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Prevalent and incident homelessness among a prospective cohort of black and white

non-Hispanic men who have sex with men in Atlanta, GA

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Abstract

Prevalent and incident homelessness among a prospective cohort of black and white non-Hispanic men who have sex with men in Atlanta, GA

By
Calli A. Taylor

Background: Homelessness is an endemic issue in the United States that disproportionately impacts certain populations, including African Americans and men who have sex with men (MSM). Herein we report on the prevalence and incidence of homelessness among men who have sex with men in Atlanta.

Methods: Data from the InvolveMENt study, a prospective cohort study of black and white Atlanta MSM that took place between June 2010 and March 2014, were used for this study. Baseline data (n=803) were used for prevalence analyses, while prospective data from HIV-negative MSM (n=556) were used for descriptive analyses and to estimate homelessness incidence rates. Significant predictors of homelessness incidence were determined using proportional hazards modeling.

Results: Among the baseline cohort, 93 (11.6%) MSM reported any prevalent homelessness, and black MSM were more likely to report prevalent homelessness than white MSM (15.2% and 6.9%, chi-square p=0.0003). Prevalent homelessness was higher among HIV-positive participants than among HIV-negative participants at baseline (17.4% and 9.0%, chi-square p=0.0006). Among the prospective cohort, there were 42 MSM who had incidence of homelessness, a rate of 5.9 per 100 person-years. Compared to white MSM, black MSM were twice as likely to have become homeless (RR: 2.1, 95% CI: 1.1, 4.1). Depressive symptoms (RR: 2.9, 95% CI: 1.6, 5.4), and age (RR: 2.4, 95% CI: 1.3, 4.5) were also found to be associated with incident homelessness.

Conclusions: Our results provided previously unreported homelessness prevalence and incidence measures of MSM in Atlanta, allowing for an examination of predictive factors of incident homelessness and providing a foundation for further research on this topic. Race, age, and depressive symptoms were found to be predictors of incident homelessness among this population. The estimates reported in this study emphasize the need for preventative programs and services focused on African American MSM, young MSM, and those with mental health disorders.

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Appendices

Introduction

Homelessness is an endemic issue in the United States that disproportionately impacts certain populations. As reported in the 2014 Point-in-Time (PIT) estimates, released by the Department of Housing and Urban Development, there were 578,424 sheltered and unsheltered homeless people in the United States.[1] In the report it was also estimated that there were 16,521 homeless people in Georgia, of whom 50.3% were unsheltered.[1] The 2013 metro Atlanta Tri-Jurisdictional PIT count found there were 6,664 homeless people in the metro Atlanta area, with 5,571 of those within the limits of the city of Atlanta.[2] In the same count it was found that a disproportionate 82% of the homeless individuals in the metro Atlanta area were male.[2] On a national level, disparities in race as well as sex are seen, with African Americans comprising 47% of the homeless population in 2007.[3, 4] In comparison, according to the U.S. Census Bureau, 13.3% of the national population in 2015 was comprised of African Americans.[5]

It is well documented that the homeless are often at high risk for chronic and acute health problems, including HIV.[6] Estimates from 2006 indicate that 3.4% of homeless people in the U.S. were HIV-positive, as compared to 0.4% of the general population.[7] It has also been reported that approximately 16% of the single, adult homeless population nationally has some form of severe, chronic mental illness.[6] In addition, the homeless population in the U.S. is more likely than the general population to be affected by all chronic health problems, aside from obesity, strokes, and cancer.[8] Homeless persons frequently do not have adequate access to health care resources, and so are unable to prevent or address these health problems if they do occur.[8, 30]

Disparities are also seen in regards to sexual orientation and homelessness in the United States. It has been reported that sexual minority youth are more likely to become homeless than are youth who identify as heterosexual, and it has been estimated that 6% to 40% of homeless

youth identify as lesbian, gay, bisexual, transgender, and questioning (LGBTQ).[9, 10, 11, 12, 13] In comparison, reports indicate that LGBTQ individuals comprise approximately 2.3% to 3.8% of the general population of the U.S.[14, 15]

One study compared the prevalence of current homelessness among sexual minority adolescents to that of their heterosexual counterparts in Massachusetts, and found that the sexual minority participants were between 4 and 13 times more likely to report homelessness.[16] Another study, that investigated HIV seroprevalence among homeless and marginally housed people in San Francisco, found that 19.2% of the adult males included in the study identified as men who have sex with men (MSM).[17] A recent report from an ongoing study of young sexual minority men in New York found that 12.7% reported unstable sleeping conditions, and 18.2% reported unstable living conditions.[18] The same study reported that non-Hispanic black participants were more likely to report unstable housing, and strong associations were found between unstable housing and history of arrest and adverse childhood experiences.[18] While there is research available regarding sexual minority homelessness, the majority of the available information is focused on prevalence of homelessness, and correlates or risks associated with homelessness among this population.

There are several factors that are commonly accepted to be associated with homelessness in the United States, including history of arrest, adverse childhood experiences, mental illness, and substance abuse. Research indicates that youth and adult homeless are more likely to have experienced adverse childhood events, including physical, emotional, and sexual abuse and neglect.[9, 19] A number of studies have also shown an association between negative early life experiences, drug abuse, and homelessness among young MSM.[9, 20, 21] Examinations of risk factors for homelessness have indicated that mental health problems and early childhood

adverse experiences are predictors of homelessness, and that history of arrest and drug and alcohol misuse are strongly associated with initiation and duration of homelessness. [21, 22, 23]

While there is research available regarding MSM in Atlanta, and there is basic information about the homeless population in the city, there have been no reports regarding the intersection of these populations. In addition, there are very few reports of incidence of homelessness among sexual minorities in the United States. Public health professionals and policy makers require a more comprehensive picture of homelessness among MSM to plan programs and design health interventions for this at-risk population. Consequently, there is a public health need to better understand prevalence and incidence of homelessness among MSM in Atlanta. Research has shown that there are disparities in sex, race, and sexual orientation among homeless populations in the U.S., and these factors suggest that the risk of homelessness for African American MSM may be elevated as compared to the general population. Herein we report on the prevalence and incidence of homelessness, overall and by race and age group, among men who have sex with men in Atlanta.

Methods

Study Description

This study was conducted using data from the InvolveMENt study, a recently completed, prospective cohort study.[24, 25, 26] The Emory University-led study was comprised of a computer-based questionnaire and HIV/STI testing of black and white metro Atlanta MSM, and has current Emory University IRB approval. Venue sampling and convenience sampling through Facebook were used to recruit black and white MSM for the study. A variety of venues throughout Atlanta where MSM congregate were randomly chosen, and at the venues study staff systematically

approached men to administer screening questions. Facebook sampling was achieved through paid advertisements directed towards men who were possibly eligible for the study.

Recruitment took place between June 2010 and December 2012 during 605 sampling events at 94 individual venues. Eligibility requirements included being male at birth, being capable of completing the study instruments in English, self-reported white or black race, currently living in the metropolitan Atlanta area, having at least one male sex partner in the last three months, being 18 years of age or older, and providing at least two means of contact. Exclusion criteria included reporting Hispanic or Latino ethnicity, having plans to move out of Atlanta within the next two years, being in a mutually monogamous relationship with a man, or currently participating in any HIV prevention research study.

Participants completed a computer assisted self-interview questionnaire at the baseline visit that included questions pertaining to demographics, psychosocial scales, community characteristics, individual-level HIV-related behaviors, and a dyadic inventory of the five most recent sex partners. Participants were also screened for HIV antibodies at each visit. At the baseline visit, participants were tested for syphilis, chlamydia, and gonorrhea. In addition, all participants were screened for biological markers of marijuana, cocaine, morphine, amphetamines, and methamphetamines at baseline. All participants who were confirmed to be HIV-negative at the baseline visit were then followed prospectively for two years to observe HIV and STI incidence. Those eligible returned for visits at 3, 6, 12, 18, and 24 months after the baseline visit, and the follow-up visits were conducted essentially the same as the baseline visit. Study participation ended after the 24-month visit or after HIV seroconversion.

Measures

This study was conducted using variables of interest from both the baseline and prospective datasets from the InvolveMENt study. The dependent variable, homelessness, was assessed at

the baseline visit as well as at each follow-up visit using two questions. The definition of homelessness used for this study was included in the first question; "In the past 12 months, have you been homeless at any time? By homeless, I mean you were living on the street, in a shelter, a Single Room Occupancy hotel (SRO), temporarily staying with friends or relatives, or living in a car?". If this question was answered affirmatively, the second question, "Are you currently homeless", was then asked. For the purposes of this study, historical prevalence is defined as homelessness within the 12 months prior to the baseline visit, while current prevalence was reported by participants at the baseline visit.

An event of homelessness was considered incident the first time a participant reported homelessness at a follow-up visit in addition to reporting no homelessness at the preceding visit. While several participants with incident homelessness reported multiple, separate events of homelessness throughout the follow-up time, for the purposes of this study participants were allowed only one event. Homelessness events were considered separate if the participant reported homelessness, and at a subsequent visit reported no longer being homeless, then later reported homelessness again.

Participants who reported incident homelessness at a follow-up visit were considered to have become homeless at the midpoint between that visit and the previous visit. Person-time for participants with an incident event was started at the date of enrollment into the study and ended at the incidence event. Person-time for participants who never reported homelessness was the difference between the date of the final study visit and the date of enrollment. For those who reported prevalent homelessness at baseline, contributed person-time was started after the first follow-up visit at which the participant reported no homelessness. If homelessness data was missing or reported as a "don't know" at a visit, the participant was censored at the midpoint between that visit and the prior visit.

The following independent variables were all assessed at the baseline visit: race, age group, prior arrests, childhood abuse, clinically significant depressive symptoms, problem drinking, and self-reported illicit drug use. For the present analysis we did not include any independent variables from the follow-up visits. Age at baseline was categorized into two groups, 18-24 years of age, and 25 years of age and older. Prior arrests were defined as any arrest, drug arrests included, in the 12 months preceding the baseline visit. Childhood abuse included any prior physical and sexual abuse, and was reported at baseline. Clinically significant depressive symptoms were defined using a shortened version of the Center for Epidemiologic Studies Depression Scale (CESD-10).[27, 28] The CESD-10 was scored on a four-point Likert scale, and a higher score indicates higher agreement with depressive symptoms. The 10 items were summed to determine a score from 0 to 30, and a total score of 10 or greater is indicative of clinically significant depressive symptoms. The CAGE questionnaire, a 4-question validated screening tool, was used as an indicator for a probable alcohol problem.[28, 29] Participants were asked to consider how they felt and behaved over their whole life when answering the questionnaire, and a total score of 2 or more indicated a likely problem with alcohol. Illicit drug use was assessed by self-reported non-injection and injection drug use in the previous 12 months, and included any use of non-prescribed crystal meth, crack cocaine, cocaine, downers, painkillers, hallucinogens, ecstasy, special k, GHB, heroin, marijuana, and poppers.

Analyses

The baseline dataset, comprised of both HIV-positive and negative MSM, was analyzed to briefly describe prevalent homelessness by HIV status among black and white MSM in Atlanta. For the descriptive analyses of the prospective dataset, which includes HIV-negative participants only, chi-square or Fisher's exact test were used to compare characteristics of black and white MSM that are commonly associated with homelessness.

Bivariate incidence-density rates, rate ratios, and exact 95% confidence intervals were computed for each independent variable to determine which were preliminarily associated with incidence homelessness among this population. Cox proportional hazards modeling was then used to determine which factors were predictors of incidence of homelessness among MSM in Atlanta. The adjusted hazard ratio for incident homelessness was estimated first, and a backwards-selection approach was used to arrive at the final model. Significant predictive factors, at a p-value of <0.05, were retained in the final model. For all models, adjusted hazard ratios and 95% CI were estimated. The Kaplan-Meier analysis method was employed to examine cumulative incidence of homelessness overall, and to further evaluate the independent variables that were determined to be significant predictors of incident homelessness among this population. Kaplan-Meier failure curves of overall homelessness incidence, stratified by race, by age at the baseline visit, by presence of depressive symptoms, and by race and age were produced. Differences in failure curves were evaluated by the log-rank test. Analysis for this study was performed using SAS 9.4.

Results

Of 19,931 men who were approached during recruitment for the InvolveMENt study, 8,983 were screened, and 2,144 were eligible. A total of 6,092 men clicked on the Facebook advertisement, 1,360 were screened, and 184 were eligible. Of the 1,010 black MSM and 713 white MSM who were offered participation in the study, 454 black MSM and 349 white MSM came to the baseline visit and consented to be enrolled in the study. Participants were followed for up to 24 months, and follow-up ended in March 2014. The final baseline dataset includes 803 men, while the prospective dataset is limited to 556 HIV-negative men.

Prevalent Homelessness

Of the 803 HIV-negative and positive black and white MSM who were enrolled in the baseline study, 93 (11.6%) reported any prevalent homelessness [Table 1]. Black MSM were significantly more likely than white MSM to report historical prevalent homelessness. Of the 803 enrolled MSM, 556 (69%) were HIV-negative, and 50 (9%) of those MSM reported any prevalence of homelessness at the baseline visit [Table 1]. Among the HIV-negative cohort that was followed prospectively, black MSM were again significantly more likely to report historical prevalent homelessness. Of the 247 HIV-positive MSM at baseline, 43 (17.4%) reported any prevalent homelessness, and there were no significant differences by race among that group. However, the percentage of prevalent homelessness among the 247 HIV-positive MSM (17.4%) was much higher than among the 556 HIV-negative MSM (9%) [Table 1].

Incident Homelessness

Of the 556 MSM (255 black, 301 white) in the prospective cohort, black MSM were, on average, younger. Among black MSM, 49.8% were 18-24 years of age at baseline, as compared to 33.2% of white MSM [Table 2]. There was a total of 710 person-years (PY) of follow-up time: 294.5 PY were contributed by black MSM, and 415.6 PY were contributed by white MSM [Table 3]. Of the follow-up time by age, 259.1 PY were contributed by MSM 18-24 years old at baseline, and 450.9 PY were contributed by MSM 25 years and older [Table 3].

There were 42 (IR: 5.9/100PY) reports of incident homelessness observed, with 27 (64.3%) reports among black MSM (IR: 9.2/100PY), and 15 (35.7%) reports among white MSM (IR: 3.6/100PY), yielding an incidence rate ratio of 2.5 (95% CI: 1.4, 4.9) [Table 3]. Of the 42 participants that reported incident homelessness, 10 (24%) had multiple homeless events: 2 (20%) among white MSM and 8 (80%) among black MSM. When considering age and race together, black MSM 18-24 years old had the highest incidence rate of homelessness (IR: 10.8, 95% CI: 6.0, 17.8). Compared to white MSM 25 years and older, black MSM 18-24 years old were

more than six times as likely to have become homeless (RR: 6.4, 95% CI: 2.4, 19.6). Incident

homelessness was also associated with childhood abuse (RR: 2.0, 95% CI: 1.1, 3.7) and

symptoms of depression (RR: 2.9, 95% CI: 1.6, 5.4) [Table 3]. Illicit drug use, problem drinking,

and prior arrest were not found to be associated with homelessness incidence.

The final adjusted Cox proportional-hazards model included race, age, and depressive

symptoms as significant predictors of incident homelessness [Table 4]. Compared to white

MSM, black MSM were twice as likely to have become homeless (hazard ratio [HR]: 2.1, 95% CI:

1.1, 4.1). MSM 18-24 years old were more than twice as likely to report incident homelessness

than MSM 25 years and older (HR: 2.4, 95% CI: 1.3, 4.5). Participants with depressive symptoms

were nearly three times as likely to have become homeless compared to those without

depressive symptoms (HR: 2.9, 95% CI: 1.6, 5.4). The interaction between race and age was also

examined, but was not included in the final model as it was not found to be a significant

predictive factor.

Stratified Kaplan-Meier failure estimate figures were then produced for the variables

that were found to be significant predictors of incident homelessness from the proportional-

hazards analysis. Proportion of homelessness from the figures was significantly different by race,

by age group, by presence of depressive symptoms, and by race and age [Figures 1-5]. While the

interaction of race and age was not found to be significant in the Cox proportional-hazards

models, it was included in the Kaplan-Meier analysis due to the strong effect of the interaction

that was observed in the bivariate analysis.

Discussion

There is little known about homelessness among MSM in the United States, but it has been well

documented that certain populations are disproportionately represented among the homeless

throughout the country. This study confirmed the racial disparities seen within homeless populations in the U.S., and it also provided information on the characteristics and most commonly reported contributing factors of homelessness among MSM in Atlanta.

Among both the baseline and prospective cohorts, black MSM were more likely to report any prevalent homelessness than white MSM. Prevalence of homelessness was found to be higher among HIV positive participants (17.4%) than among HIV negative participants (9%). The incidence of homelessness among MSM in Atlanta was 5.9/100PY, which suggests that approximately 6% of MSM in Atlanta become newly homeless each year. In addition, significant racial disparities in homelessness incidence were observed, with 9.2% incidence among black MSM, in comparison to 3.6% for white MSM.

While available research regarding homelessness among MSM populations in the U.S. is sparse, the findings of this study are mostly consistent with estimates from the available research on young LGBTQ populations and homelessness more broadly. The Krause et al. study from New York reported similar historical prevalence estimates to those in this study (18.2% and 11.4%, respectively), while the Corliss et al. study from Massachusetts reported higher estimates of current homelessness prevalence among gay/lesbian participants than in this study (25% and 2.4%, respectively).[16, 18] Multiple studies, on both a national and regional scale, found young sexual minorities to be a group that is overrepresented within the homeless population, with approximately 6% to 40% of homeless youth identifying as LGBTQ.[9, 10, 12, 13, 16, 17, 18] Findings from this study are consistent with those estimates, with 9% to 17.4% of the baseline cohort reporting any prevalent homelessness, depending on HIV status. The observed racial differences among MSM who reported homelessness in this study are also consistent with previous studies. A cross-sectional study found that African Americans comprised approximately 47% of the total

U.S. homeless population in 2007, which is a similar, but less extreme disparity, than we observed in this study, with black MSM reporting 64.3% of incident homelessness.[3, 4]

While the prevalence estimates from this study are consistent with the findings from many previous reports, we were able to make a rather unique contribution to the existing body of research with this study. Due to a variety of factors, the vast majority of previous studies related to LGBTQ homelessness have reported only prevalence measures, while this study was able to provide both prevalence and incidence estimates. Incidence measures of homelessness in general are useful indicators of risk, but this study was able to provide incidence estimates of homelessness among a population that is already at risk for many other health concerns. This incidence data allowed us to include an element of temporality, and to examine potential predictive factors of incident homelessness rather than solely reporting correlation. In addition, this study provides a foundation for further research on homelessness among MSM. This report demonstrates that incidence research on homelessness in this population is feasible, and shows that more specifically designed future studies could examine this issue in greater depth.

The unadjusted incidence results of this study indicate that among this population of MSM in Atlanta, race, age, depressive symptoms, and childhood abuse are associated with incidence of homelessness. When considering the adjusted model, race, age, and symptoms of depression were significant predictors of homelessness incidence. While prior arrest, illicit drug use, and problem drinking are known correlates of homelessness, they were not found to be significantly associated with incident homelessness among this study population.

This study was subject to some limitations. The censoring of HIV seroconverted men from further follow-up as part of the InvolveMENt study design may result in an underestimate of incidence of homelessness in this study. This is also a possibility as prevalence of HIV is higher among homeless populations in the U.S., and we found that prevalence of homelessness at

baseline was higher among those with HIV infection in this study as well.[6, 7] Additionally, the

substance use variables were likely impacted by misclassification, as an analysis of the self-

reported baseline measures indicated systematic underreporting of substance use by black

participants.[25] Despite using systematic sampling methods, the cohort study was not

representative of all black and white MSM in Atlanta. This study conservatively allowed only one

event of incident homelessness per participant during the analysis, but 24% of participants

reported multiple incident events. A more complex analysis, allowing participants to contribute

multiple events or to be censored for missed visits and later continue contributing person-time,

is recommended for subsequent studies. As this was a preliminary study, only factors that were

previously reported as correlates of homelessness were included, and further research should

explore other factors among this population of MSM in Atlanta. Moreover, this study used

baseline characteristics as these measures were consistent across participants, and subsequent

analyses should consider including time varying factors.

As demonstrated in this study, MSM in Atlanta may be at higher risk for homelessness

than is the general population. Incidence of homelessness among this study population was

5.9/100PY, and there were clear racial and age disparities in homelessness incidence observed

among MSM in Atlanta. In addition, symptoms of depression, race, and age were found to be

significant predictors of incident homelessness. This information, which is elucidating the

intersection of two at-risk populations, could aid public health professionals and policy makers

in planning programs and health interventions tailored towards this specific population.

The homeless populations in the United States are at higher risk for many health

problems, including HIV, and they frequently lack adequate access to health care.[6, 8, 30]

Furthermore, MSM nationally and in Atlanta have been shown to be at elevated risk for certain

health problems, and are also disproportionately affected by HIV. [7, 24, 31] In this study population

of MSM in Atlanta, prevalent homelessness was higher among those living with HIV infection, indicating a need for programs and services targeted towards ensuring housing stability for those with HIV. In addition, younger age and symptoms of depression were both predictors of incident homelessness among this population. These factors indicate that younger MSM may have a lack of support and resources, which places them at higher risk of housing instability, and that those with depression may be more likely to engage in behaviors and risks that increase their likelihood of becoming homeless. Additional programs and preventative services should be created with a focus on at-risk youth, and on those with mental health disorders.

African Americans nationally are at higher risk of homelessness, and racial disparities in prevalence and incidence of homelessness were observed in this study population as well.[3, 4] While there are many factors that may be associated with racial disparities in homelessness, the findings from this study confirm the need for programs and services focused specifically on African Americans as a population at risk for homelessness in Atlanta. Furthermore, sexual minority populations in the U.S. have been reported to be at higher risk of homelessness than their heterosexual counterparts, and the prevalence and incidence estimates of homelessness among MSM in this study are consistent with those findings.[9, 10, 12, 13, 16, 17, 18] Support for sexual minority populations, including MSM in Atlanta, would be greatly beneficial to help prevent adverse public health outcomes, such as homelessness, among these at-risk populations.

Table 1. Prevalent homelessness by baseline HIV status and race, among black and white non-Hispanic MSM followed in an incidence cohort, Atlanta 2010-2014

Prevalent Homelessness, all MSM, at baseline	Overall (N=803) % (N)	Black (n=454) % (n)	White (n=349) % (n)	*p-value*
All prevalence	11.6 (93/803)	15.2 (69/454)	6.9 (24/349)	0.0003
Historical prevalence, previous 12 months	11.4 (91/798)	14.9 (67/451)	6.9 (24/347)	0.0005
Current prevalence, at baseline visit	2.4 (19/796)	3.8 (17/449)	0.6 (2/347)	0.003 [a]
Prevalent Homelessness, HIV- MSM, at baseline	**Overall (N=556) % (N)**	**Black (n=255) % (n)**	**White (n=301) % (n)**	***p-value***
All prevalence	9.0 (50/556)	14.1 (36/255)	4.7 (14/301)	0.0001
Historical prevalence, previous 12 months	8.8 (49/554)	13.7 (35/255)	4.7 (14/299)	0.0002
Current prevalence, at baseline visit	1.3 (7/550)	2.0 (5/251)	0.7 (2/299)	0.25 [a]
Prevalent Homelessness, HIV+ MSM, at baseline	**Overall (N=247) % (N)**	**Black (n=199) % (n)**	**White (n=48) % (n)**	***p-value***
All prevalence	17.4 (43/247)	16.6 (33/199)	20.8 (10/48)	0.49
Historical prevalence, previous 12 months	17.2 (42/244)	16.3 (32/196)	20.8 (10/48)	0.46
Current prevalence, at baseline visit	4.9 (12/246)	6.1 (12/198)	0.0 (0/48)	0.07[a]

[a] From Fisher's exact test

Table 2. Baseline characteristics of 556 black and white non-Hispanic MSM followed in an incidence cohort, Atlanta, 2010-2014

	Overall (N=556) % (N)	Black (n=255) % (n)	White (n=301) % (n)	p-value [a]
Age, *years* [b]	n=556	n=255	n=301	< .0001
18-24	40.8 (227)	49.8 (127)	33.2 (100)	
≥25	59.1 (329)	50.2 (128)	66.8 (201)	
Illicit Drug Use, *previous 12 months* [c]	40.1 (223)	27.1 (69)	51.1 (154)	< .0001
Problem Drinking, *ever* [d]	14.5 (75/517)	9.1 (21/231)	18.9 (54/286)	0.002
Childhood abuse, *ever* [e]	38.9 (216)	43.5 (111)	34.9 (105)	0.04
Arrested, *previous 12 months* [f]	12.2 (68)	14.1 (36)	10.6 (32)	0.21
Depressive Symptoms, *past week* [g]	26.4 (141/535)	26.2 (64/244)	26.5 (77/291)	0.95

[a] From chi-square test for categorical variables and t-tests for continuous variables
[b] Age at baseline
[c] Illicit drug use included self-reported non-injection and injection drug use in the previous 12 months, and included any use of non-prescribed crystal meth, crack cocaine, cocaine, downers, painkillers, hallucinogens, ecstasy, special k, GHB, heroin, marijuana, and poppers
[d] Problem drinking was assessed using the CAGE questionnaire, reported at baseline, and considered lifetime feelings and behaviors
[e] Childhood abuse includes physical and sexual abuse, self-reported
[f] Any arrests, drug arrests included, in previous 12 months
[g] Clinically significant depressive symptoms were reported at baseline, based on feelings and behaviors of the past week, and assessed using the CESD-10 scale

Table 3. Predictors of incident homelessness in 556 black and white non-Hispanic MSM followed in an incidence cohort, Atlanta, 2010-2014

Characteristic	Reported homelessness N (%)	Person-years (PY)	Incidence rate per 100 PY (95% CI)	Unadjusted incidence rate ratio (95% CI)
Overall	42	710	5.9 (4.3, 7.9)	-- --
Race				
Black	27 (64.3)	294.5	9.2 (6.0, 13.3)	2.5 (1.4, 4.9)
White	15 (35.7)	415.6	3.6 (2.0, 6.0)	ref.
Age, years, *baseline*				
18-24	25 (59.5)	259.1	9.6 (6.2, 14.2)	2.6 (1.4, 4.8)
≥25	17 (40.5)	450.9	3.8 (2.2, 6.0)	ref.
Race and age				
Black, 18-24	15 (35.7)	139.0	10.8 (6.0, 17.8)	6.4 (2.4, 19.6)
Black, 25+	12 (28.6)	155.5	7.7 (4.0, 13.5)	4.6 (1.6, 14.4)
White, 18-24	10 (23.8)	120.2	8.3 (4.0, 15.3)	4.9 (1.7, 15.9)
White, 25+	5 (11.9)	295.4	1.7 (0.5, 4.0)	ref.
Arrested, past 12 months, *baseline* [a]				
Yes	6 (14.3)	64.8	9.3 (3.4, 20.2)	1.7 (0.6, 3.8)
No	36 (85.7)	645.2	5.6 (3.9, 7.7)	ref.
Illicit drug use, past 12 months, *baseline* [b]				
Yes	21 (50.0)	283	7.4 (4.6, 11.3)	1.5 (0.8, 2.8)
No	21 (50.0)	427	4.9 (3.0, 7.5)	ref.
Problem drinking, ever, *baseline* [c, d]				
Yes	7 (18.4)	77.5	9.0 (3.6, 18.6)	1.7 (0.7, 3.7)
No	31 (81.6)	581.2	5.3 (3.6, 7.6)	ref.
Depressive symptoms, past week, *baseline* [e, f]				
Yes	20 (48.8)	170.3	11.7 (7.2, 18.1)	2.9 (1.6, 5.4)

No	21 (51.2)	516.3	4.1 (2.5, 6.2)	*ref.*
Childhood abuse, ever, *baseline* [g]				
Yes	21 (50.0)	271.9	9.6 (6.0, 14.7)	2.0 (1.1, 3.7)
No	21 (50.0)	438.1	4.8 (3.0, 7.3)	*ref.*

[a] Any arrests, drug arrests included, in previous 12 months

[b] Illicit drug use included self-reported non-injection and injection drug use in the previous 12 months, and included any use of non-prescribed crystal meth, crack cocaine, cocaine, downers, painkillers, hallucinogens, ecstasy, special k, GHB, heroin, marijuana, and poppers

[c] Problem drinking was assessed using the CAGE questionnaire, reported at baseline, and considered lifetime feelings and behaviors

[d] Problem drinking status missing for 4 participants with incident homelessness

[e] Clinically significant depressive symptoms were reported at baseline, based on feelings and behaviors of the past week, and assessed using the CESD-10 scale

[f] Depressive symptoms status missing for 1 participant with incident homelessness

[g] Childhood abuse includes physical and sexual abuse, self-reported

Table 4. Adjusted hazard ratios for homelessness from multivariable models, in an incidence cohort of 556 black and white non-Hispanic MSM, Atlanta, 2010-2014

Variables	Hazard Ratio	95% CI	p-value
Race, black vs. white	2.1	1.1 - 4.1	0.02
Age, 18-24 vs. 25+	2.4	1.3 - 4.5	0.008
Depressive symptoms	2.9	1.6 - 5.4	0.0007

Figure 1 Kaplan Meier plot illustrating incident homelessness in 556 black and white non-Hispanic MSM followed in an incidence cohort, Atlanta, 2010-2014
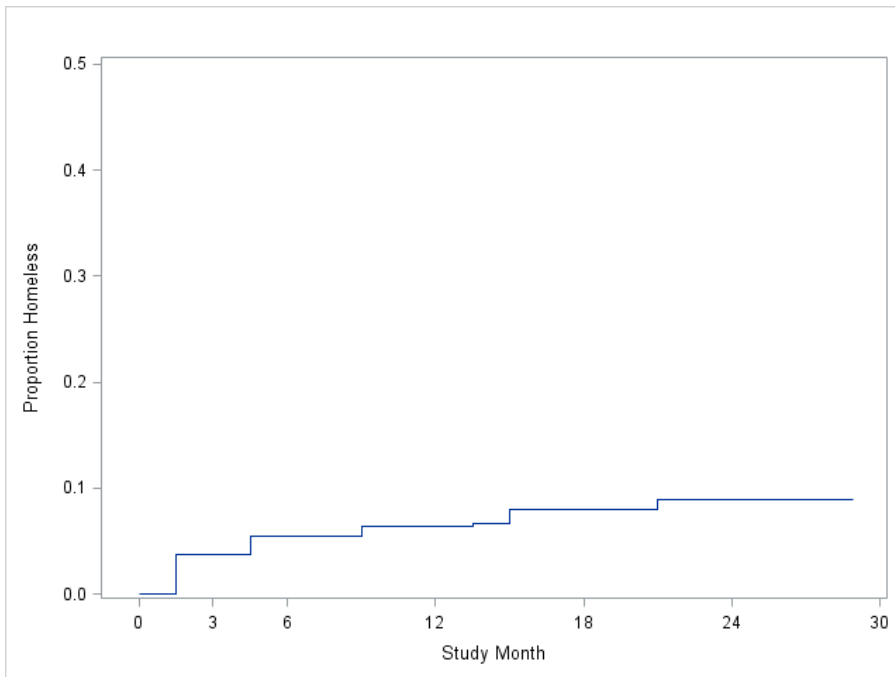
Figure 2 Kaplan Meier plot illustrating incident homelessness, by race, in 556 black and white non-Hispanic MSM followed in an incidence cohort, Atlanta, 2010-2014
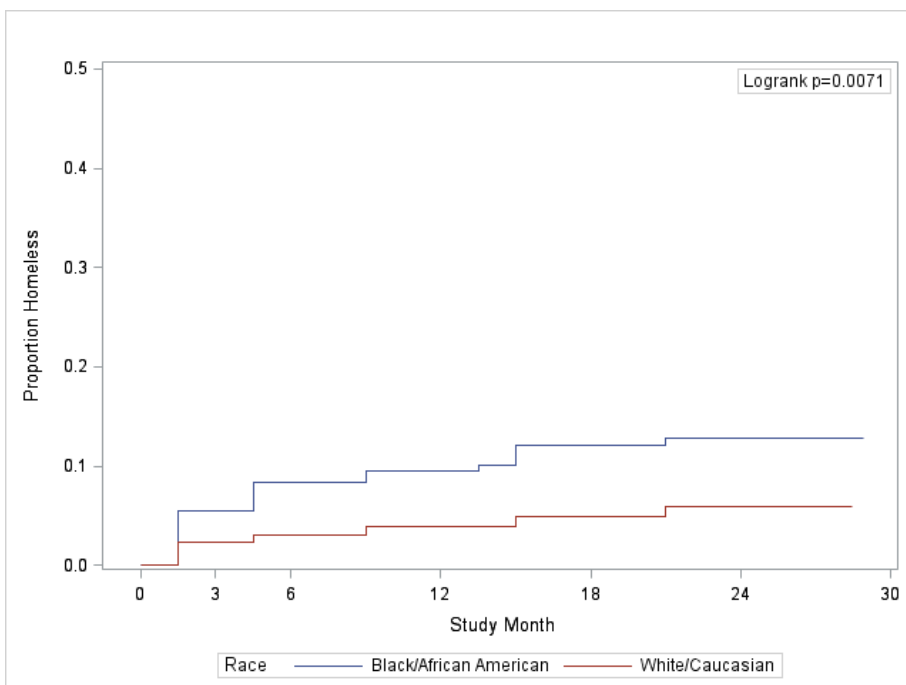
Figure 3 Kaplan Meier plot illustrating incident homelessness, by age, in 556 black and white non-Hispanic MSM followed in an incidence cohort, Atlanta, 2010-2014
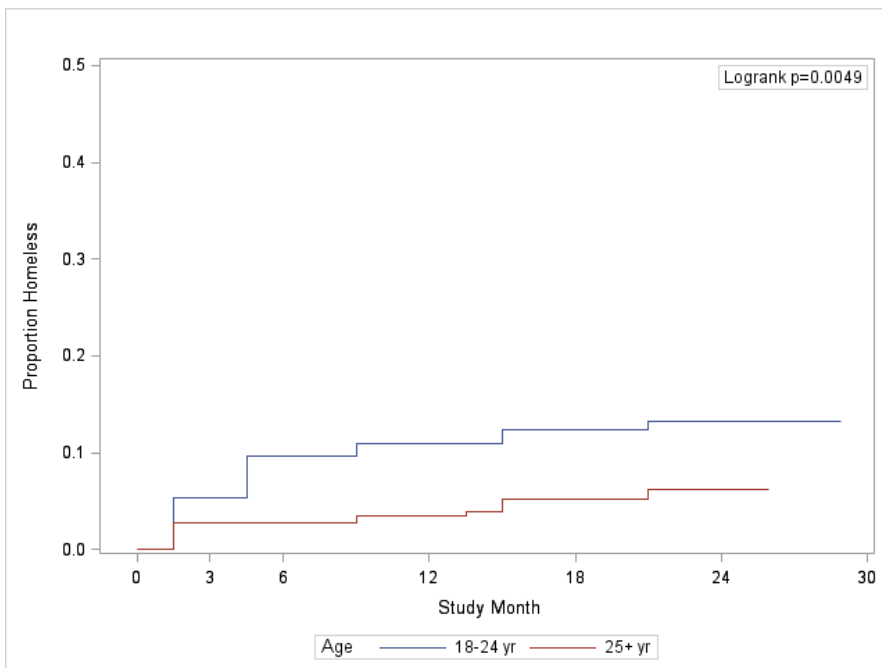
Figure 4 Kaplan Meier plot illustrating incident homelessness, by depressive symptoms, in 556 black and white non-Hispanic MSM followed in an incidence cohort, Atlanta, 2010-2014
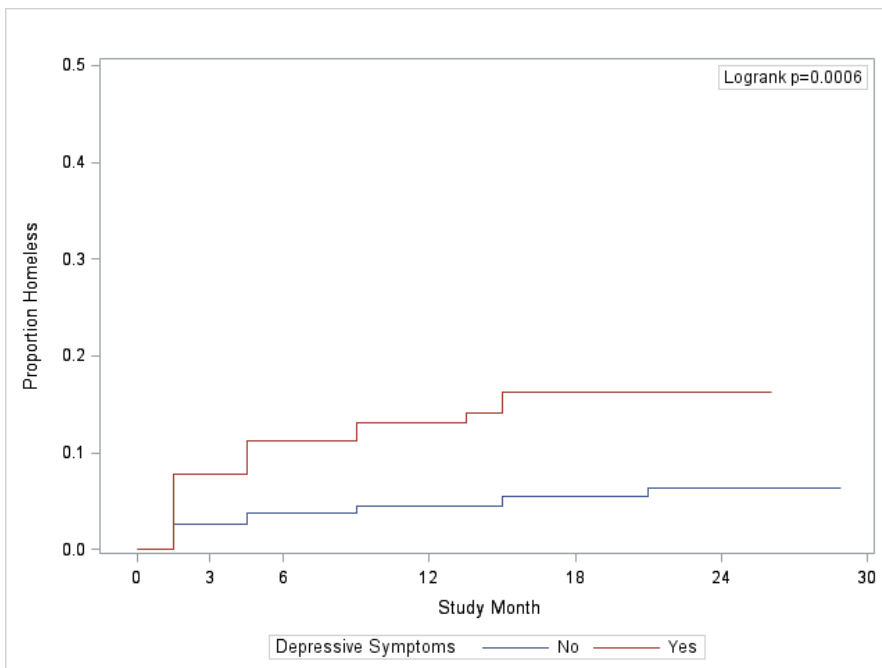
Figure 5 Kaplan Meier plot illustrating incident homelessness, by race and age, in 556 black and white non-Hispanic MSM followed in an incidence cohort, Atlanta, 2010-2014
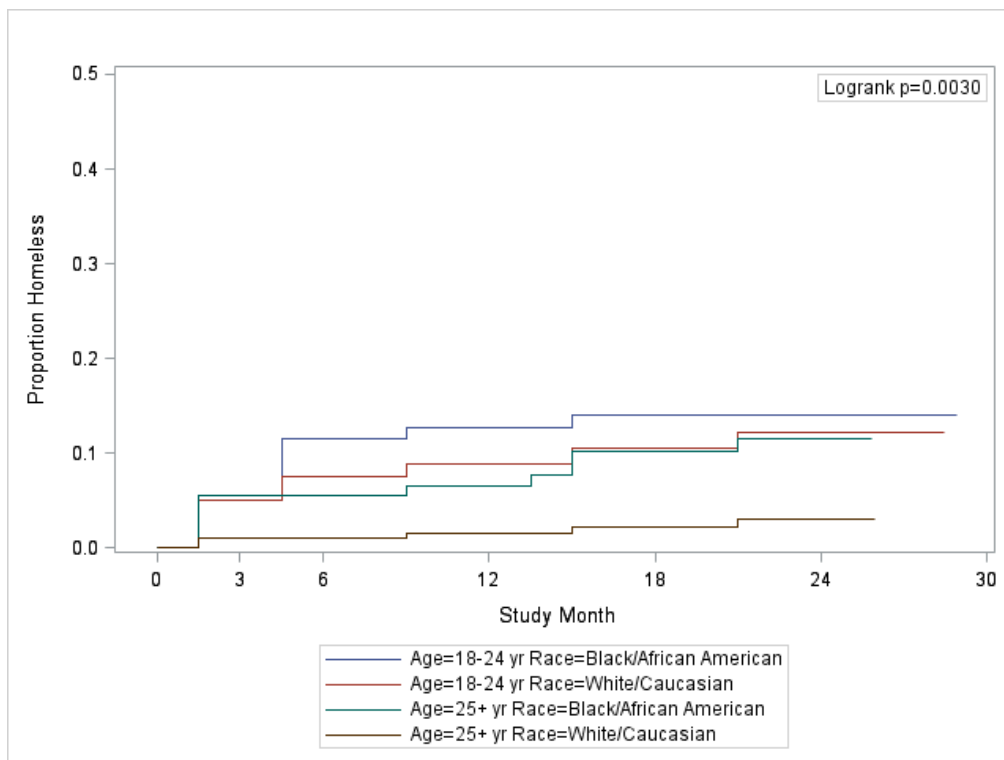
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Appendix A: SAS Code

```
************************************************************;
* Program: T:\epiprojs\Sullivan_data_ident\            *;
*              C_Taylor_Inv\cat\thesis_data.sas7bdat *;
*                                                      *;
* Date: 11/20/15                                       *;
* Programmer: Calli Taylor                             *;
*                                                      *;
* Purpose: This program uses the InvolveMENt           *;
* datasets for thesis work.                            *;
************************************************************;

*** Run thesis_formats FIRST;

libname thesis 'T:\epiprojs\Sullivan_data_ident\C_Taylor_Inv';

******
* Create temporary datasets from long stacked set to limit # of vars
      and prepare sets for merging;
      * Also format and recode covariates;
******;

      data stacked;
            set thesis.participants_bto24_stacked;

                  keep study_id visit homeless_p12m homeless_now
                        homeless_p6m homeless1_int homeless2_int income
                        poverty educ arrested_ever arrested_p12m_final
                        arrested_p6m drug_arrest abuse_child_physabuse
                        abuse_child_sexabuse alcoholp6m drink_p12m
                        cocaine_p12m cocaine_p6m crack_p12m crack_p6m
                        crystalmeth_p12m crystalmeth_p6m downers_p12m
                        downers_p6m ecstasy_p12m ecstasy_p6m
                        ecstacy_p6m ghb_p12m ghb_p6m hallucinogen_p12m
                        hallucinogen_p6m heroin_p12m heroin_p6m
                        inject injectp6m marijuana_p12m marijuana_p6m
                        noninject_p12m noninject_p6
                        noninject_other_p12m painkillers_p12m
                        painkillers_p6m poppers_p12m poppers_p6m
                        specialk_p12m specialk_p6m cesd_hopeful
                        cesd_happy cesd_hopefulp cesd_happyp
                        cesd_lonely cesd_getgoing cesd_fearful
                        cesd_effort cesd_depressed cesd_concentrate
                        cesd_bother cesd_badsleep drink_critic
                        drink_cut drink_morning drink_guilt;

                  format cocaine_p12m cocaine_p6m any_cocaine
                        crack_p12m crack_p6m any_crack
                        crystalmeth_p12m crystalmeth_p6m any_crystal
                        downers_p12m downers_p6m any_downers
                        ecstasy_p12m ecstasy_p6m ecstacy_p6m
                        any_ecstasy ghb_p12m ghb_p6m any_ghb
```

```
        hallucinogen_p12m hallucinogen_p6m
        any_hallucinogen heroin_p12m heroin_p6m
        any_heroin inject injectp6m any_inject
        marijuana_p12m marijuana_p6m any_marijuana
        noninject_p12m noninject_p6m any_noninject
        all_noninject_p12m painkillers_p12m
        painkillers_p6m any_painkillers
        poppers_p12m poppers_p6m any_poppers
        specialk_p12m specialk_p6m any_specialk
DRUG.;


if visit = 1 then homeless1_int = homeless_p12m;
if visit >1 then homeless2_int = homeless_p6m;

if cocaine_p12m ge 1 then cocaine_p12m = 1;
if cocaine_p6m ge 1 then cocaine_p6m = 1;

if crack_p12m ge 1 then crack_p12m = 1;
if crack_p6m ge 1 then crack_p6m = 1;

if crystalmeth_p12m ge 1 then crystalmeth_p12m = 1;
if crystalmeth_p6m ge 1 then crystalmeth_p6m = 1;

if downers_p12m ge 1 then downers_p12m = 1;
if downers_p6m ge 1 then downers_p6m = 1;

if ecstasy_p12m ge 1 then ecstasy_p12m = 1;
if ecstasy_p6m ge 1 then ecstasy_p6m = 1;
if ecstacy_p6m ge 1 then ecstacy_p6m = 1;

if ghb_p12m ge 1 then ghb_p12m = 1;
if ghb_p6m ge 1 then ghb_p6m = 1;

if hallucinogen_p12m ge 1 then hallucinogen_p12m = 1;
if hallucinogen_p6m ge 1 then hallucinogen_p6m = 1;

if heroin_p12m ge 1 then heroin_p12m = 1;
if heroin_p6m ge 1 then heroin_p6m = 1;

if inject ge 1 then inject = 1;
if injectp6m ge 1 then injectp6m = 1;

if marijuana_p12m ge 1 then marijuana_p12m = 1;
if marijuana_p6m ge 1 then marijuana_p6m = 1;

if noninject_p12m ge 1 then noninject_p12m = 1;
if noninject_p6m ge 1 then noninject_p6m = 1;

if painkillers_p12m ge 1 then painkillers_p12m = 1;
if painkillers_p6m ge 1 then painkillers_p6m = 1;

if poppers_p12m ge 1 then poppers_p12m = 1;
if poppers_p6m ge 1 then poppers_p6m = 1;

if specialk_p12m ge 1 then specialk_p12m = 1;
if specialk_p6m ge 1 then specialk_p6m = 1;
```

```
*Recode scoring of positive CES-D items - reversed scoring;

                        if cesd_hopeful = 3 then cesd_hopefulp = 0;
                        if cesd_hopeful = 2 then cesd_hopefulp = 1;
                        if cesd_hopeful = 1 then cesd_hopefulp = 2;
                        if cesd_hopeful = 0 then cesd_hopefulp = 3;

                        if cesd_happy = 3 then cesd_happyp = 0;
                        if cesd_happy = 2 then cesd_happyp = 1;
                        if cesd_happy = 1 then cesd_happyp = 2;
                        if cesd_happy = 0 then cesd_happyp = 3;
        run;


        data stacked1;
            set stacked;

                keep study_id visit homeless_p12m homeless_now
                    homeless_p6m homeless1_int homeless2_int income
                    poverty educ arrested_ever arrested_p12m_final
                    arrested_p6m drug_arrest abuse_child_physabuse
                    abuse_child_sexabuse alcoholp6m drink_p12m
                    cocaine_p12m cocaine_p6m crack_p12m crack_p6m
                    crystalmeth_p12m crystalmeth_p6m downers_p12m
                    downers_p6m ecstasy_p12m ecstasy_p6m
                    ecstacy_p6m ghb_p12m ghb_p6m hallucinogen_p12m
                    hallucinogen_p6m heroin_p12m heroin_p6m inject
                    injectp6m marijuana_p12m marijuana_p6m
                    noninject_p12m noninject_p6
                    noninject_other_p12m painkillers_p12m
                    painkillers_p6m poppers_p12m poppers_p6m
                    specialk_p12m specialk_p6m cesd_hopeful
                    cesd_happy cesd_lonely cesd_getgoing
                    cesd_fearful cesd_effort cesd_depressed
                    cesd_concentrate cesd_bother cesd_badsleep
                    drink_critic drink_cut drink_morning
                    drink_guilt;

                where homeless_now  = 1;
        run;


        data stacked2;
            set stacked;

                keep study_id visit homeless_p12m homeless_now
                    homeless_p6m homeless1_int homeless2_int income
                    poverty educ arrested_ever arrested_p12m_final
                    arrested_p6m drug_arrest abuse_child_physabuse
                    abuse_child_sexabuse alcoholp6m drink_p12m
                    cocaine_p12m cocaine_p6m crack_p12m crack_p6m
                    crystalmeth_p12m crystalmeth_p6m downers_p12m
                    downers_p6m ecstasy_p12m ecstasy_p6m
                    ecstacy_p6m ghb_p12m ghb_p6m hallucinogen_p12m
                    hallucinogen_p6m heroin_p12m heroin_p6m inject
                    injectp6m marijuana_p12m marijuana_p6m
```

```
                            noninject_p12m noninject_p6
                            noninject_other_p12m painkillers_p12m
                            painkillers_p6m poppers_p12m poppers_p6m
                            specialk_p12m specialk_p6m cesd_hopeful
                            cesd_happy cesd_lonely cesd_getgoing
                            cesd_fearful cesd_effort cesd_depressed
                            cesd_concentrate cesd_bother cesd_badsleep
                            drink_critic drink_cut drink_morning
                            drink_guilt;

                    where homeless1_int = 1;

        run;


        data stacked3;
            set stacked;

                    keep study_id visit homeless_p12m homeless_now
                            homeless_p6m homeless1_int homeless2_int income
                            poverty educ arrested_ever arrested_p12m_final
                            arrested_p6m drug_arrest abuse_child_physabuse
                            abuse_child_sexabuse alcoholp6m drink_p12m
                            cocaine_p12m cocaine_p6m crack_p12m crack_p6m
                            crystalmeth_p12m crystalmeth_p6m downers_p12m
                            downers_p6m ecstasy_p12m ecstasy_p6m
                            ecstacy_p6m ghb_p12m ghb_p6m hallucinogen_p12m
                            hallucinogen_p6m heroin_p12m heroin_p6m inject
                            injectp6m marijuana_p12m marijuana_p6m
                            noninject_p12m noninject_p6
                            noninject_other_p12m painkillers_p12m
                            painkillers_p6m poppers_p12m poppers_p6m
                            specialk_p12m specialk_p6m cesd_hopeful
                            cesd_happy cesd_lonely cesd_getgoing
                            cesd_fearful cesd_effort cesd_depressed
                            cesd_concentrate cesd_bother cesd_badsleep
                            drink_critic drink_cut drink_morning
                            drink_guilt;

                    where homeless2_int = 1;

        run;


******
* To create vars that indicate visit of first reported homelessness;
        /** http://www.ats.ucla.edu/stat/sas/faq/enumerate.htm **/
******;

        proc sort data = stacked1;
            by study_id visit;
        run;

        data s1;
            set stacked1;
                by study_id visit;
                    if first.study_id then output;
```

```
        run;

        data s2;
             set s1 (rename = (visit = first_event));
                  keep study_id first_event;
        run;

/*
proc print data = s2;
run;
*/

*** p12m event;

        proc sort data = stacked2;
             by study_id visit;
        run;

        data s3;
             set stacked2;
                  by study_id visit;
                       if first.study_id then output;
        run;

        data s4;
             set s3 (rename = (visit = first_1home));
                  keep study_id first_1home;
        run;

/*
proc print data = s4;
run;
*/

*** p6m event;

        proc sort data = stacked3;
             by study_id visit;
        run;

        data s5;
             set stacked3;
                  by study_id visit;
                       if first.study_id then output;
        run;

        data s6;
             set s5 (rename = (visit = first_2home));
                  keep study_id first_2home;
        run;

/*
proc print data = s6;
run;
*/

******
```

```sas
* To merge the sets that indicate visit before homelessness;
******;

    proc sort data = s2;
        by study_id;
    run;

    proc sort data = s4;
        by study_id;
    run;

    proc sort data = s6;
        by study_id;
    run;

    data stacked_new;
        merge s2 s4 s6;
        by study_id;

    run;



******
* Create a new var that indicates the first visit with reported
homelessness
    Then make a var that indicates the visit prior to the first;
        * Also make var that indicates whether a guy is incident
homeless;
        * Then merge them into one set to later be merged into
master set;
******;

    proc sort data = stacked_new;
        by first_1home first_2home first_event;
    run;

    data s_first;
        set stacked_new;
            if first_1home = 1 then first_visit = 1;
            else if first_event = 1 then first_visit = 1;
            else if first_2home le first_event
            then first_visit = first_2home;
            else if first_1home = . and first_event = .
            then first_visit = first_2home;


            if first_1home = 1 and first_event = . and
            first_2home = . then incident = 0;
            else if first_1home = 1 and first_event = 1 and
            first_2home = . then incident = 0;
            else if first_1home = . and first_event = 1 and
            first_2home = . then incident = 0;
            else if first_1home = 1 and first_event = 1 and
            first_2home = 2 and study_id ne 0202941
            then incident = 0;
            else incident = 1;
```

```
        run;

        data s_prior;
              set s_first;
                    visit_prior = first_visit-1;
        run;

        proc sort data = s_first;
              by study_id;
        run;

        proc sort data = s_prior;
              by study_id;
        run;

        data s;
              merge s_first s_prior;
              by study_id;
        run;



******
* Create a temporary dataset stat identical to permanent dataset status
      keeping only vars of interest;
******;

        data stat;
              set thesis.status;
                    keep study_id race_inc age_baseline
                          dt_enroll last_visit_date part_dob
                          daysenrolled daysenrolledstop daysenrolledvisit
                          met_behav_crit prospective_pt baseline_hiv
                          double_enroll last_visit;
        run;



******
* To get the right n from the stat set;
******;

* Baseline positives included (n=803);

        data stat_base;
              set stat;
                    where double_enroll^=1 and met_behav_crit=1;
        run;

* Prospective negative guys only (n=556);

        data stat_pro_neg;
              set stat;
                    where double_enroll^=1 and met_behav_crit=1 and
                    prospective_pt=1 and baseline_hiv=1;
        run;
```

```
******
* Process to make wide dataset -
      create datasets with one row per participant based on id, by
visit,
      then change var names and merge all back together;
******;

      data baseline_survey ;
                set stacked (rename = (homeless_now = homeless_1now
                      homeless_p12m = homeless_1
                      income = income1
                      poverty = poverty1
                      educ = educ1
                      arrested_ever = arrested_ever1
                      arrested_p6m = arrested_p6m1
                      arrested_p12m_final = arrested_p12m_final1
                      drug_arrest = drug_arrest1
                      abuse_child_physabuse = abuse_child_physabuse1
                      abuse_child_sexabuse = abuse_child_sexabuse1
                      alcoholp6m = alcoholp6m1
                      drink_p12m = drink_p12m1
                      cocaine_p12m = cocaine_p12m1
                      cocaine_p6m = cocaine_p6m1
                      crack_p12m = crack_p12m1
                      crack_p6m = crack_p6m1
                      crystalmeth_p12m = crystalmeth_p12m1
                      crystalmeth_p6m = crystalmeth_p6m1
                      downers_p12m = downers_p12m1
                      downers_p6m = downers_p6m1
                      ecstasy_p12m = ecstasy_p12m1
                      ecstasy_p6m = ecstasy_p6m1
                      ecstacy_p6m = ecstacy_p6m1
                      ghb_p12m = ghb_p12m1
                      ghb_p6m = ghb_p6m1
                      hallucinogen_p12m = hallucinogen_p12m1
                      hallucinogen_p6m = hallucinogen_p6m1
                      heroin_p12m = heroin_p12m1
                      heroin_p6m = heroin_p6m1
                      inject = inject1
                      injectp6m = injectp6m1
                      marijuana_p6m = marijuana_p6m1
                      marijuana_p12m = marijuana_p12m1
                      noninject_p12m = noninject_p12m1
                      noninject_p6m = noninject_p6m1
                      noninject_other_p12m = noninject_other_p12m1
                      painkillers_p12m = painkillers_p12m1
                      painkillers_p6m = painkillers_p6m1
                      poppers_p12m = poppers_p12m1
                      poppers_p6m = poppers_p6m1
                      specialk_p12m = specialk_p12m1
                      specialk_p6m = specialk_p6m1
                      cesd_hopefulp = cesd_hopeful1
                      cesd_happyp = cesd_happy1
                      cesd_lonely = cesd_lonely1
                      cesd_getgoing = cesd_getgoing1
                      cesd_fearful = cesd_fearful1
```

```
                    cesd_effort = cesd_effort1
                    cesd_depressed = cesd_depressed1
                    cesd_concentrate = cesd_concentrate1
                    cesd_bother = cesd_bother1
                    cesd_badsleep = cesd_badsleep1
                    drink_critic = drink_critic1
                    drink_cut = drink_cut1
                    drink_morning = drink_morning1
                    drink_guilt = drink_guilt1));

            where visit = 1;
            drop visit;
    run;


    data month3_survey ;
            set stacked (rename = (homeless_now = homeless_2now
                    homeless_p6m = homeless_2
                    income = income2
                    poverty = poverty2
                    educ = educ2
                    arrested_ever = arrested_ever2
                    arrested_p6m = arrested_p6m2
                    arrested_p12m_final = arrested_p12m_final2
                    drug_arrest = drug_arrest2
                    abuse_child_physabuse = abuse_child_physabuse2
                    abuse_child_sexabuse = abuse_child_sexabuse2
                    alcoholp6m = alcoholp6m2
                    drink_p12m = drink_p12m2
                    cocaine_p12m = cocaine_p12m2
                    cocaine_p6m = cocaine_p6m2
                    crack_p12m = crack_p12m2
                    crack_p6m = crack_p6m2
                    crystalmeth_p12m = crystalmeth_p12m2
                    crystalmeth_p6m = crystalmeth_p6m2
                    downers_p12m = downers_p12m2
                    downers_p6m = downers_p6m2
                    ecstasy_p12m = ecstasy_p12m2
                    ecstasy_p6m = ecstasy_p6m2
                    ecstacy_p6m = ecstacy_p6m2
                    ghb_p12m = ghb_p12m2
                    ghb_p6m = ghb_p6m2
                    hallucinogen_p12m = hallucinogen_p12m2
                    hallucinogen_p6m = hallucinogen_p6m2
                    heroin_p12m = heroin_p12m2
                    heroin_p6m = heroin_p6m2
                    inject = inject2
                    injectp6m = injectp6m2
                    marijuana_p6m = marijuana_p6m2
                    marijuana_p12m = marijuana_p12m2
                    noninject_p12m = noninject_p12m2
                    noninject_p6m = noninject_p6m2
                    noninject_other_p12m = noninject_other_p12m2
                    painkillers_p12m = painkillers_p12m2
                    painkillers_p6m = painkillers_p6m2
                    poppers_p12m = poppers_p12m2
                    poppers_p6m = poppers_p6m2
```

```
                              specialk_p12m = specialk_p12m2
                              specialk_p6m = specialk_p6m2
                              cesd_hopefulp = cesd_hopeful2
                              cesd_happyp = cesd_happy2
                              cesd_lonely = cesd_lonely2
                              cesd_getgoing = cesd_getgoing2
                              cesd_fearful = cesd_fearful2
                              cesd_effort = cesd_effort2
                              cesd_depressed = cesd_depressed2
                              cesd_concentrate = cesd_concentrate2
                              cesd_bother = cesd_bother2
                              cesd_badsleep = cesd_badsleep2
                              drink_critic = drink_critic2
                              drink_cut = drink_cut2
                              drink_morning = drink_morning2
                              drink_guilt = drink_guilt2));

                     where visit = 2;
                     drop visit;
          run;

          data month6_survey ;
                     set stacked (rename = (homeless_now = homeless_3now
                              homeless_p6m = homeless_3
                              income = income3
                              poverty = poverty3
                              educ = educ3
                              arrested_ever = arrested_ever3
                              arrested_p6m = arrested_p6m3
                              arrested_p12m_final = arrested_p12m_final3
                              drug_arrest = drug_arrest3
                              abuse_child_physabuse = abuse_child_physabuse3
                              abuse_child_sexabuse = abuse_child_sexabuse3
                              alcoholp6m = alcoholp6m3
                              drink_p12m = drink_p12m3
                              cocaine_p12m = cocaine_p12m3
                              cocaine_p6m = cocaine_p6m3
                              crack_p12m = crack_p12m3
                              crack_p6m = crack_p6m3
                              crystalmeth_p12m = crystalmeth_p12m3
                              crystalmeth_p6m = crystalmeth_p6m3
                              downers_p12m = downers_p12m3
                              downers_p6m = downers_p6m3
                              ecstasy_p12m = ecstasy_p12m3
                              ecstasy_p6m = ecstasy_p6m3
                              ecstacy_p6m = ecstacy_p6m3
                              ghb_p12m = ghb_p12m3
                              ghb_p6m = ghb_p6m3
                              hallucinogen_p12m = hallucinogen_p12m3
                              hallucinogen_p6m = hallucinogen_p6m3
                              heroin_p12m = heroin_p12m3
                              heroin_p6m = heroin_p6m3
                              inject = inject3
                              injectp6m = injectp6m3
                              marijuana_p6m = marijuana_p6m3
                              marijuana_p12m = marijuana_p12m3
                              noninject_p12m = noninject_p12m3
```

```
                                noninject_p6m = noninject_p6m3
                                noninject_other_p12m = noninject_other_p12m3
                                painkillers_p12m = painkillers_p12m3
                                painkillers_p6m = painkillers_p6m3
                                poppers_p12m = poppers_p12m3
                                poppers_p6m = poppers_p6m3
                                specialk_p12m = specialk_p12m3
                                specialk_p6m = specialk_p6m3
                                cesd_hopefulp = cesd_hopeful3
                                cesd_happyp = cesd_happy3
                                cesd_lonely = cesd_lonely3
                                cesd_getgoing = cesd_getgoing3
                                cesd_fearful = cesd_fearful3
                                cesd_effort = cesd_effort3
                                cesd_depressed = cesd_depressed3
                                cesd_concentrate = cesd_concentrate3
                                cesd_bother = cesd_bother3
                                cesd_badsleep = cesd_badsleep3
                                drink_critic = drink_critic3
                                drink_cut = drink_cut3
                                drink_morning = drink_morning3
                                drink_guilt = drink_guilt3));

                where visit = 3;
                drop visit;
        run;


        data month12_survey ;
                set stacked (rename = (homeless_now = homeless_4now
                        homeless_p6m = homeless_4
                        income = income4
                        poverty = poverty4
                        educ = educ4
                        arrested_ever = arrested_ever4
                        arrested_p6m = arrested_p6m4
                        arrested_p12m_final = arrested_p12m_final4
                        drug_arrest = drug_arrest4
                        abuse_child_physabuse = abuse_child_physabuse4
                        abuse_child_sexabuse = abuse_child_sexabuse4
                        alcoholp6m = alcoholp6m4
                        drink_p12m = drink_p12m4
                        cocaine_p12m = cocaine_p12m4
                        cocaine_p6m = cocaine_p6m4
                        crack_p12m = crack_p12m4
                        crack_p6m = crack_p6m4
                        crystalmeth_p12m = crystalmeth_p12m4
                        crystalmeth_p6m = crystalmeth_p6m4
                        downers_p12m = downers_p12m4
                        downers_p6m = downers_p6m4
                        ecstasy_p12m = ecstasy_p12m4
                        ecstasy_p6m = ecstasy_p6m4
                        ecstacy_p6m = ecstacy_p6m4
                        ghb_p12m = ghb_p12m4
                        ghb_p6m = ghb_p6m4
                        hallucinogen_p12m = hallucinogen_p12m4
                        hallucinogen_p6m = hallucinogen_p6m4
                        heroin_p12m = heroin_p12m4
```

```
                              heroin_p6m = heroin_p6m4
                              inject = inject4
                              injectp6m = injectp6m4
                              marijuana_p6m = marijuana_p6m4
                              marijuana_p12m = marijuana_p12m4
                              noninject_p12m = noninject_p12m4
                              noninject_p6m = noninject_p6m4
                              noninject_other_p12m = noninject_other_p12m4
                              painkillers_p12m = painkillers_p12m4
                              painkillers_p6m = painkillers_p6m4
                              poppers_p12m = poppers_p12m4
                              poppers_p6m = poppers_p6m4
                              specialk_p12m = specialk_p12m4
                              specialk_p6m = specialk_p6m4
                              cesd_hopefulp = cesd_hopeful4
                              cesd_happyp = cesd_happy4
                              cesd_lonely = cesd_lonely4
                              cesd_getgoing = cesd_getgoing4
                              cesd_fearful = cesd_fearful4
                              cesd_effort = cesd_effort4
                              cesd_depressed = cesd_depressed4
                              cesd_concentrate = cesd_concentrate4
                              cesd_bother = cesd_bother4
                              cesd_badsleep = cesd_badsleep4
                              drink_critic = drink_critic4
                              drink_cut = drink_cut4
                              drink_morning = drink_morning4
                              drink_guilt = drink_guilt4));

                   where visit = 4;
                   drop visit;
        run;

        data month18_survey ;
                   set stacked (rename = (homeless_now = homeless_5now
                              homeless_p6m = homeless_5
                              income = income5
                              poverty = poverty5
                              educ = educ5
                              arrested_ever = arrested_ever5
                              arrested_p6m = arrested_p6m5
                              arrested_p12m_final = arrested_p12m_final5
                              drug_arrest = drug_arrest5
                              abuse_child_physabuse = abuse_child_physabuse5
                              abuse_child_sexabuse = abuse_child_sexabuse5
                              alcoholp6m = alcoholp6m5
                              drink_p12m = drink_p12m5
                              cocaine_p12m = cocaine_p12m5
                              cocaine_p6m = cocaine_p6m5
                              crack_p12m = crack_p12m5
                              crack_p6m = crack_p6m5
                              crystalmeth_p12m = crystalmeth_p12m5
                              crystalmeth_p6m = crystalmeth_p6m5
                              downers_p12m = downers_p12m5
                              downers_p6m = downers_p6m5
                              ecstasy_p12m = ecstasy_p12m5
                              ecstasy_p6m = ecstasy_p6m5
```

```
                                ecstacy_p6m = ecstacy_p6m5
                                ghb_p12m = ghb_p12m5
                                ghb_p6m = ghb_p6m5
                                hallucinogen_p12m = hallucinogen_p12m5
                                hallucinogen_p6m = hallucinogen_p6m5
                                heroin_p12m = heroin_p12m5
                                heroin_p6m = heroin_p6m5
                                inject = inject5
                                injectp6m = injectp6m5
                                marijuana_p6m = marijuana_p6m5
                                marijuana_p12m = marijuana_p12m5
                                noninject_p12m = noninject_p12m5
                                noninject_p6m = noninject_p6m5
                                noninject_other_p12m = noninject_other_p12m5
                                painkillers_p12m = painkillers_p12m5
                                painkillers_p6m = painkillers_p6m5
                                poppers_p12m = poppers_p12m5
                                poppers_p6m = poppers_p6m5
                                specialk_p12m = specialk_p12m5
                                specialk_p6m = specialk_p6m5
                                cesd_hopefulp = cesd_hopeful5
                                cesd_happyp = cesd_happy5
                                cesd_lonely = cesd_lonely5
                                cesd_getgoing = cesd_getgoing5
                                cesd_fearful = cesd_fearful5
                                cesd_effort = cesd_effort5
                                cesd_depressed = cesd_depressed5
                                cesd_concentrate = cesd_concentrate5
                                cesd_bother = cesd_bother5
                                cesd_badsleep = cesd_badsleep5
                                drink_critic = drink_critic5
                                drink_cut = drink_cut5
                                drink_morning = drink_morning5
                                drink_guilt = drink_guilt5));

                    where visit = 5;
                    drop visit;
        run;

        data month24_survey ;
                    set stacked (rename = (homeless_now = homeless_6now
                            homeless_p6m = homeless_6
                            income = income6
                            poverty = poverty6
                            educ = educ6
                            arrested_ever = arrested_ever6
                            arrested_p6m = arrested_p6m6
                            arrested_p12m_final = arrested_p12m_final6
                            drug_arrest = drug_arrest6
                            abuse_child_physabuse = abuse_child_physabuse6
                            abuse_child_sexabuse = abuse_child_sexabuse6
                            alcoholp6m = alcoholp6m6
                            drink_p12m = drink_p12m6
                            cocaine_p12m = cocaine_p12m6
                            cocaine_p6m = cocaine_p6m6
                            crack_p12m = crack_p12m6
                            crack_p6m = crack_p6m6
```

```
                        crystalmeth_p12m = crystalmeth_p12m6
                        crystalmeth_p6m = crystalmeth_p6m6
                        downers_p12m = downers_p12m6
                        downers_p6m = downers_p6m6
                        ecstasy_p12m = ecstasy_p12m6
                        ecstasy_p6m = ecstasy_p6m6
                        ecstacy_p6m = ecstacy_p6m6
                        ghb_p12m = ghb_p12m6
                        ghb_p6m = ghb_p6m6
                        hallucinogen_p12m = hallucinogen_p12m6
                        hallucinogen_p6m = hallucinogen_p6m6
                        heroin_p12m = heroin_p12m6
                        heroin_p6m = heroin_p6m6
                        inject = inject6
                        injectp6m = injectp6m6
                        marijuana_p6m = marijuana_p6m6
                        marijuana_p12m = marijuana_p12m6
                        noninject_p12m = noninject_p12m6
                        noninject_p6m = noninject_p6m6
                        noninject_other_p12m = noninject_other_p12m6
                        painkillers_p12m = painkillers_p12m6
                        painkillers_p6m = painkillers_p6m6
                        poppers_p12m = poppers_p12m6
                        poppers_p6m = poppers_p6m6
                        specialk_p12m = specialk_p12m6
                        specialk_p6m = specialk_p6m6
                        cesd_hopefulp = cesd_hopeful6
                        cesd_happyp = cesd_happy6
                        cesd_lonely = cesd_lonely6
                        cesd_getgoing = cesd_getgoing6
                        cesd_fearful = cesd_fearful6
                        cesd_effort = cesd_effort6
                        cesd_depressed = cesd_depressed6
                        cesd_concentrate = cesd_concentrate6
                        cesd_bother = cesd_bother6
                        cesd_badsleep = cesd_badsleep6
                        drink_critic = drink_critic6
                        drink_cut = drink_cut6
                        drink_morning = drink_morning6
                        drink_guilt = drink_guilt6));

                where visit = 6;
                drop visit;
        run;



******
* To merge pulled apart stacked sets back into one wide set;
******;

        proc sort data = baseline_survey;
            by study_id;
        run;

        proc sort data = month3_survey;
            by study_id;
```

```
        run;

        proc sort data = month6_survey;
              by study_id;
        run;

        proc sort data = month12_survey;
              by study_id;
        run;

        proc sort data = month18_survey;
              by study_id;
        run;

        proc sort data = month24_survey;
              by study_id;
        run;


        data stacked_wide;
              merge baseline_survey month3_survey month6_survey
                    month12_survey month18_survey month24_survey;
              by study_id;
        run;


******
* To merge set (with visit indicator and incidence vars) with wide
stacked;
******;

        proc sort data = stacked_wide;
              by study_id;
        run;

        proc sort data = s;
              by study_id;
        run;

        data stacks;
              merge stacked_wide s;
              by study_id;
        run;


******
To merge stat (stat_base set, n=803) and stacked_wide datasets;
        * Set DKs to missings;
******;

        proc sort data = stacks;
              by study_id;
        run;

        proc sort data = stat_base;
              by study_id;
        run;
```

```
data merged1;
      merge stacks (in=survey) stat_base (in=status);
            by study_id;
                  if status;
                        if homeless_1now eq 9
                        then homeless_1now = .;
                        if homeless_1 eq 9 then homeless_1 = .;
                        if homeless_2now eq 9
                        then homeless_2now = .;
                        if homeless_2 eq 9 then homeless_2 = .;
                        if homeless_3now eq 9
                        then homeless_3now = .;
                        if homeless_3 eq 9 then homeless_3 = .;
                        if homeless_4now eq 9
                        then homeless_4now = .;
                        if homeless_4 eq 9 then homeless_4 = .;
                        if homeless_5now eq 9
                        then homeless_5now = .;
                        if homeless_5 eq 9 then homeless_5 = .;
                        if homeless_6now eq 9
                        then homeless_6now = .;
                        if homeless_6 eq 9 then homeless_6 = .;


            if age_baseline le 24 then age_n = '18-24 yr';
            if age_baseline ge 25 then age_n = '25+ yr' ;


      any_arrestp12m = sum(arrested_p12m_final1, drug_arrest1);

      any_abuse = sum(abuse_child_physabuse1,
                  abuse_child_sexabuse1);

      all_drug = sum(noninject_p12m1, inject1);

            if any_abuse ge 1 then any_abuse = 1;

            if any_arrestp12m ge 1 then any_arrestp12m = 1;

            if all_drug ge 1 then all_drug = 1;


*Create var for total response for CES-D scale;

      cesd_total = 0;
      cesd_total = cesd_bother1 + cesd_concentrate1 +
            cesd_depressed1 + cesd_effort1 + cesd_hopeful1 +
            cesd_fearful1 + cesd_badsleep1 + cesd_happy1 +
            cesd_lonely1 + cesd_getgoing1;

*Create binary outcome for CES-D scale. The cutoff is 10;

      if cesd_total gt . and cesd_total lt 10 then cesd = 2;
      if cesd_total ge 10 then cesd = 1;

*Create var for total response for CAGE scale questions;
```

```
            cage = 0;
            if drink_cut1 = . then cage = .;
            if drink_critic1 = . then cage = .;
            if drink_guilt1 = . then cage = .;
            if drink_morning1 = . then cage = .;
            if drink_cut1 = 1 then cage = cage + 1;
            if drink_critic1 = 1 then cage = cage + 1;
            if drink_guilt1 = 1 then cage = cage + 1;
            if drink_morning1 = 1 then cage = cage + 1;

        *Create binary var for CAGE outcome. 3-4 indicates problematic
        alcohol use;

            if cage gt . and cage le 2 then drink = 0;
            if cage gt 2 then drink = 1;


            if homeless_1 = 1 or homeless_1now = 1 then prev_home = 1;
            else prev_home = 0;

            label age_n = "Age"
            person_time = "Person time in days"
            pt_month = "Study Month"
            race_inc = "Race"
            cesd = "Depressive Symptoms"
            drink = "Problem Drinking"
            all_drug = "Illicit Drug Use"
            any_arrestp12m = "Arrested"
            any_abuse = "Childhood Abuse";


            format drink all_drug any_arrestp12m any_abuse homeless_1
                  homeless_1now prev_home
            yaynay.;

            format cesd
            cesdbi.;


    run;


******
* To merge stat (stat_pro_neg set, n=556) and stacked_wide datasets;
    * Set DKs to missings;
    * Create summed covariate vars, and PT vars;
******;

    proc sort data = stacks;
        by study_id;
    run;

    proc sort data = stat_pro_neg;
        by study_id;
    run;
```

```
data merged3;
    merge stacks (in=survey) stat_pro_neg (in=status);
        by study_id;
            if status;
    if homeless_1now eq 9 then homeless_1now = .;
    if homeless_1 eq 9 then homeless_1 = .;
    if homeless_2now eq 9 then homeless_2now = .;
    if homeless_2 eq 9 then homeless_2 = .;
    if homeless_3now eq 9 then homeless_3now = .;
    if homeless_3 eq 9 then homeless_3 = .;
    if homeless_4now eq 9 then homeless_4now = .;
    if homeless_4 eq 9 then homeless_4 = .;
    if homeless_5now eq 9 then homeless_5now = .;
    if homeless_5 eq 9 then homeless_5 = .;
    if homeless_6now eq 9 then homeless_6now = .;
    if homeless_6 eq 9 then homeless_6 = .;

    any_homeless = sum(homeless_1, homeless_1now, homeless_2,
                homeless_2now, homeless_3, homeless_3now,
                homeless_4, homeless_4now, homeless_5,
                homeless_5now, homeless_6, homeless_6now);

    anyp6m_arrest = sum(arrested_p6m1, arrested_p6m2,
                arrested_p6m3, arrested_p6m4, arrested_p6m5,
                arrested_p6m6);

    any_arrest = sum(arrested_ever1, arrested_p12m_final1,
                anyp6m_arrest, drug_arrest1);

    any_arrestp12m = sum(arrested_p12m_final1, drug_arrest1);

    any_abuse = sum(abuse_child_physabuse1,
                abuse_child_sexabuse1);

    any_alcohol = sum(drink_p12m1, alcoholp6m3, alcoholp6m4,
                alcoholp6m5, alcoholp6m6);

    any_cocaine = sum(cocaine_p12m1, cocaine_p6m1,
                cocaine_p6m2, cocaine_p6m3, cocaine_p6m4,
                cocaine_p6m5, cocaine_p6m6);

    any_crack = sum(crack_p12m1, crack_p6m2, crack_p6m3,
                crack_p6m4, crack_p6m5, crack_p6m6);

    any_crystal = sum(crystalmeth_p12m1, crystalmeth_p6m2,
                crystalmeth_p6m3, crystalmeth_p6m4,
                crystalmeth_p6m5, crystalmeth_p6m6);

    any_downers = sum(downers_p12m1, downers_p6m2,
                downers_p6m3, downers_p6m4, downers_p6m5,
                downers_p6m6);

    ecstasy_p6m2 = ecstacy_p6m2;
```

```
any_ecstasy = sum(ecstasy_p12m1, ecstasy_p6m2,
            ecstasy_p6m3, ecstasy_p6m4, ecstasy_p6m5,
            ecstasy_p6m6);

any_ghb = sum(ghb_p12m1, ghb_p6m2, ghb_p6m3, ghb_p6m4,
            ghb_p6m5, ghb_p6m6);

any_hallucinogen = sum(hallucinogen_p12m1,
            hallucinogen_p6m2, hallucinogen_p6m3,
            hallucinogen_p6m4, hallucinogen_p6m5,
            hallucinogen_p6m6);

any_heroin = sum(heroin_p12m1, heroin_p6m2, heroin_p6m3,
            heroin_p6m4, heroin_p6m5, heroin_p6m6);

any_inject = sum(inject1, injectp6m2, injectp6m3,
            injectp6m4, injectp6m5, injectp6m6);

any_marijuana = sum(marijuana_p12m1, marijuana_p6m2,
            marijuana_p6m3, marijuana_p6m4, marijuana_p6m5,
            marijuana_p6m6);

any_noninject = sum(noninject_p12m1, noninject_p6m2,
            noninject_p6m3, noninject_p6m4, noninject_p6m5,
            noninject_p6m6);

any_painkillers = sum(painkillers_p12m1, painkillers_p6m2,
            painkillers_p6m3, painkillers_p6m4,
            painkillers_p6m5, painkillers_p6m6);

any_poppers = sum(poppers_p12m1, poppers_p6m2,
            poppers_p6m3, poppers_p6m4, poppers_p6m5,
            poppers_p6m6);

any_specialk = sum(specialk_p12m1, specialk_p6m2,
            specialk_p6m3, specialk_p6m4, specialk_p6m5,
            specialk_p6m6);

any_noninjectp12m = sum(cocaine_p12m1, crack_p12m1,
            crystalmeth_p12m1, downers_p12m1,
            ecstasy_p12m1, ghb_p12m1, hallucinogen_p12m1,
            heroin_p12m1, marijuana_p12m1,
            painkillers_p12m1, poppers_p12m1,
            specialk_p12m1);

invol_noninjectp12m = sum(cocaine_p12m1, crack_p12m1,
            crystalmeth_p12m1, downers_p12m1,ecstasy_p12m1,
            ghb_p12m1, hallucinogen_p12m1,
            painkillers_p12m1, specialk_p12m1);

all_noninject_p12m = sum(noninject_p12m1,
            noninject_other_p12m1);

all_drug = sum(noninject_p12m1, inject1);

    if any_abuse ge 1 then any_abuse = 1;
```

```
                    if any_arrestp12m ge 1 then any_arrestp12m = 1;

                    if first_event = . and first_1home = . and
                    first_2home = . then incident = 0;

                    if all_drug ge 1 then all_drug = 1;

                          v1_dt = dt_enroll;
                          v2_dt = (dt_enroll + 91.25);
                          v3_dt = (dt_enroll + 182.5);
                          v4_dt = (dt_enroll + 365);
                          v5_dt = (dt_enroll + 547.5);
                          v6_dt = (dt_enroll + 730);


*Create var for total response for CES-D scale;

             cesd_total = 0;
             cesd_total = cesd_bother1 + cesd_concentrate1 +
             cesd_depressed1 + cesd_effort1 + cesd_hopeful1 +
             cesd_fearful1 + cesd_badsleep1 + cesd_happy1 + cesd_lonely1
             + cesd_getgoing1;

*Create binary outcome for CES-D scale. The cutoff is 10;

             if cesd_total gt . and cesd_total lt 10 then cesd = 2;
             if cesd_total ge 10 then cesd = 1;

*Create var for total response for CAGE scale questions;

             cage = 0;
             if drink_cut1 = . then cage = .;
             if drink_critic1 = . then cage = .;
             if drink_guilt1 = . then cage = .;
             if drink_morning1 = . then cage = .;
             if drink_cut1 = 1 then cage = cage + 1;
             if drink_critic1 = 1 then cage = cage + 1;
             if drink_guilt1 = 1 then cage = cage + 1;
             if drink_morning1 = 1 then cage = cage + 1;

*Create binary var for CAGE outcome. 3-4 indicates problematic alcohol
use;
             if cage gt . and cage le 2 then drink = 0;
             if cage gt 2 then drink = 1;
             if homeless_1 = 1 or homeless_1now = 1 then prev_home = 1;
             else prev_home = 0;

      run;



******
* Make set/var so I can subtract incident pt time from total pt
calculations;
      * Also make a var, time, that indicates pt at first incident
      event;
      * Also also make a var that censors guys when they have missing
```

```
p6m homelessness data;
* Create var to correct start time (to start after they've
answered no to homeless questions) for current prevalent guys;
* Create final person time var that calculates for everyone;
* Create age groups;
* Create format for drug covariates;
******;

data incidence;
    set merged3;

        if homeless_2 = 1 then event_time = (dt_enroll +
        45.625);

        else if (homeless_2 = 0 or homeless_2 = .) and
        homeless_2now = 1
        then event_time = (dt_enroll + 91.25);

        else if (homeless_2 = 0 or homeless_2 = .) and
        (homeless_2now = 0 or homeless_2now = .) and
        homeless_3 = 1
        then event_time = (dt_enroll + 136.875);

        else if (homeless_2 = 0 or homeless_2 = .) and
        (homeless_2now = 0 or homeless_2now = .) and
        (homeless_3 = 0 or homeless_3 = .) and
        homeless_3now = 1
        then event_time = (dt_enroll + 182.5);

        else if (homeless_2 = 0 or homeless_2 = .) and
        (homeless_2now = 0 or homeless_2now = .) and
        (homeless_3 = 0 or homeless_3 = .) and (homeless_3now
        = 0 or homeless_3now = .) and homeless_4 = 1
        then event_time = (dt_enroll + 273.75);

        else if (homeless_2 = 0 or homeless_2 = .) and
        (homeless_2now = 0 or homeless_2now = .) and
        (homeless_3 = 0 or homeless_3 = .) and (homeless_3now
        = 0 or homeless_3now = .) and (homeless_4 = 0 or
        homeless_4 = .) and homeless_4now = 1
        then event_time = (dt_enroll + 365);

        else if (homeless_2 = 0 or homeless_2 = .) and
        (homeless_2now = 0 or homeless_2now = .) and
        (homeless_3 = 0 or homeless_3 = .) and (homeless_3now
        = 0 or homeless_3now = .) and (homeless_4 = 0 or
        homeless_4 = .) and (homeless_4now = 0 or
        homeless_4now = .) and homeless_5 = 1
        then event_time = (dt_enroll + 456.25);

        else if (homeless_2 = 0 or homeless_2 = .) and
        (homeless_2now = 0 or homeless_2now = .) and
        (homeless_3 = 0 or homeless_3 = .) and (homeless_3now
        = 0 or homeless_3now = .) and (homeless_4 = 0 or
        homeless_4 = .) and (homeless_4now = 0 or
        homeless_4now = .) and (homeless_5 = 0 or
        homeless_5 = .) and homeless_5now = 1
```

```
                              then event_time = (dt_enroll + 547.5);

                              else if (homeless_2 = 0 or homeless_2 = .) and
                              (homeless_2now = 0 or homeless_2now = .) and
                              (homeless_3 = 0 or homeless_3 = .) and (homeless_3now
                              = 0 or homeless_3now = .) and (homeless_4 = 0 or
                              homeless_4 = .) and (homeless_4now = 0 or
                              homeless_4now = .) and (homeless_5 = 0 or homeless_5
                              = .) and (homeless_5now = 0 or homeless_5now = .) and
                              homeless_6 = 1
                              then event_time = (dt_enroll + 638.75);

                              else if (homeless_2 = 0 or homeless_2 = .) and
                              (homeless_2now = 0 or homeless_2now = .) and
                              (homeless_3 = 0 or homeless_3 = .) and (homeless_3now
                              = 0 or homeless_3now = .) and (homeless_4 = 0 or
                              homeless_4 = .) and (homeless_4now = 0 or
                              homeless_4now = .) and (homeless_5 = 0 or
                              homeless_5 = .) and (homeless_5now = 0 or
                              homeless_5now = .) and (homeless_6 = 0 or homeless_6
                              = .) and homeless_6now = 1
                              then event_time = (dt_enroll + 730);

 * Fix event status for guys that look incident but are not;
 * Also create event status var;

                              if study_id = 0300361 then event = 0;
                              else if study_id = 0300641 then event = 0;
                              else if study_id = 0300731 then event = 0;
                              else if incident = 1 then event = 1;
                              else event = 0;

 * Fix start time for incident guys with prevalent homelessness;

                              if study_id = 0102491
                                  then start_time = (dt_enroll + 45.625);
                                  * YYN.N.N.YY..;
                              else if study_id = 0102521
                                  then start_time = (dt_enroll + 136.875);
                                  * YYYYN.N.N...;
                              else if study_id = 0202471
                                  then start_time = (dt_enroll + 45.625);
                                  * YYN.N.N.....;
                              else if study_id = 0202941
                                  then start_time = (dt_enroll + 91.25);
                                  * YYYNYY..N...;
                              else if study_id = 0301531
                                  then start_time = (dt_enroll + 182.5);
                                  * YYYYYNN.N.N.;

 * Fix start time for guys with DKs;

                              else if study_id = 0100361
                                  then start_time = (dt_enroll + 45.625);
                                  * DDN.N.N.N.N.;
                              else if study_id = 0102241
```

```
                    then start_time = (dt_enroll);
                        * DN..........;
                else if study_id = 0200201
                    then start_time = (dt_enroll + 182.5);
                        * NNN.N...N.D.;
                else if study_id = 0200991
                    then start_time = (dt_enroll + 182.5);
                        * NNN.N.D.N...;
                else if study_id = 0202911
                    then start_time = (dt_enroll + 182.5);
                        * NNN.N.N.D...;
                else if study_id = 0400411
                    then start_time = (dt_enroll);
                        * DN..........;
                else start_time = dt_enroll;


    * Fix end time for incident guys with prevalent homelessness;

                if study_id = 0102491
                    then end_time = (dt_enroll + 456.25);
                        * YYN.N.N.YY..;
                else if study_id = 0102521
                    then end_time = (last_visit_date);
                        * YYYYN.N.N...;
                else if study_id = 0202471
                    then end_time = (last_visit_date);
                        * YYN.N.N.....;
                else if study_id = 0202941
                    then end_time = (dt_enroll + 136.875);
                        * YYYNYY..N...;
                else if study_id = 0301531
                    then end_time = (last_visit_date);
                        * YYYYYYNN.N.N.;


    * Fix end time for guys with DKs;

                else if study_id = 0100361
                    then end_time = (last_visit_date);
                        * DDN.N.N.N.N.;
                else if study_id = 0102241
                    then end_time = (last_visit_date);
                        * DN..........;
                else if study_id = 0200201
                    then end_time = (dt_enroll + 273.75);
                        * NNN.N...N.D.;
                else if study_id = 0200991
                    then end_time = (dt_enroll + 273.75);
                        * NNN.N.D.N...;
                else if study_id = 0202911
                    then end_time = (dt_enroll + 456.25);
                        * NNN.N.N.D...;
                else if study_id = 0400411
                    then end_time = (last_visit_date);
                        * DN..........;
```

```
* Fix end time for guys with missings for homelessness var;

        else if event = 1 then end_time = event_time;
        else if homeless_2 = . then end_time = (dt_enroll +
        45.625);
        else if homeless_3 = . then end_time = (dt_enroll +
        136.875);
        else if homeless_4 = . then end_time = (dt_enroll +
        273.75);
        else if homeless_5 = . then end_time = (dt_enroll +
        456.25);
        else if homeless_6 = . then end_time = (dt_enroll +
        638.75);
        else end_time = last_visit_date;


* Create final person time var;
* Also fix person time for incident guys with missings;

        person_time = end_time - start_time;
        if study_id = 0100221 then person_time = 0;
                * NY..N.......;
        if study_id = 0300361 then person_time = 0;
                * YY..YY......;
        if study_id = 0300641 then person_time = 45.625;
                * NN..YNN.N.N.;
        if study_id = 0300731 then person_time = 45.625;
                * YDYY..N.D...;



        if age_baseline le 24 then age_n = '18-24 yr';
        if age_baseline ge 25 then age_n = '25+ yr' ;


            pt_month = person_time/30.42;

            pt_years = person_time/365.25;


        label event = "Proportion Homeless"
            person_time = "Person time in days"
            pt_month = "Study Month"
            race_inc = "Race"
            age_n = "Age"
            cesd = "Depressive Symptoms"
            drink = "Problem Drinking"
            all_drug = "Illicit Drug Use"
            any_arrestp12m = "Arrested"
            any_abuse = "Childhood Abuse";


        format drink all_drug any_arrestp12m any_abuse
            homeless_1 homeless_1now prev_home
        yaynay.;

        format cesd
```

```
                    cesdbi.;


        run;




******
* Merge sets to create master set, thesis;
******;

        proc sort data = incidence;
                by study_id;
        run;

        proc sort data = merged3;
                by study_id;
        run;

        data thesis;
                merge incidence merged3;
                        by study_id;
        run;




******
* Make sure pt vars are working correctly
******;

/*
        proc freq data = thesis;
                tables homeless_1 homeless_1now homeless_2 homeless_2now
                    homeless_3 homeless_3now homeless_4 homeless_4now
                    homeless_5 homeless_5now homeless_6 homeless_6now;
                where study_id = 0100221;
        run;



        proc freq data = thesis;
                tables study_id;
                where person_time = .;
        run;

        proc freq data = thesis;
                tables curr_prev*event;
                where homeless_1 = 1;
        run;


        proc freq data = thesis;
                tables curr_prev*study_id;
                where curr_prev = 1;
        run;
```

```
        proc freq data = thesis;
               tables miss_pt;
        run;

        proc means data = thesis;
               var pt_years;
               where pt_years ge 2;
               by study_id;
        run;

        proc means data = thesis;
               var person_time;
        run;



        proc freq data = thesis;
                tables homeless_1 homeless_2
                            homeless_3 homeless_4
                            homeless_5 homeless_6;
                   where study_id = 0300641;
        run;



        proc freq data = thesis;
               where person_time = 879;
        run;

        proc freq data = thesis;
               tables dt_enroll event_time start_time end_time
               person_time;
               where study_id = 0100361;
        run;

        proc univariate data = thesis;
               var person_time;
               where event = 0;
        run;

        proc freq data = thesis;
               tables event;
        run;

        proc freq data = thesis;
               tables pt_month*person_time;
        run;

    */


    ********************************************************;
    * Program: T:\epiprojs\Sullivan_data_ident\          *;
    *               C_Taylor_Inv\cat                     *;
```

```
*                         \thesis_var_explore.sas7bdat    *;
*                                                        *;
* Date: 02/28/16                                         *;
*                                                        *;
* Programmer: Calli Taylor                               *;
*                                                        *;
* Purpose: This program uses the merged InvolveMENt      *;
* datasets for thesis work (variable exploration).       *;
**********************************************************;

*** Run thesis_formats FIRST;

**********************************************************;
* Call in thesis merged data                             ;
**********************************************************;

%include
"T:\epiprojs\Sullivan_data_ident\C_Taylor_Inv\cat\thesis_data.sas";

****************************************
Exploring vars of interest, checking #s;
****************************************;

******
Arrests;
******;

*** Baseline guys only;

    proc freq data = merged1;
        tables arrested_ever1
            arrested_ever2
            arrested_ever3
            arrested_ever4
            arrested_ever5
            arrested_ever6;
    run;

* Baseline ? only, 310 yes, 493 no, n=803;

    proc freq data = merged1;
        tables arrested_p12m_final1
            arrested_p12m_final2
            arrested_p12m_final3
            arrested_p12m_final4
            arrested_p12m_final5
            arrested_p12m_final6;
    run;

* Baseline ? only, of the 310 ever arrested, 86 were in p12m
  86 yes, 716 no, 1 missing, n=803;

    proc freq data = merged1;
        tables arrested_p6m1
            arrested_p6m2
```

```
                            arrested_p6m3
                            arrested_p6m4
                            arrested_p6m5
                            arrested_p6m6;
        run;

        proc freq data = merged1;
              tables anyp6m_arrest;
        run;

* Follow up ? only, 46 yes, 492 no, 265 missing, n=803;

        proc freq data = merged1;
              tables drug_arrest1
                     drug_arrest2
                     drug_arrest3
                     drug_arrest4
                     drug_arrest5
                     drug_arrest6;
        run;

*Baseline ? only, 26 yes, 287 no, 490 missing, n=803;

        proc freq data = merged1;
              tables any_arrest;
        run;

* 335 ever arrested, 468 never, n=803;


*** Prospective guys only;

        proc freq data = merged3;
              tables arrested_ever1
                     arrested_ever2
                     arrested_ever3
                     arrested_ever4
                     arrested_ever5
                     arrested_ever6;
        run;

* Baseline ? only, 173 yes, 383 no, n=556;


        proc freq data = merged3;
              tables arrested_p12m_final1
                     arrested_p12m_final2
                     arrested_p12m_final3
                     arrested_p12m_final4
                     arrested_p12m_final5
                     arrested_p12m_final6;
        run;

* Baseline ? only, of the 173 ever arrested, 55 were in p12m
  55 yes, 501 no, n=556;
```

```
    proc freq data = merged3;
        tables arrested_p6m1
             arrested_p6m2
             arrested_p6m3
             arrested_p6m4
             arrested_p6m5
             arrested_p6m6;
    run;

    proc freq data = merged3;
        tables anyp6m_arrest;
    run;

* Follow up ? only, 45 yes, 483 no, 28 missing, n=556;


    proc freq data = merged3;
        tables drug_arrest1
             drug_arrest2
             drug_arrest3
             drug_arrest4
             drug_arrest5
             drug_arrest6;
    run;

* Baseline ? only, 15 yes, 208 no, 333 missing, n=556;


    proc freq data = merged3;
        tables any_arrest;
    run;

* 208 ever arrested, 348 never, n=556;

*** Among homeless prospective guys;

    proc freq data = merged3;
        tables any_arrest;
             where any_homeless ge 1;
    run;

* 36 ever arrested, 41 never, n=77;



******
Abuse;
******;

* Baseline ? only, so only need 1st visit var;

*** Among baseline guys;

    proc freq data = merged1;
        tables abuse_child_physabuse1 abuse_child_sexabuse1;
    run;
```

```
        proc freq data = merged1;
               tables any_abuse;
        run;

* physical: 241 yes, 561 no, 1 missing, n=802;
* sexual: 228 yes, 571 no, 4 missing, n=799;
* 346 ever abused, 457 never;

*** Among prospective guys;

        proc freq data = merged3;
               tables abuse_child_physabuse1 abuse_child_sexabuse1;
        run;

        proc freq data = merged3;
               tables any_abuse;
        run;

* physical: 154 yes, 401 no, 1 missing, n=555;
* sexual: 130 yes, 422 no, 4 missing, n=552;
* 216 ever abused, 340 never;


*** Among homeless prospective guys;

        proc freq data = merged3;
               tables abuse_child_physabuse1 abuse_child_sexabuse1;
                   where any_homeless ge 1;
        run;

        proc freq data = merged3;
               tables any_abuse;
                   where any_homeless ge 1;
        run;

* physical: 27 yes, 50 no, n=77;
* sexual: 25 yes, 51 no, 1 missing, n=76;
* 37 ever abused, 40 never;




******
Drug Use;
******;


*** Alcohol;

* No V2 data, ? wasn't asked at that visit?;

        proc freq data = merged3;
               tables drink_p12m1;
        run;

        proc freq data = merged3;
               tables
```

```
                    alcoholp6m2
                    alcoholp6m3
                    alcoholp6m4
                    alcoholp6m5
                    alcoholp6m6;
        run;

        proc freq data = merged3;
            tables any_alcohol;
        run;

* 536 yes, 20 no, n=556;

        proc freq data = merged3;
            tables any_alcohol;
                where any_homeless ge 1;
        run;

* 75 yes, 2 no, n=77;



*** Cocaine;

        proc freq data = merged3;
            tables cocaine_p12m1;
        run;

        proc freq data = merged3;
            tables
                    cocaine_p6m2
                    cocaine_p6m3
                    cocaine_p6m4
                    cocaine_p6m5
                    cocaine_p6m6;
        run;

        proc freq data = merged3;
            tables any_cocaine;
        run;

* 125 yes, 152 no, 279 missing n=277;

        proc freq data = merged3;
            tables any_cocaine;
                where any_homeless ge 1;
        run;

* 20 yes, 21 no, 36 missing, n=41;



*** Crack;

        proc freq data = merged3;
            tables crack_p12m1;
        run;
```

```
        proc freq data = merged3;
            tables
                    crack_p6m2
                    crack_p6m3
                    crack_p6m4
                    crack_p6m5
                    crack_p6m6;
        run;

        proc freq data = merged3;
            tables any_crack;
        run;

* 15 yes, 260 no, 281 missing, n=275;

        proc freq data = merged3;
            tables any_crack;
                    where any_homeless ge 1;
        run;

*  5 yes, 35 no, 37 missing, n=40;



*** Crystal Meth;

        proc freq data = merged3;
            tables crystalmeth_p12m1;
        run;

* 22 yes, 190 no, 344 missing, n=212;

        proc freq data = merged3;
            tables
                    crystalmeth_p6m2
                    crystalmeth_p6m3
                    crystalmeth_p6m4
                    crystalmeth_p6m5
                    crystalmeth_p6m6;
        run;

        proc freq data = merged3;
            tables any_crystal;
        run;

* 44 yes, 231 no, 281 missing, n=275;



*** Downers;

        proc freq data = merged3;
            tables downers_p12m1;
        run;

* 44 yes, 168 no, 344 missing, n=212;
```

```
      proc freq data = merged3;
            tables
                  downers_p6m2
                  downers_p6m3
                  downers_p6m4
                  downers_p6m5
                  downers_p6m6;
      run;

      proc freq data = merged3;
            tables any_downers;
      run;

* 70 yes, 204 no, 282 missing, n=274;


*** Ecstasy;

      proc freq data = merged3;
            tables ecstasy_p12m1;
      run;

* 62 yes, 149 no, 345 missing, n=211;

      proc freq data = merged3;
            tables
                  ecstasy_p6m2
                  ecstasy_p6m3
                  ecstasy_p6m4
                  ecstasy_p6m5
                  ecstasy_p6m6;
      run;

      proc freq data = merged3;
            tables any_ecstasy;
      run;

* 90 yes, 188 no, 278 missing, n=278;


*** GHB;

      proc freq data = merged3;
            tables ghb_p12m1;
      run;

* 19 yes, 190 no, 347 missing, n=209;

      proc freq data = merged3;
            tables
                  ghb_p6m2
                  ghb_p6m3
                  ghb_p6m4
                  ghb_p6m5
```

```
                    ghb_p6m6;
        run;

        proc freq data = merged3;
            tables any_ghb;
        run;

* 31 yes, 243 no, 282 missing, n=274;



*** Hallucinogen;

        proc freq data = merged3;
            tables hallucinogen_p12m1;
        run;

* 32 yes, 177 no, 347 missing, n=209;

        proc freq data = merged3;
            tables
                    hallucinogen_p6m2
                    hallucinogen_p6m3
                    hallucinogen_p6m4
                    hallucinogen_p6m5
                    hallucinogen_p6m6;
        run;

        proc freq data = merged3;
            tables any_hallucinogen;
        run;

* 53 yes, 222 no, 281 missing, n=275;



*** Heroin;

        proc freq data = merged3;
            tables heroin_p12m1;
        run;

* 2 yes, 206 no, 348 missing, n=208;

        proc freq data = merged3;
            tables
                    heroin_p6m2
                    heroin_p6m3
                    heroin_p6m4
                    heroin_p6m5
                    heroin_p6m6;
        run;

        proc freq data = merged3;
            tables any_heroin;
        run;
```

```
* 5 yes, 269 no, 282 missing, n=274;



*** Inject;

     proc freq data = merged3;
          tables inject1;
     run;

* 4 yes, 551 no, 1 missing, n=555;

     proc freq data = merged3;
          tables
                injectp6m2
                injectp6m3
                injectp6m4
                injectp6m5
                injectp6m6;
     run;

     proc freq data = merged3;
          tables any_inject;
     run;

* 13 yes, 543 no, n=556;



*** Weed;

     proc freq data = merged3;
          tables marijuana_p12m1;
     run;

* 203 yes, 21 no, 332 missing, n=224;

     proc freq data = merged3;
          tables
                marijuana_p6m2
                marijuana_p6m3
                marijuana_p6m4
                marijuana_p6m5
                marijuana_p6m6;
     run;

     proc freq data = merged3;
          tables any_marijuana;
     run;

* 266 yes, 28 no, 262 missing, n=294;



*** Non Inject;
* Unspecified drug use, just asked if any non inject drugs in p12m;
```

```
        proc freq data = merged3;
                tables noninject_p12m1;
        run;

* 223 yes, 330 no, 3 missing, n=553;

        proc freq data = merged3;
                tables
                        noninject_p6m2
                        noninject_p6m3
                        noninject_p6m4
                        noninject_p6m5
                        noninject_p6m6;
        run;

        proc freq data = merged3;
                tables any_noninject;
        run;

* 292 yes, 264 no, n=556;

 proc freq data = merged3;
        tables noninject_other_p12m1;
        run;

* 10 yes, 213 no, 333 missing, n=223;


*** Painkillers;

        proc freq data = merged3;
                tables painkillers_p12m1;
        run;

* 59 yes, 152 no, 345 missing, n=211;

        proc freq data = merged3;
                tables
                        painkillers_p6m2
                        painkillers_p6m3
                        painkillers_p6m4
                        painkillers_p6m5
                        painkillers_p6m6;
        run;

        proc freq data = merged3;
                tables any_painkillers;
        run;

* 86 yes, 186 no, 284 missing, n=272;



*** Poppers;

        proc freq data = merged3;
                tables poppers_p12m1;
```

```
        run;

* 63 yes, 147 no, 346 missing, n=210;

        proc freq data = merged3;
                tables
                        poppers_p6m2
                        poppers_p6m3
                        poppers_p6m4
                        poppers_p6m5
                        poppers_p6m6;
        run;

        proc freq data = merged3;
                tables any_poppers;
        run;

* 101 yes, 173 no, 282 missing, n=274;



*** Special K;

        proc freq data = merged3;
                tables specialk_p12m1;
        run;

* 15 yes, 193 no, 348 missing, n=208;

        proc freq data = merged3;
                tables
                        specialk_p6m2
                        specialk_p6m3
                        specialk_p6m4
                        specialk_p6m5
                        specialk_p6m6;
        run;

        proc freq data = merged3;
                tables any_specialk;
        run;

* 29 yes, 243 no, 284 missing, n=272;



*** Various non inject drug vars;

        proc freq data = merged3;
                tables noninject_p12m1;
        run;

* 223 yes, 330 no, 3 missing, n=553;

        proc freq data = merged3;
                tables any_noninjectp12m;
```

```sas
        run;

* 223 yes, 3 no, 330 missing, n=226;

        proc freq data = merged3;
            tables invol_noninjectp12m;
        run;

* 144 yes, 74 no, 338 missing, n=218;

        proc freq data = merged3;
            tables all_noninject_p12m;
        run;

* 223 yes, 330 no, 3 missing, n=553;


**** Look at patterns of missings;

        proc format;
            value miss . = 'Missing'
                   other = 'Ok';
        run;

        proc freq data = merged3;
            tables drink_p12m1*noninject_p12m1*inject1*marijuana_p12m1
                   *any_abuse*any_arrestp12m*race_inc*age_baseline/list
                   missing;
            format drink_p12m1 noninject_p12m1 inject1 marijuana_p12m
                   any_abuse any_arrestp12m race_inc age_baseline miss.;
            where incident = 1;
        run;

** Among all pro. homeless, 39 are missing marijuana_p12m1, 1 is also
missing noninject_p12m1;
** Among incident homeless, 21 are missing marijuana_p12m1, 1 is also
missing noninject_p12m1;


        proc freq data = merged3;
            tables
                   homeless_1 homeless_1now homeless_2 homeless_2now
                   homeless_3 homeless_3now homeless_4 homeless_4now
                   homeless_5 homeless_5now homeless_6 homeless_6now;
        run;

*/


/*
******
* Problem drinking vars;
******;
* None of the problem drinking vars were asked at V2;
* All reported numbers are for baseline only;
```

```
        proc freq data = thesis;
             tables drink_cut1
                    drink_cut3
                    drink_cut4
                    drink_cut5
                    drink_cut6;
        run;
```

* 218 yes, 306 no, 32 missing, n=524;

```
        proc freq data = thesis;
             tables drink_critic1
                    drink_critic3
                    drink_critic4
                    drink_critic5
                    drink_critic6;
        run;
```

* 89 yes, 432 no, 35 missing, n=521;

```
        proc freq data = thesis;
             tables drink_guilt1
                    drink_guilt3
                    drink_guilt4
                    drink_guilt5
                    drink_guilt6;
        run;
```

* 150 yes, 369 no, 37 missing, n=519;

```
        proc freq data = thesis;
             tables drink_morning1
                    drink_morning3
                    drink_morning4
                    drink_morning5
                    drink_morning6;
        run;
```

* 69 yes, 450 no, 37 missing, n=519;

***;

```
        proc freq data = thesis;
             tables cage
                         drink;
        run;
```

* 75 yes (3-4), 442 no (0-2), 39 missing, n=517;

******
* Depressive symptoms vars;
******;

```
* None of the depressive symptoms vars were asked at V2;
* All reported numbers are for baseline only;


        proc freq data = thesis;
                tables cesd_hopeful1
                       cesd_hopeful3
                       cesd_hopeful4
                       cesd_hopeful5
                       cesd_hopeful6;
        run;

* 236 no, 3 missing, n=553;


        proc freq data = thesis;
                tables cesd_happy1
                       cesd_happy3
                       cesd_happy4
                       cesd_happy5
                       cesd_happy6;
        run;

* 273 no, 3 missing, n=553;


        proc freq data = thesis;
                tables cesd_lonely1
                       cesd_lonely3
                       cesd_lonely4
                       cesd_lonely5
                       cesd_lonely6;
        run;

* 196 no, 4 missing, n=552;


        proc freq data = thesis;
                tables cesd_getgoing1
                       cesd_getgoing3
                       cesd_getgoing4
                       cesd_getgoing5
                       cesd_getgoing6;
        run;

* 289 no, 4 missing, n=552;


        proc freq data = thesis;
                tables cesd_fearful1
                       cesd_fearful3
                       cesd_fearful4
                       cesd_fearful5
                       cesd_fearful6;
        run;

* 373 no, 3 missing, n=553;
```

```
proc freq data = thesis;
      tables cesd_effort1
             cesd_effort3
             cesd_effort4
             cesd_effort5
             cesd_effort6;
run;
```

* 229 no, 4 missing, n=552;

```
proc freq data = thesis;
      tables cesd_depressed1
             cesd_depressed3
             cesd_depressed4
             cesd_depressed5
             cesd_depressed6;
run;
```

* 326 no, 5 missing, n=551;

```
proc freq data = thesis;
      tables cesd_concentrate1
             cesd_concentrate3
             cesd_concentrate4
             cesd_concentrate5
             cesd_concentrate6;
run;
```

* 245 no, 5 missing, n=551;

```
proc freq data = thesis;
      tables cesd_bother1
             cesd_bother3
             cesd_bother4
             cesd_bother5
             cesd_bother6;
run;
```

* 355 no, 5 missing, n=551;

```
proc freq data = thesis;
      tables cesd_badsleep1
             cesd_badsleep3
             cesd_badsleep4
             cesd_badsleep5
             cesd_badsleep6;
run;
```

* 239 no, 4 missing, n=552;

****;

```
        proc freq data = thesis;
                tables cesd_total
                            cesd;
        run;

* 141 yes (10+), 394 no (0-9), 21 missing, n=535;


***********************************************************;
* Program: T:\epiprojs\Sullivan_data_ident\           *;
*               C_Taylor_Inv\cat                       *;
*                     \thesis_analyses.sas7bdat        *;
*                                                      *;
* Date: 04/13/16                                       *;
* Programmer: Calli Taylor                             *;
*                                                      *;
* Purpose: This program uses the InvolveMENt           *;
* datasets for thesis analyses.                        *;
***********************************************************;


***********************************************************;
* Call in thesis merged data                           ;
***********************************************************;

%include
"T:\epiprojs\Sullivan_data_ident\C_Taylor_Inv\cat\thesis_data.sas";


*Run thesis_formats FIRST;


**************************;
* It's analysis tiiimmmeeee;
**************************;


******
* Final data exploration;
******;

        proc freq data = merged1;
                tables race_inc
                            any_abuse
                            any_arrestp12m
                            all_drug
                            drink
                            cesd;
        run;


        proc freq data = thesis;
                tables race_inc
                            any_abuse
                            any_arrestp12m
                            all_drug
                            drink
```

```
                              cesd;
        run;


* Figure out best age groups;

        proc univariate data = thesis;
             var age_baseline;
        run;

        proc sort data = thesis;
             by race_inc;
        run;

        proc boxplot data = thesis;
             plot age_baseline*race_inc;
        run;

        proc freq data = thesis;
             tables race_inc age_n;
        run;

* Age_n, 18-24 and 25+;


        proc univariate data = thesis;
             var pt_years pt_month;
        run;


        proc corr data = thesis plots (maxpoints = none) = matrix
        (histogram);
             var pt_years
                 pt_month
                 race_inc
                 age_baseline
                 any_abuse
                 any_arrestp12m
                 all_drug
                 drink
                 cesd;
        run;



*******;
* Table 1, prevalence;
*******;
* Need to include test stats for racial differences in prevalence;
* Overall (n=803), 56.5% black, 43.5% white;
* Pro. only (n=556), 46% black, 54% white;


        proc freq data = merged1;
             tables race_inc;
        run;
```

```
* Historical, current, and all prevalence by race, HIV- and HIV+
(n=803) at baseline;

      proc freq data = merged1 order = formatted;
            tables race_inc*homeless_1/chisq;
      run;

      proc freq data = merged1 order = formatted;
            tables race_inc*homeless_1now/fisher;
      run;

      proc freq data = merged1 order = formatted;
            tables race_inc*prev_home/chisq;
      run;


* Historical, current, and all prevalence by race, HIV- only (n=556) at
baseline;

      proc freq data = thesis order = formatted;
            tables race_inc*homeless_1/chisq;
      run;

      proc freq data = thesis order = formatted;
            tables race_inc*homeless_1now/fisher;
      run;

      proc freq data = thesis order = formatted;
            tables race_inc*prev_home/chisq;
      run;


* Historical, current, and all prevalence by race, HIV+ only (n=247) at
baseline;


      proc freq data = merged1 order = formatted;
            tables race_inc*homeless_1/chisq;
            where prospective_pt ne 1 or baseline_hiv ne 1;
      run;

      proc freq data = merged1 order = formatted;
            tables race_inc*homeless_1now/fisher;
            where prospective_pt ne 1 or baseline_hiv ne 1;
      run;

      proc freq data = merged1 order = formatted;
            tables race_inc*prev_home/chisq;
            where prospective_pt ne 1 or baseline_hiv ne 1;
      run;



*******;
* Table 2, baseline characteristics;
*******;
```

```
proc freq data = thesis;
      tables race_inc*age_n/chisq;
run;


proc freq data = thesis order = formatted;
      tables race_inc*all_drug/chisq;
run;


proc freq data = thesis order = formatted;
      tables race_inc*drink/chisq;
run;


proc freq data = thesis order = formatted;
      tables race_inc*any_abuse/chisq;
run;


proc freq data = thesis order = formatted;
      tables race_inc*any_arrestp12m/chisq;
run;


proc freq data = thesis order = formatted;
      tables race_inc*cesd/chisq;
run;



********;
* Table 3, for incidence rates and rate ratios;
********;

proc freq data = thesis;
      tables event;
run;

proc univariate data = thesis;
      var person_time;
run;

proc univariate data = thesis;
      var pt_years;
run;


*** Race;

proc freq data = thesis;
      tables race_inc*event;
run;

proc univariate data = thesis;
      var pt_years;
```

```
              class race_inc;
        run;


*** Age;

        proc freq data = thesis;
              tables age_n*event;
        run;

        proc univariate data = thesis;
              var pt_years;
              class age_n;
        run;


*** Race and age;

        proc freq data = thesis;
              tables race_inc*age_n;
              where event = 1;
        run;

        proc univariate data = thesis;
              var pt_years;
              class race_inc age_n;
        run;


*** Arrested;

        proc freq data = thesis;
              tables any_arrestp12m;
              where event = 1;
        run;

        proc univariate data = thesis;
              var pt_years;
              class any_arrestp12m;
        run;


*** Drug;

        proc freq data = thesis;
              tables all_drug;
              where event = 1;
        run;

        proc univariate data = thesis;
              var pt_years;
              class all_drug;
        run;


*** Drink;
```

```
      proc freq data = thesis;
            tables drink;
            where event = 1;
      run;

      proc univariate data = thesis;
            var pt_years;
            class drink;
      run;


*** Depression;

      proc freq data = thesis;
            tables cesd;
            where event = 1;
      run;

      proc univariate data = thesis;
            var pt_years;
            class cesd;
      run;


*** Abuse;

      proc freq data = thesis;
            tables any_abuse;
            where event = 1;
      run;

      proc univariate data = thesis;
            var pt_years;
            class any_abuse;
      run;




********;
* Survival analysis;
********;


**** Nonparametric, Kaplan Meier plots (Figures 1-4);

/*
* To find the sas template for survival analysis, saved it in
thesis_KM_template,
      can edit it there before running each plot;

ods trace on;
ods graphics on;

      proc lifetest data = thesis plots = survival (nocensor failure
test);
            time pt_month*event(0);
```

```
      run;

ods trace off;

proc template;
      source Stat.Lifetest.Graphics.ProductLimitSurvival;
run;

proc template;
      source Stat.Lifetest.Graphics.ProductLimitFailure;
run;
*/


**** Alter/Run thesis_KM_template before each plot;


* Overall;

      proc lifetest data = thesis plots = survival (nocensor failure
            test);
            time pt_month*event(0);
      run;

* By race;

      proc lifetest data = thesis plots = survival (nocensor failure
            test);
            strata race_inc;
            time pt_month*event(0);
      run;

* By age;

      proc lifetest data = thesis plots = survival (nocensor failure
            test);
            strata age_n;
            time pt_month*event(0);
      run;


* By race and age;

      proc lifetest data = thesis plots = survival (nocensor failure
            test);
            strata age_n race_inc;
            time pt_month*event(0);
      run;




**** Cox proportional hazards models, Table 4;


* All covariates, race*age included, Model #1;
```

```
proc phreg data = thesis plots = survival;
      class race_inc age_n any_abuse any_arrestp12m all_drug
      drink cesd;
      model person_time*event(0) = race_inc age_n any_abuse
      any_arrestp12m all_drug drink cesd race_inc | age_n /
      risklimits;

      hazardratio 'Effect of change in race by age' race_inc /at
      (age_n = all);

run;


* All covariates, no interaction terms, Model #2;

proc phreg data = thesis plots = survival;
      class race_inc age_n any_abuse any_arrestp12m all_drug
      drink cesd;
      model person_time*event(0) = race_inc age_n any_abuse
      any_arrestp12m all_drug drink cesd / risklimits;
run;


* Dropped problem drinking due to amount of missings, Model #3;

proc phreg data = thesis plots = survival;
      class race_inc age_n any_abuse any_arrestp12m all_drug
      cesd;
      model person_time*event(0) = race_inc age_n any_abuse
      any_arrestp12m all_drug cesd / risklimits;
run;


* Age, race, age | race, and depression;

proc phreg data = thesis plots = survival;
      class race_inc age_n cesd;
      model person_time*event(0) = race_inc age_n cesd race_inc |
      age_n / risklimits;
run;



* Age, race, and depression only, Model #4;

proc phreg data = thesis plots = survival;
      class race_inc age_n cesd;
      model person_time*event(0) = race_inc age_n cesd /
      risklimits;
run;


* Race and age only, Model #5;

proc phreg data = thesis plots = survival;
      class race_inc age_n;
      model person_time*event(0) = race_inc age_n / risklimits;
```

```sas
    run;


* Race only, Model #6;

    proc phreg data = thesis plots = survival;
        class race_inc;
        model person_time*event(0) = race_inc / risklimits;
    run;

***********************************************************;
* Program: T:\epiprojs\Sullivan_data_ident\              *;
*              C_Taylor_Inv\cat                          *;
*                  \thesis_KM_template.sas7bdat          *;
*                                                        *;
* Date: 07/13/16                                         *;
*                                                        *;
* Programmer: Calli Taylor (but mostly SAS)              *;
*                                                        *;
* Purpose: This program uses the SAS ods template        *;
*     for KM failure curve graphs to alter the produced *;
*     plots for thesis work.                             *;
***********************************************************;


******
* Kaplan Meier failure curve template;
******;

proc template;

source Stat.Lifetest.Graphics.ProductLimitFailure;

define statgraph Stat.Lifetest.Graphics.ProductLimitFailure;

dynamic NStrata xName maxTime plotAtRisk plotCensored plotCL plotHW
    plotEP labelCL labelHW labelEP yMin xtickVals
    xtickValFitPol method StratumID classAtRisk plotTest GroupName
    Transparency rowWeights SecondTitle TestName
    pValue _byline_ _bytitle_ _byfootnote_;
  BeginGraph;
    if (NSTRATA=1)
       if (EXISTS(STRATUMID))
          entrytitle  " " ;
       else
          entrytitle  " ";
       endif;
          if (PLOTATRISK=1) entrytitle "With Number of Subjects at
          Risk" / textattrs=GRAPHVALUETEXT;
       endif;
          layout overlay / xaxisopts=(shortlabel=XNAME offsetmin=.05
          linearopts=(viewmax=MAXTIME tickvaluelist=XTICKVALS
          tickvaluefitpolicy=XTICKVALFITPOL))
          yaxisopts=(label="Proportion Homeless" shortlabel="Failure"
          linearopts=
          (viewmin=0 viewmax=.5 tickvaluelist=(0 .1 .2 .3 .4 .5)));
```

```
if (PLOTHW=1 AND PLOTEP=0)
bandplot LimitUpper=eval (1-HW_LCL) LimitLower=eval (1-
HW_UCL) x=TIME / displayTail=false modelname=
"Failure" fillattrs=GRAPHCONFIDENCE name="HW"
legendlabel=LABELHW;
endif;
      if (PLOTHW=0 AND PLOTEP=1) bandplot LimitUpper=eval
      (1-EP_LCL) LimitLower=eval (1-EP_UCL) x=TIME /
      displayTail=false modelname=
      "Failure" fillattrs=GRAPHCONFIDENCE name="EP"
      legendlabel=LABELEP;
endif;
      if (PLOTHW=1 AND PLOTEP=1) bandplot LimitUpper=eval
      (1-HW_LCL) LimitLower=eval (1-HW_UCL) x=TIME /
      displayTail=false modelname=
      "Failure" fillattrs=GRAPHDATA1 datatransparency=.55
      name="HW" legendlabel=LABELHW;
      bandplot LimitUpper=eval (1-EP_LCL) LimitLower=eval
      (1-EP_UCL) x=TIME / displayTail=false modelname=
      "Failure" fillattrs=GRAPHDATA2 datatransparency=.55
      name="EP" legendlabel=LABELEP;
endif;
      if (PLOTCL=1)
      if (PLOTHW=1 OR PLOTEP=1) bandplot LimitUpper=eval
      (1-SDF_LCL) LimitLower=eval (1-SDF_UCL) x=TIME /
      displayTail=false modelname ="Failure"
      display=(outline) outlineattrs=GRAPHPREDICTIONLIMITS
      name="CL" legendlabel=LABELCL;
   else
       bandplot LimitUpper=eval (1-SDF_LCL) LimitLower=eval
      (1-SDF_UCL) x=TIME / displayTail=false modelname
         ="Failure" fillattrs=GRAPHCONFIDENCE name="CL"
      legendlabel=LABELCL;
   endif;
endif;
   stepplot y=eval (1-SURVIVAL) x=TIME / name="Failure"
   rolename=(_tip1=ATRISK _tip2=EVENT) tiplabel=(y=
   "Failure Probability" _tip1="Number at Risk"
   _tip2="Observed Events") tip=(x y _tip1 _tip2)
   legendlabel= "Failure";
   if (PLOTCENSORED) scatterplot y=eval (1-CENSORED) x=TIME
   / tiplabel=(y="Failure Probability")
   markerattrs=(symbol=plus)
   name="Censored" legendlabel="Censored";
endif;
      if (PLOTCL=1 OR PLOTHW=1 OR PLOTEP=1)
      discretelegend "Censored" "CL" "HW" "EP" /
      location=outside halign=center;
else
      if (PLOTCENSORED=1)
      discretelegend "Censored" / location=inside
      autoalign=(topleft bottomright);
   endif;
endif;
      if (PLOTATRISK=1)
      innermargin / align=bottom;
```

```
            axistable x=TATRISK value=ATRISK / display=(label)
            valueattrs=(size=7pt);
            endinnermargin;
        endif;
    endlayout;
else
    entrytitle  " ";
    if (EXISTS(SECONDTITLE))
        entrytitle SECONDTITLE / textattrs=GRAPHVALUETEXT;
    endif;
        layout overlay / xaxisopts=(shortlabel=XNAME offsetmin=.05
                linearopts=(viewmax=MAXTIME tickvaluelist=XTICKVALS
                tickvaluefitpolicy=XTICKVALFITPOL))
        yaxisopts=(label="Proportion Homeless" shortlabel="Failure"
                linearopts=(viewmin=0 viewmax=.5 tickvaluelist=(0 .1
                .2 .3 .4 .5)));
                if (PLOTHW=1) bandplot LimitUpper=eval (1-HW_LCL)
                LimitLower=eval (1-HW_UCL) x=TIME / displayTail=false
                group=STRATUM index=STRATUMNUM modelname="Failure"
                datatransparency=Transparency;
        endif;
                if (PLOTEP=1)
                bandplot LimitUpper=eval (1-EP_LCL) LimitLower=eval
                (1-EP_UCL) x=TIME / displayTail=false group=STRATUM
                index=STRATUMNUM modelname="Failure"
                datatransparency=Transparency;
        endif;
                if (PLOTCL=1)
                if (PLOTHW=1 OR PLOTEP=1)
                bandplot LimitUpper=eval (1-SDF_LCL) LimitLower=eval
                (1-SDF_UCL) x=TIME / displayTail=false group=
                STRATUM index=STRATUMNUM modelname="Failure"
                display=(outline) outlineattrs=(pattern=ShortDash);
            else
                 bandplot LimitUpper=eval (1-SDF_UCL) LimitLower=eval
                (1-SDF_LCL) x=TIME / displayTail=false group=
                 STRATUM index=STRATUMNUM modelname="Failure"
                datatransparency=Transparency;
            endif;
        endif;
                stepplot y=eval (1-SURVIVAL) x=TIME / group=STRATUM
                index=STRATUMNUM name="Failure"
                rolename=(_tip1=ATRISK _tip2=EVENT)
                tiplabel=(y="Failure Probability" _tip1="Number at
                Risk" _tip2="Observed Events") tip=(x y _tip1 _tip2);
                if (PLOTCENSORED=1)
                scatterplot y=eval (1-CENSORED) x=TIME /
                tiplabel=(y="Failure Probability") group=STRATUM
                index=
                STRATUMNUM markerattrs=(symbol=plus);
        endif;
                if (PLOTATRISK=1)
                innermargin / align=bottom;
                axistable x=TATRISK value=ATRISK / display=(label)
                valueattrs=(size=7pt) class=CLASSATRISK colorgroup
                =CLASSATRISK;
                endinnermargin;
```

```
              endif;
                  DiscreteLegend "Failure" / title=GROUPNAME
                  location=outside;
                  if (PLOTCENSORED=1)
                  if (PLOTTEST)
                  layout gridded / rows=2 autoalign=(TOPLEFT
                  BOTTOMRIGHT BOTTOM TOP) border=true BackgroundColor=
                  GraphWalls:Color Opaque=true;
                  entry "+ Censored";
                  if (PVALUE < .0001) entry TESTNAME " p " eval
                  (PUT(PVALUE, PVALUE6.4));
                      else
                          entry TESTNAME " p=" eval (PUT(PVALUE,
                          PVALUE6.4));
                      endif;
                  endlayout;
                else
                    layout gridded / rows=1 autoalign=(TOPLEFT
                    BOTTOMRIGHT BOTTOM TOP) border=true BackgroundColor=
                    GraphWalls:Color Opaque=true;
                    entry "+ Censored";
                    endlayout;
                endif;
            else
                  if (PLOTTEST=1)
                  layout gridded / rows=1 autoalign=(TOPLEFT
                  BOTTOMRIGHT BOTTOM TOP) border=true BackgroundColor=
                  GraphWalls:Color Opaque=true;
                  if (PVALUE < .0001) entry TESTNAME " p " eval
                  (PUT(PVALUE, PVALUE6.4));
                      else
                          entry TESTNAME " p=" eval (PUT(PVALUE,
                          PVALUE6.4));
                      endif;
                  endlayout;
                endif;
            endif;
        endlayout;
    endif;
          if (_BYTITLE_)
          entrytitle _BYLINE_ / textattrs=GRAPHVALUETEXT;
      else
          if (_BYFOOTNOTE_)
          entryfootnote halign=left _BYLINE_;
        endif;
      endif;
   EndGraph;
end;


**********************************************************************
*                      Involve[men]t Study                        *
*             Formats and Labels for SAS Data sets                *
**********************************************************************;
options pagesize=66 linesize=120 pageno=1 missing=' ' date FORMCHAR="|-
----|+|---+=|-/\<>*";
* Programmer    : Nicole Luisi
```

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* Modified     : 2/4/2011 by Brandon OHara, 3/27/2013 by Nicole Luisi,
                  2/10/2016 by Calli Taylor
* Purpose      : Program to set values and labels for all
Involve[men]t SAS data sets.;
* Program Location: T:\EpiProjs\MSM cohort\SAS\data_mgt
* Program Name: SQL_Formats.sas;

* Set pathways;
libname library 'T:\epiprojs\Sullivan_data_ident\C_Taylor_Inv\cat';

proc format library = library;
********************** VALUES **********************;
* GENERAL ;

value cesdbi
     1 = 'Yes'
     2 = 'No'
     . = 'Missing';

value yaynay
     1 = '1 Yes'
     0 = '2 No'
     . = 'Missing';

value DRUG
     0 = 'Didnt Use'
     1 = 'Have Used';

value BIN
     0 = 'No'
     1 = 'Yes';

 value YNF
     0 = 'No'
     1 = 'Yes' ;

 value VISIT
     1 = 'Baseline'
     2 = 'Month 3'
     3 = 'Month 6'
     4 = 'Month 12'
     5 = 'Month 18'
     6 = 'Month 24'
     11= 'Baseline - REDO'
     12= 'Month 3 - REDO'
     13= 'Month 6 - REDO'
     14= 'Month 12 - REDO'
     15= 'Month 18 - REDO'
     16= 'Month 24 - REDO';

value RACE_INC
     4 = 'White/Caucasian'
     1 = 'Black/African American'
     7 = 'Other';

value Binary_prefernot
     1="Yes"
```

```
        0="No"
        2="Not Sure"
        7="Prefer not to answer"
        9="Don't know";

value arrested_jaildays
        1="Under 30 days"
        2="Over 30 days"
        9="Don't know";

value drugfreq
        0="Didn't use"
        1="More than once a day"
        2="Once a day"
        3="More than once a week"
        4="Once a week"
        5="More than once a month"
        6="Once a month"
        7="Less than once a month"
        8="Refused to Answer";

value LikertFive
        5='Always'
        4='Very Often'
        3='Sometimes'
        2='Rarely'
        1='Never';

value CESD
        0='Rarely or none of the time'
        1='Some or little of the time'
        2='Occasionally or a moderate amount of the time'
        3='Most or all of the time';

value noninject_often
        1= "More than once a day"
        2= "Once a day"
        3= "More than once a week"
        4= "Once a week"
        5= "More than once a month"
        6= "Once a month"
        7= "Less than once a month"
        8= "Refused to answer";
```