

(Toro, Urberg, & Heinze, 2004). For participating, youth were compensated \$20 at the baseline, 3-month, 6-month, 1-year, and 2-year interviews. They were compensated \$50 at the 5-year, 6-year, and 7-year interviews. To limit study attrition, interviewers and their assigned participants maintained regular contact through phone and mail check-ins, using internet databases to keep “track” of the participant, and using driver’s license records to also “track” the participant.

Measures

Demographic Information. Participant age, gender, and race/ethnicity, as well as homeless/housed status were controlled for in each longitudinal model. This self-reported demographic information was provided by participants at baseline.

The Diagnostic Interview Schedule for Children, 2nd Edition (DISC). The DISC is designed to assess diagnostic criteria for various forms of psychopathology in children and adolescents including questions about drug and alcohol use (Fisher, Wicks, Shaffer, Piacentini, & Lapkin, 1992). The DISC demonstrates acceptable interrater reliability ($r = .97$; Shaffer, Schwab-Stone, Fisher, Cohen, Piacentini, Davies, Connors, & Regier, 1993). The number of symptoms of alcohol, marijuana and other drug abuse and dependence [] endorsed was calculated for each participant. To reduce positive skew, the “symptom count” scores for marijuana and other (illegal) drugs were combined into one score.

Stressful Events To assess stressful events experience in the past six months, the Modified Life Events Interview (MLEI) was used (Lovell, 1984). This scale was developed specifically for the homeless population and addresses five domains: housing situations, employment, social relationships, education/job training, and mental/physical health. The MLEI demonstrated good test-retest reliability ($r = 0.84$; Toro, Rabideau, Bellavia, Daeschler, Wall, Thomas, & Smith, 1997).

Statistical analysis. The models were fitted to the variance/covariance matrix of number of recent stressful events and symptom counts for alcohol and illegal drugs, respectively. Maximum likelihood (ML) was the estimation procedure used. Given that this sample meets the assumption of multivariate normality, ML estimation is the preferred method. Model fitting and analyses were conducted using LISREL 8.8 software (Jöreskog & Sörbom, 2006). There are numerous amounts of fit indices available to compare the data to the proposed model. Kline (1998) reports that different indices reflect different aspects of the model and, thus, multiple indices should be reported when analyzing fit. Additionally, a researcher should take into account parameter estimates when making decisions about models and their significance. The Normal Theory Weighted Least Squares Chi-Square index is used to assess the overall fit of the model. Good fit is indicated by a nonsignificant Chi Square value, $p < .05$. Other fit indices are less sensitive to sample size than the Chi Square value; the indices this particular study will use are the Bentler Comparative Fit Index (CFI), goodness-of-fit index (GFI), the Root-Mean-Square Error of Approximation (RMSEA), and the Standardized Root Mean Squared Residual (SRMR) (Kline, 1998). The CFI assesses the improvement the researcher's model has over a baseline model. For the CFI, good model fit is indicated by values at or above .90. The GFI estimates the variability accounted for by the model in the sample covariance matrix. GFI values greater than .90 reflect good fit. The RMSEA is based on noncentrality parameter, meaning it is not assumed that the researcher's model has perfect fit. The RMSEA also has a built-in correction dependent on model complexity, where simpler models are favored. A RMSEA between .05 and .08 is indicative of good fit, whereas a value equal to or greater than .10 is considered to reflect bad fit. The SRMR will be used to verify the model fit using the average of the covariance residuals. For the SRMR, values below .10 indicate good model fit.

Path Analyses. Path analysis is based on linear regression and allows one to examine the strength of a relationship between two variables, including direct effects, indirect effects, and total effects (Mueller, 1996). The first path analysis will be a cross-lag design linking alcohol and stress longitudinally with the purpose of finding relationships between the variables across different time points, specifically, from baseline to 2 years, baseline to 5 years, baseline to 7 years, 2 years to 5 years, 2 years to 7 years, and 5 years to 7 years. The second path analysis will be the same cross-lag design linking illegal drugs, including marijuana, to stress.

RESULTS

Descriptives and Correlational Data. Table 1 summarizes the means and standard deviations of the variables of interest. Table 2 summarizes the correlations between the variables. In regards to demographic variables, race was eliminated from the proposed model because it did not significantly correlate with any of the stress variables. Additionally, sex was eliminated from the proposed model as it did not produce any significant correlations with of the variables at a baseline time point. Age and housing status were retained as demographic variables.

Among the variables of interest, there were seven bivariate pairs that did not have significant relationships: baseline stress and seven year alcohol symptoms ($r = .10$); baseline alcohol symptoms and five year stress ($r = .10$); baseline other drug symptoms and five year stress ($r = .07$); two year alcohol symptoms and two year drug symptoms ($r = .03$); two year alcohol symptoms and five year drug symptoms ($r = .04$); two year alcohol symptoms and seven year drug symptoms ($r = .10$); and five year drug symptoms and seven year alcohol symptoms ($r = .10$). Overall, there tended to be strong relationships between stress, alcohol symptoms, and other drug symptoms across variables and over time. Also, all of the correlations were positive correlations meaning that, as one variable increased, the other variable also increased. For example, as baseline stress increased, the number of alcohol symptoms endorsed at the five year time point also increased.

Data Screening. The data were screened for missing values for each participant at every time-point. A participant must have had data on all variables for the baseline and must have had data on at least one variable of interest at the 2 year follow-up to be included in the study. The number of participants at baseline was 398 and the final sample size was 254 participants. After eliminating participants who did not have data for this specified time, the data was then screened

for univariate outliers. Positive skew was expected on many of the variables of interest. For example, in this sample, 46.5% of the sample endorsed no alcohol symptoms at baseline; however, there were a few people who endorsed 10, 11, even 13 alcohol symptoms at this same time point. Instead of throwing out these numbers, the data for any outliers was truncated. In this case, any numbers determined to be outliers based on a z-score greater than 1.96 were changed to the number that was highest but with a z-score under 1.96. For example, for baseline alcohol, a value greater than or equal to seven exceeded the 1.96 z-score value. These values were changed to “6s” which were below the 1.96 cutoff.

The data were also screened for multivariate normality, an assumption when using the maximum likelihood estimation procedure. The alcohol and illegal drug variables all had significant skew so it was decided to transform the data. Since the skew was slight and the variables could have zero as a feasible answer, a log transformation with the addition of a constant (in this case, 10) was used. The skewness was improved, although in some cases it was still significant. The graphs of these variables were checked and, visually, the skew did not appear extreme. Maximum likelihood can be robust to some violations of multivariate normality, so the data screening continued with checking multicollinearity between the variables, as well as examining the Mahalanobis distance values, which is a way to check for multivariate normality.

Missing data were imputed using multiple imputation (Baraldi & Enders, 2010). Multiple imputation requires that data are Missing Completely at Random (MCAR; Rubin, 1976; Baraldi & Enders, 2010). The assumption of MCAR means that the absence of scores on a variable is unrelated to scores on any of the other variables. Little’s MCAR Test was used to test this assumption, which is a global test statistic available using Missing Value Analysis in SPSS, and the data were missing completely at random (Little, 1988). Multiple imputation creates copies of

the data set where the missing values have different imputed values in each set; all of the sets are then pooled together to form one set of results (Baraldi & Enders, 2010). LISREL 8.8 has an analysis package for multiple imputation which used 200 imputations as the default.

Results of the Structural Equation Models. The results of the models are in Figure 1 (alcohol and stress) and Figure 2 (other drugs and stress).

The alcohol and stress model obtained a significant chi-square which indicated poor fit; however, this statistic is sensitive to sample size ($\chi^2 = 80.94$; $p < .001$). The RMSEA also indicated poor fit (.12). However, the CFI obtained was .91 which indicated good fit as it was greater than the .90 cutoff. The SRMR also indicated favorable fit as it was less than the .10 cutoff (SRMR = .085) and the GFI was greater than the .90 cutoff (GFI = .94).

The other drugs and stress model obtained a significant chi-square which indicated poor fit ($\chi^2 = 88.48$; $p < .001$). The RMSEA also indicated poor fit (.12). However, the CFI obtained was .92 which indicated good fit as it is greater than the .90 cutoff. The SRMR also indicated good fit as it was less than the .10 cutoff (SRMR = .097). Finally, the GFI indicated good fit (GFI = .93).

Given these fit indices the models would appear to have some evidence for good fit. However, as previously mentioned, fit indices are only a portion of making decisions about models. Looking at the parameter estimates can also give an indication of fit, specifically, where there were variables that had consistently poor fit and where there were variables that had consistently good fit.

In both models, there were significant paths between individual variables. Within the alcohol variable, alcohol at baseline to alcohol at two year follow-up was significantly related ($\beta = .42$; $p < .001$), as well as two to five year follow-up ($\beta = .41$; $p < .001$), and five to seven year

follow-up ($\beta = .54; p < .001$). Other drugs had the same pattern with baseline to two year follow-up ($\beta = .44; p < .001$), two to five year follow-up ($\beta = .43; p < .001$), and five to seven year follow-up ($\beta = .64; p < .001$). Finally, stress also displayed the same pattern over time with baseline to two year follow-up ($\beta = .38; p < .001$), two to five year follow-up ($\beta = .47; p < .001$), and five to seven year follow-up ($\beta = .32; p < .001$).

Additionally there were many significant correlations between variables at the same time point. Alcohol and stress were related at baseline ($\beta = .32; p < .001$), two year follow-up ($\beta = .30; p < .001$), and five year follow-up ($\beta = .25; p < .001$). Alcohol and stress were not significant at seven year follow-up ($\beta = .08; p = .093$). Other drugs and stress were related at baseline ($\beta = .25; p < .001$), two year follow-up ($\beta = .34; p < .001$), five year follow-up ($\beta = .38; p < .001$), and seven year follow-up ($\beta = .23; p < .001$).

There was one interesting, significant pathway between variables and across differing time points. Five year alcohol symptoms ($\beta = .20; p = .002$) and five year other drug symptoms ($\beta = .19; p = .007$) were significantly related to the number of stressful events at the seven year time point. These relationships will be explored more in the discussion section.

Finally, it is worth noting the relationship between the variables of interest and the two demographic variables. Age was significantly related to baseline alcohol and other drugs ($\beta = .26; p < .001$ and $\beta = .37; p < .001$, respectively), but it was not significantly related to stress ($\beta = .06; p = .308$). Housing status was significantly related to all three baseline variables of interest: stress ($\beta = .37; p < .001$), alcohol ($\beta = .17; p = .004$), and other drugs ($\beta = .18; p = .004$).

DISCUSSION

The findings from this study give more support for the relationship between stress and substance use within a population of at-risk adolescents; however, this study was not able to lend much support to the relationships having temporal effects over different time periods. The one significant finding supporting a temporal effect was evident in both models. There was a significant relationship between five-year alcohol/other drug use and seven-year stress. This, perhaps, offers some evidence that substance use may be having a larger impact on stress than the other way around.

This finding raised an additional question: why does this relationship occur at these particular time points? There are several hypotheses that may help answer why the only significant temporal relationship happens between the five- and seven-year time points, rather than earlier time points. First, it is important to note that at baseline the sample ranged in ages from 13-17, with most participants falling between 14-16 years of age. This means that at the five year time point most of the sample was 19-21 and at the seven year time point 21-23.

One hypothesis to explain these temporal findings is based on a study by Zapert, Snow, and Tebes (2002) which classified adolescents into six different clusters: non-users, experimenters, low escalators, early starters, late starters, and high escalators. These different clusters have varying degrees of substance use as well as varying symptoms of substance use. The current study did not parse out these different clusters and, subsequently, may have masked certain significant relationships that would emerge for one cluster but not for another cluster. For example, experimenters probably had a high rate of use at baseline and no use at follow-ups, whereas late starters would have a high rate of use at the five or seven year follow-ups, or beyond the scope of this study's follow-ups. Had this study parsed out these clusters or a similar

group of clusters it could have explored a more specific question: Is stress related to substance abuse among a specific group, such as people who identify as substance abusers and began at a young age (early starters)? Rather, this study examined the more general question about the relation of substance abuse and stress among an entire group of adolescents, without separating them based on their level of substance abuse.

Another hypothesis about why the significant path emerged when it did is based on the idea that, typically, rates of substance use peak in the 18-21 age group and then begin to decline (Kandel, 1980). This study followed most participants to the ages of 21-23; however, given the peak age of substance use for this sample was at time point five this could be contributing to why the significant temporal finding was at the five year and seven year time points. The means and standard deviations of this study lend some evidence to this argument with the highest average alcohol symptoms at the seven year follow-up and the highest average drug symptoms at the five year follow-up. It would have been helpful to have an additional follow-up at nine or ten years to determine if this hypothesis had even more strength.

Finally, perhaps another effect due to age could be on the coping strategies developed. By the time someone reaches the ages of 19-21 they may have solidified their coping strategies. For some people substance use may be a major coping strategy, one that later turns out to be ineffective and produces growing stress levels. By this age people may no longer evaluate the stressor and their resources, but rather either use emotion-focused coping or problem-focused coping extensively.

There are some noteworthy limitations of this study. First, when the sample was recruited it did not draw from all potential sites for homeless individuals. For example, homeless adolescents often stay with friends or family for brief periods of time rather than staying in

shelters (the so-called “couch-surfing”). Other homeless youth appear in centers for delinquent youth. Our study did not sample from either of these types of sites. Second, some of the participants’ data were not obtained at the later time points. If every person had been followed up at the two year time point, the sample size would have been closer to 400 people, which may have led to a model more indicative of the population as a whole. Additionally, at the five year and seven year time points some participants’ data had to be imputed. While this is an acceptable practice, it still does not replace obtaining the “real” values from a participant. Finally, and perhaps most importantly, the data relied solely on self-report during a structured interview. With self-report there are always underlying issues such as bias and answering in socially desirable ways, particularly when administering sensitive measures such as those about substance use.

While this study made some of its own contributions there are several directions to go from here. First, multi-method and/or multi-informant studies can build on the findings of this particular study. Parents, guardians, siblings, and government workers may be able to provide some additional accurate information to the self-reports of the adolescents. Additionally, other methods such as sophisticated drug screenings, breathalyzers, etc. may be able to also provide information beyond a self-report. Second, as mentioned, it may be helpful to develop clusters of adolescents with different use patterns and examine these models when taking these patterns into account. Finally, given the results of this study, future studies may look at initiating substance use treatment at the ages of 18-22 to examine the impact it has on subsequent substance use, but also its impact on subsequent stress levels.

Implications of the research should also be examined. First, the significant relationship between 5 year substance abuse and 7 year stress points to some additions that should be made to

substance abuse treatment. Stress relief skills as well as related concepts such as meditation and mindfulness therapy could contribute to more effective treatments, especially in young adults compared to adolescents. Further research should be done comparing a traditional substance abuse treatment to one that includes this added component. Furthermore, while the longitudinal relationship between stress and substance abuse is still speculative, one can see from the significant relationships at the same time points that the two are related. For some people this means when they experience stress they seek substance use as a coping mechanism, for others their substance use increases stressors in their lives. Regardless, effective coping strategies should be taught to adolescents before they seek substances for their coping. Additionally, as previously mentioned, substance abuse treatment should contain some component dedicated to stress management.

Table 1 Descriptive Statistics of Stress, Alcohol, and Other Drugs

Variable	Mean	Standard Deviation
Baseline Stress	12.50	6.37
Two Year Stress	9.17	5.37
Five Year Stress	10.59	6.61
Seven Year Stress	9.23	6.05
Baseline Alcohol	1.56	2.03
Two Year Alcohol	2.17	2.42
Five Year Alcohol	2.57	2.67
Seven Year Alcohol	3.07	2.55
Baseline Other Drugs	1.30	2.21
Two Year Other Drugs	1.13	1.90
Five Year Other Drugs	1.61	2.57
Seven Year Other Drugs	1.57	2.24

Table 2 Correlation Table of the Stress, Alcohol, and Other Drugs

	Stress				Alcohol				Other Drugs			
	Baselin e	2 Year	5 Year	7 Year	Baselin e	2 Year	5 Year	7 Year	Baselin e	2 Year	5 Year	7 Year
Sex	-.07	-.08	-	-	-.05	-.12	-	-	-.01	-.19**	-	-
			.18*	.21*			.24**	.27**			.29**	.26**
			*	*			*	*			*	*
Race	-.02	-.04	.01	-.12	-	-	-	-	-	-	-	-.19**
					.37**	.35**	.28**	.31**	.36**	.31**	.26**	
					*	*	*	*	*	*	*	
Age	.03	.06	-.16*	-	.25**	.14*	-.02	-.06	.20**	.11	-.10	-.14*
				.20*	*							
				*								
Hous- -ing	.37***	.22**	.19*	.30*	.15*	.05	.07	.04	.15*	.10	.09	.23**
Baselin e Stress	1.00											
Two Year Stress	.41**	1.00										
Five Year Stress	.42**	.48*	1.00									
Seven Year Stress	.43**	.40*	.47**	1.00								
Baselin e Alcohol	.39**	.25*	.10	.19*	1.00							
Two Year Alcohol	.21**	.43*	.15*	.21**	.43**	1.00						
Five Year Alcohol	.23**	.28*	.37**	.38**	.31**	.46**	1.00					
Seven Year Alcohol	.10	.19*	.24**	.30**	.30**	.35**	.58**	1.00				
Baselin e Other Drugs	.32**	.22*	.07	.21**	.24**	.14*	.19*	.14*	1.00			
Two Year Other Drugs	.18*	.46*	.20**	.31**	.23**	.03	.14*	.19*	.46**	1.00		
Five Year Other Drugs	.27**	.30*	.51**	.43**	.15*	.04	.13*	.10	.31**	.49*	1.00	
Seven Year Other Drugs	.22**	.19*	.34**	.51**	.16*	.10	.21**	.18*	.34**	.46*	.67**	1.00
										*		

p value < .05 = *; p value < .001 = **

Figure 1. Multiple Cross-lag Model Examining Temporal Relationship between Stress and Symptoms of Alcohol Abuse/Dependence

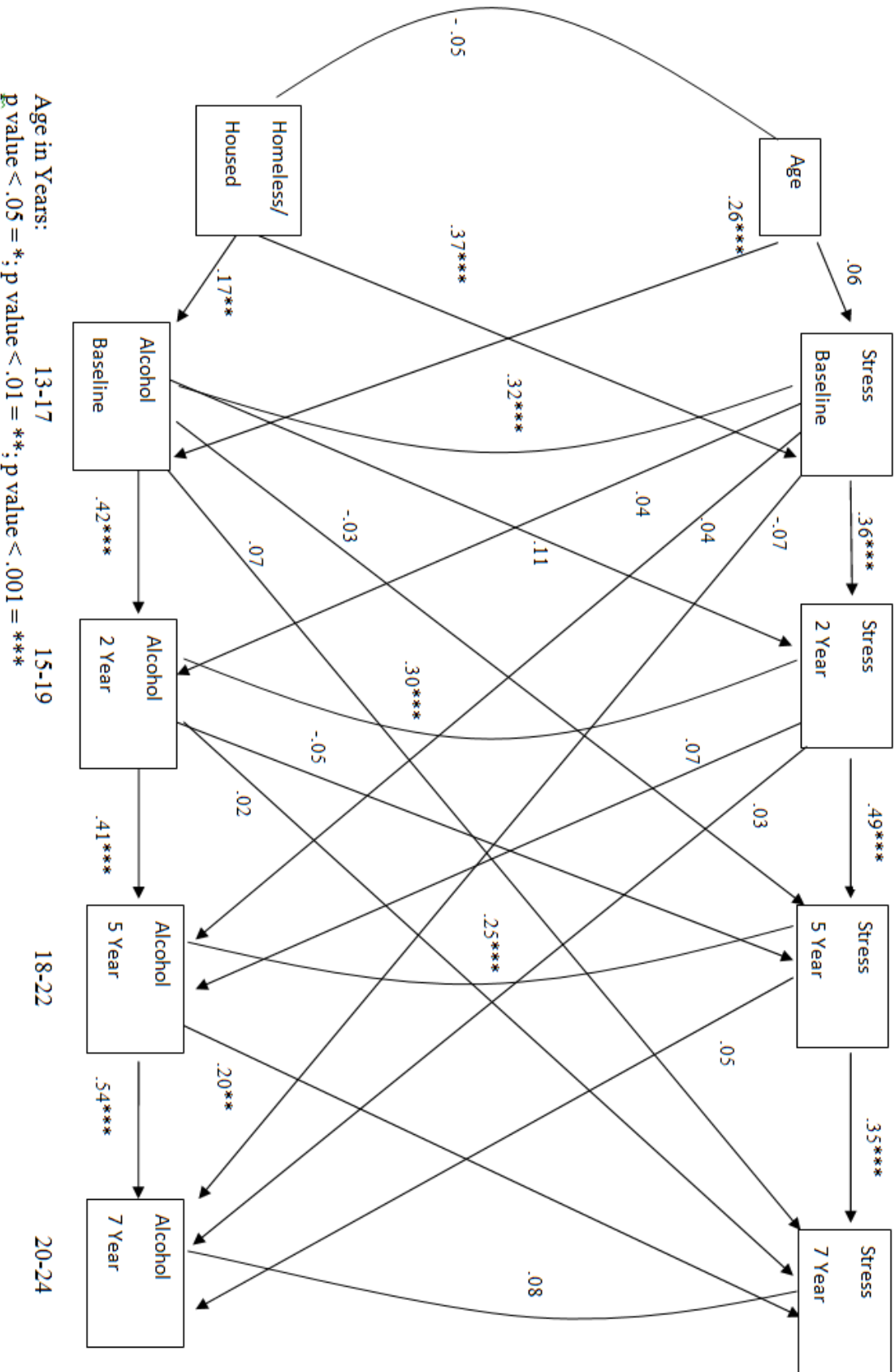
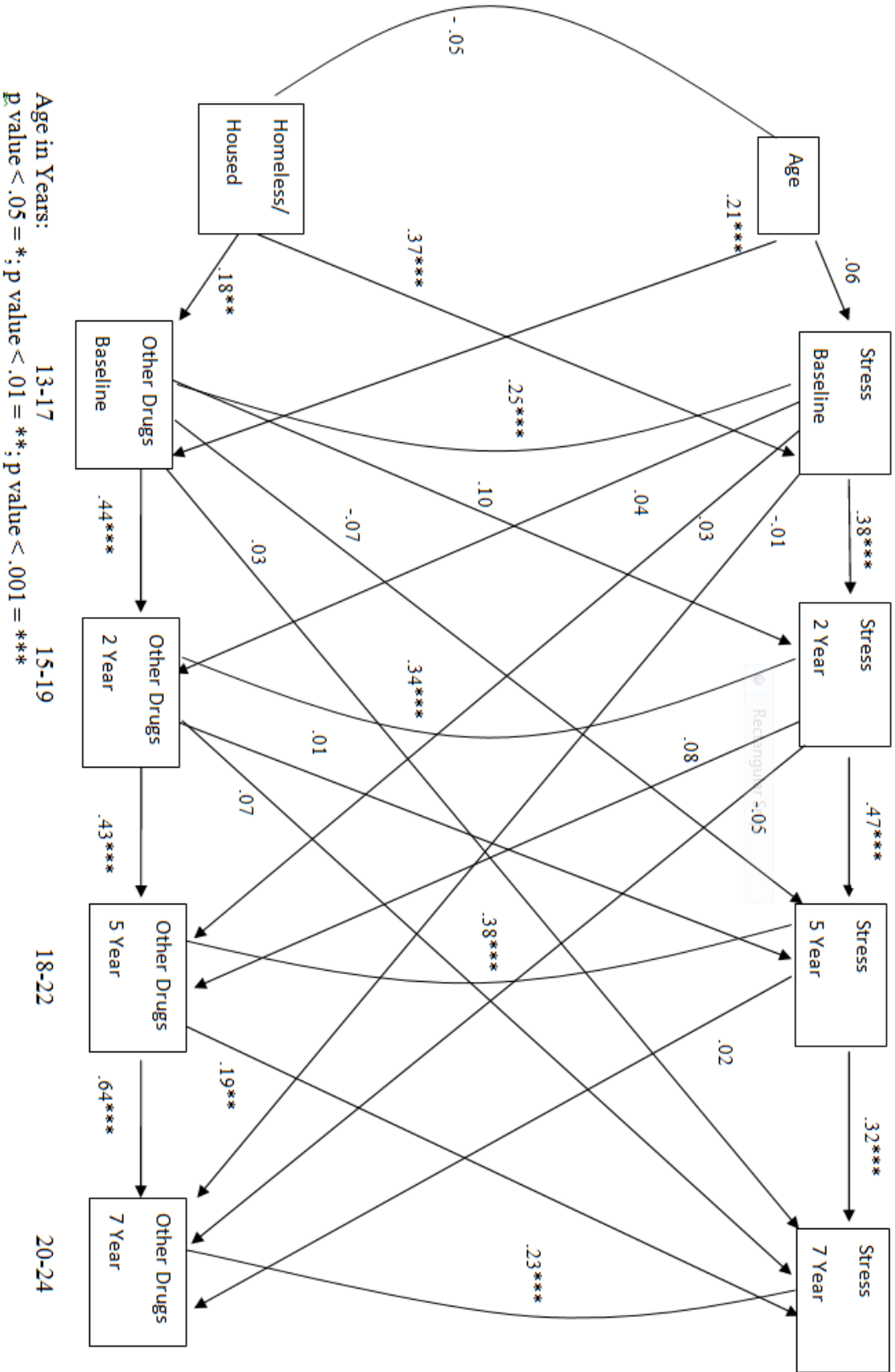


Figure 2. Multiple Cross-lag Model Examining Temporal Relationship between Stress and Symptoms of Drug Abuse/Dependence



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ABSTRACT**STRESS AND SUBSTANCE ABUSE IN HOMELESS AND MATCHED HOUSED ADOLESCENTS: A LONGITUDINAL MODEL**

by

CORISSA A. CARLSON**December 2013****Advisor:** Paul A. Toro, Ph.D.**Major:** Clinical Psychology**Degree:** Master of Arts

The relationship between stress and substance abuse within an at-risk adolescent population is an important topic to research. There are several models examining the relationship between stress and substance abuse; however, this study will look to longitudinal methods to examine if there is a temporal relationship between stress and substance abuse in a high risk population. Interviews were conducted at a baseline time point as well as follow-up time points at two, five, and seven years. Two hundred fifty-four participants were retained at the two year follow-up and their data were analyzed using structural equation modeling. The two proposed models had evidence for overall good fit. Two significant temporal pathways emerged between five year alcohol abuse and seven year stress as well as five year illegal drug abuse and seven year stress. Explanations for these particular time points emerging as significant are explored. Additionally, implications of these findings are discussed.

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