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Impulsivity as a Risk Factor for HIV Transmission in Men who have Sex with Men: A Delay Discounting Approach

By

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Epidemiology

_____

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An abstract of
A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
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Abstract

Impulsivity as a Risk Factor for HIV Transmission in Men who have Sex with Men: A Delay Discounting Approach
By Jeb Jones

Background: Delay discounting (DD) is a measure of impulsivity that has been used with much success in the area of substance abuse research. However, impulsivity likely plays a role in decision-making processes involved in other risky behaviors as well. The goal of the current research was to assess whether the results of a monetary DD task would be predictive of sexual risk-taking in a group of internet-using men who have sex with men (MSM).

Methods: Participants (n=1402) were men ≥ 18 years old, resided in the United States, and reported having sex with ≥ one man in the previous 12 months. Recruitment occurred via advertisements on Facebook that linked to an online survey. The survey included questions about the participant's demographics, sexual history and behavior, drug use, sexual compulsivity, and a monetary DD task which was comprised of a previously validated series of questions to quantify subjective decline in value of money as the delay to receiving the money increases. The data from the survey were fit to a logistic regression model to describe associations of DD with unprotected anal intercourse (UAI) in the prior 12 months, controlling for education and drug use.

Results: The DD parameter (*k*) was highly skewed, thus analyses were conducted using the natural log transform of *k*. Two exploratory analyses were conducted. In the first, above-median rates of delay discounting were not found to be significantly associated with reporting any UAI partners in the previous 12 months, controlling for education and drug use (aOR = 1.17, CI_{95}: 0.92-1.50). In the second analysis, high (top 20%) rates of delay discounting were significantly associated with reporting multiple (>2) UAI partners in the previous 12 months, controlling for income (aOR = 1.55, CI_{95}: 1.13-2.12).

Discussion: Above-median DD was not found to be significantly associated with UAI. However, high DD was found to be a significant predictor of multiple UAI partners. Future studies should examine the utility of DD as a predictor of risky sexual behavior, as well as explore the possibility of HIV prevention interventions targeting DD.

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Table of Contents

Background

Men who have sex with men (MSM) account for a disproportionate amount of HIV cases in the United States. After several years of declining rates, incidence of HIV among MSM is on the rise. As of 2008, the prevalence of HIV among MSM was 19% (1), although this figure is likely inflated because it was estimated based on venue-based sampling in large metropolitan areas; MSM accounted for 53% of new HIV infections in the U.S. in 2006 (2). The potential for new biomedical interventions such as pre-exposure prophylaxis (PrEP) as a highly efficacious (3), yet expensive, prevention intervention necessitates the development of methods to accurately identify those at highest risk for HIV transmission in order to better target available resources to those individuals most in need. The need for tools to identify those individuals most likely to benefit from PrEP has been noted previously (4).

Impulsivity has the potential for being an indicator of HIV transmission. Impulsivity has been defined in substance abuse research as the tendency to select smaller, sooner reinforcers in lieu of larger, delayed reinforcers (5). In the context of sexual behavior, this might include eschewing the use of condoms because they are unavailable at the time of the sexual episode or because they are perceived to reduce sexual sensation. Within the impulsivity paradigm, such behavior would be impulsive because not using condoms involves immediate sexual pleasure (i.e., smaller, sooner reward) potentially at the cost of poor health outcomes (i.e., larger, delayed reward).

One indicator of impulsivity is delay discounting. Delay discounting refers to the tendency for the subjective value of a delayed reward to be discounted as a function of time (6). Individual delay discounting functions have been found to be hyperbolic in form and described by the formula,

$$V = \frac{A}{1 + kD},$$

where *V* is the present subjective value of the reward, *A* is the amount of the reward, *k* is a free parameter that describes the rate of discounting, and *D* is delay to reward (6). Thus, the *k* parameter can be used as a measure of discounting, with larger values of *k* representing a tendency to select smaller, sooner reinforcers. Delay discounting can be measured through a series of hypothetical questions that vary monetary incentives and time of reward (called a delay discounting "task").

To date, delay discounting has primarily been used within the field of substance abuse research. Substance abusers who use nicotine (7-9), alcohol (10), cocaine (11), and heroin (12, 13) have been found to discount money at higher rates than non-substance abusing controls. Further, substance abusers have been shown to discount their drug of choice at steeper rates than they discount money (10, 13). Additionally, injection drug users who report using unclean needles have been found to discount money more steeply than injection drug users who do not report using unclean needles (13). Finally, smokers have been shown to discount delayed health outcomes more steeply than non-smokers (14). In the sexual behavior literature, habitual viewers of erotic material were found to significantly discount delays to viewing erotic material compared to non-habitual viewers (15).

Thus, delay discounting is a phenotype that is not exclusively conceptually related to sexual risk taking, as evinced by the higher rates of discounting of monetary rewards by substance abusers compared to non-substance abusing controls. Further, because delay discounting of money has been shown to be a reliable finding among different types of impulsive individuals (e.g., gamblers, substance abusers), a task measuring delay discounting as it relates to money rather than sexual behavior *per se* is well suited for this type of exploratory research.

We conducted an exploratory analysis to describe the distribution of the delay discounting phenotype (discounting rate), as measured by a monetary discounting task, among internet-using US MSM, and to describe the association of delay discounting with self-reported HIV-risk behaviors. We hypothesized that we would observe larger values of *k* among individuals reporting more risky sexual behavior. For example, we hypothesized that men found to be more impulsive would be more likely to report multiple sex partners and to have sex without condoms – two activities that increase risk for HIV (16). To the extent that delay discounting is associated with sexual risk taking, it might hold value for identifying individuals at risk for HIV as well as a potential behavioral target of intervention - namely, impulsivity.

Methods

Participants

Participants were recruited via advertisements on the Facebook. Advertisements were displayed on users' pages who were male, aged ≥ 18 years, resided in the United States, and reported being interested in men in their profile. Individuals were eligible if they were male at birth, aged ≥ 18 years, and reported oral or anal sex at least with a man in the past 12 months. A total of 1,563 men completed the survey. Of those, 1,402 (90%) had data on all analysis variables. Participants were not compensated for their participation.

Materials

The survey was completed entirely online and hosted on SurveyGizmo (www.surveygizmo.com). The complete survey is included in Appendix B. The survey included questions regarding participant demographics, sexual history and behavior, and drug use. The Control portion of the Compulsive Sexual Behavior Inventory (CSBI) was also included (17) in order to compare respondents CSBI scores with the results of the delay discounting task. The CSBI has three parts, but the portion related to sexual control was most relevant to the current study. The survey concluded with the Kirby delay discounting questionnaire (12).

Kirby Delay Discounting Questionnaire

The Kirby delay-discounting questionnaire is a 27-item survey tool. This questionnaire can be administered more quickly than traditional delay discounting tasks and has been shown to result in similar values of *k* as traditional methods (18). The questionnaire includes questions in the form "Would you prefer to receive $34 today or $35 in three weeks?" It assesses discounting across three magnitudes of money: small ($25), medium ($55), and large ($85). A particular

pattern of responding on the questionnaire corresponds to a pre-determined *k* value. For example, an individual who selects the delayed value in every trial would be assigned the lowest value of *k*. As in previous studies (e.g., 12), each participant was assigned the *k* corresponding to the pattern to which their responses had the highest percent agreement. If a participant's responses matched two patterns equally then they were assigned a *k* value corresponding to the geometric mean of the corresponding parameter values. Participants were excluded if the percent agreement with their assigned value of *k* was less than 80%.

There is no empirically defined breakpoint for impulsivity within the delay discounting paradigm, thus, we conducted two exploratory analyses. In the first analysis ("above-median"), the delay discounting parameter was dichotomized at the median such that above-median delay discounting was compared to below-median delay discounting. In the second analysis ("high delay discounting"), the first quintile was used selected such that the top 20% of delay discounting parameters were identified as high delay discounting.

Data Analysis

The distribution of *k* values was highly skewed, so this variable was normalized using a natural-log transformation. Bivariate chi-square analyses were conducted to identify associations of potential predictor variables with above-median and high delay discounting and UAI. Because income had multiple levels, a chi-square test for trend was conducted to evaluate associations between changes in income and delay discounting. A logistic model was fit to the data to determine if above-median delay discounting was predictive of engaging in unprotected anal intercourse (UAI) in the previous 12 months. A second logistic model was fit to the data to determine if high delay discounting was associated with reporting more than 2 UAI partners in the previous 12 months. Because delay discounting was the exposure of interest, it was forced

into both logistic models. Both models controlled for drug use in the past 12 months (1 = yes, 0 = no) and education (college graduate = 1, some college = 2, and high school or less = 3). Alpha was set to .05 for all analyses. Data analysis was conducted using SAS 9.2 (Cary, NC) and EpiInfo 7.0 (CDC).

Results

Demographics

Demographic data are presented in Table 1. Of 1,563 completed surveys, a total of 1402 (90%) of respondents had data sufficient for analysis (Figure 1). All participants were male except for 2 (0.1%) who reported being male-to-female transgender. The modal race/ethnicity group was white, with the second largest being Hispanic (any race). Most respondents had at least some college education; about 1 in 5 had a high school education or less. Reported income was positively skewed with over 35% of respondents reporting income of less than $15,000. Just over 10% reported annual income greater than $75,000.

Delay Discounting

The overall geometric mean of the delay discounting parameter (*k*) was 0.0098 (range: 0.00016-0.25). For the above-median analysis, respondents were dichotomized into high and low discounters with those at or above the geometric mean classified as *above-median* (geometric mean = 0.0274) and those below it classified as *below-median* (geometric mean = 0.0015). For the high delay discounting analysis the first quintile was classified as *high* discounting (geometric mean = 0.0055) and the second through fifth quintiles were classified as *low* discounting (geometric mean = 0.0942).

Bivariate Analyses

Chi-square analyses were conducted to determine if there were significant bivariate relationships between the dichotomized delay discounting outcomes and demographic and behavioral variables (Tables 2 and 3).

Above-median delay discounting. Education was significantly associated with above-median delay discounting with college graduates (χ^2=5.2, p = .0229) and those with high school or less (χ^2=6.7, p = .0096) differing significantly from those with some college education. Income was also significantly associated with above-median discounting with individuals with higher reported income being less likely to highly discount delayed monetary rewards (χ^2_{trend} = 9.6, p = .002). Finally, reporting drug use in the previous 12 months was also significantly associated with above-median delay discounting (χ^2=7.7, p=.005). No significant associations of above-median DD with race/ethnicity were observed.

High delay discounting. Education was significantly associated with high delay discounting, with college graduates differing significantly from those with at least some college education (χ^2=20.4, p < .0001); however, no significant difference was observed in high delay discounting between those with some college and those with high school or less. A chi-square test for trend indicates that high delay discounting tends to decrease as income increases (χ^2_{trend} = 8.6, p = .003). Hispanic respondents were significantly different from white respondents (χ^2 = 4.9, p = .03), but no other effects of race were observed. High delay discounting was not significantly associated with using drugs in the past year.

Logistic Regression

Logistic regression models were fit to the data to determine if above-median or high delay discounting were associated with any self-reported UAI in the previous 12 months. Delay discounting was the exposure of interest and was included in all models that were tested. We considered the following potential confounders: HIV status, race, age, income and drug use. Variables that were either associated (p < .05) with both UAI and delay

discounting in bivariate analyses or have been shown to be associated with both UAI and delay discounting in previous research were included in the model.

Above-median delay discounting. Education has been shown to be associated with delay discounting (18) and was significantly associated with above-median delay discounting and UAI in the current study, so it was included in the model as a potential confounder. Drug use was associated with above-median delay discounting, and has been shown in the past to be a predictor for UAI (19). Thus, it was also included in the model as a potential confounder. Income was associated with above-median delay discounting but not UAI, whereas HIV status was associated with UAI but not above-median delay discounting. Race was not associated with UAI or above-median delay discounting. Thus, the final model included above-median delay discounting, education, and drug use. Above-median delay discounting was not significantly associated with reporting UAI (aOR = 1.19, $CI_{95\%}$ = 0.94-1.50; Table 4).

High delay discounting. The survey did not ask participants to specify whether UAI partners were main or casual partners, yet engaging in UAI with casual partners might be a much more risky sexual behavior. In order to try to analyze whether delay discounting predicts UAI with casual partners, participants were assumed to engage in UAI with a casual partner if they reported > 2 UAI partners in the past 12 months. Additionally, those individuals assumed to be high delay discounters were those in the top 20% of *k* scores. The same confounders were considered as in the above-median analysis. Race, education, and income were significantly associated with high delay discounting, but there was no association with drug use or HIV status. Income, drug use, and HIV status were significantly associated with reporting > 2 UAI partners. Thus, the final model controlled for income.

High delay discounting was significantly associated with reporting > 2 UAI partners in the past 12 months compared to ≤ two UAI partners in the past 12 months (aOR = 1.55, CI_{95}: 1.13-2.12; Table 4).

Discussion

The primary goal of the current study was to determine if delay discounting, a measure of impulsivity, was associated with sexual risk-taking in Internet-using MSM. Delay discounting has been found in previous research to be associated with increased substance abuse and gambling addictions (9, 20, 21). Additionally, Odum, Madden, and Bickel demonstrated that cigarette smokers discount future health gains as compared to never-smokers and former smokers (14). As expected based on previous research, delay discounting was significantly associated with reporting any drug use in the previous 12 months. Above-median delay discounting was not significantly associated with reporting any UAI in the previous 12 months. Although not statistically significant, the effect was in the expected direction and warrants future study. Further, high delay discounting was found to be significantly associated with reporting > 2 UAI partners in the past 12 months compared to ≤ 2 UAI partners. This indicates that those demonstrating the highest rates of discounting might be at risk for engaging in risky sexual behaviors.

The current analysis contributes a novel method of assessing impulsivity in the context of sexual risk behaviors. Delay discounting has been used extensively in research with substance abusers and has found to be predictive of both engaging in substance use (8) and, among substance abusers, of engaging in riskier substance abuse behaviors, such as sharing needles (13). Although the results of the primary analysis of delay discounting and UAI were not statistically significant, they suggest that delay discounting might be related to risky sexual behavior.

Delay discounting has potential advantages as a diagnostic tool and potential intervention target. First, it is not necessary to ask invasive sexual behavior questions in order to assess delay

discounting. An individual could be identified as a high delay-discounter, and thus at risk of engaging in risky sexual behavior, without necessarily revealing details about their sexual behavior. Additionally, the relationship between delay discounting and substance abuse, as well as the relationship between substance abuse and risky sexual behavior, suggests that delay discounting might provide a single point for assessment and, perhaps, intervention for both of these behaviors that relate to HIV acquisition.

The current study also demonstrates the feasibility of conducting delay-discounting research online. Although participants were not compensated for their time, response rates were still quite high. Of 2,320 persons that qualified for the survey, 1565 completed it (67%). Participant recruitment, conducted via advertisements on Facebook, was also low-cost. Based on the final sample size of 1,402, recruitment costs were $1.42 per participant. Additionally, all data collection was completed within 13 days of the start of the study. No other method provides the means for contacting such a large, diverse sample with such cost- and time-effectiveness.

The current study has limitations. First, the rewards considered during the monetary delay-discounting task were purely hypothetical. Although participants were instructed to answer each question as though they were considering real amounts of money, it is not clear if their responses would be different if they did indeed expect to receive actual money. Previous studies have commonly used hypothetical rewards to assess monetary delay discounting (e.g., 9, 13, 22, 23); however, such studies usually include a random selection of one or more participants who receive the reward associated with a randomly selected trial from the questionnaire. Johnson and Bickel have shown that individuals tend to provide similar responses when indicating preferences for real and hypothetical rewards (24).

Another limitation involves the limited number of questions included on the survey regarding sexual behavior and history. Because participants were not compensated for completing the survey, we kept it as short as possible in order to minimize attrition. Thus, we were not able to include some potentially useful variables. For instance, respondents were not asked to differentiate between casual and main partners when answering questions about UAI.

In order to partially address this limitation, an analysis ("high delay discounting") was conducted in which the outcome in a logistic regression model was reporting more than 2 different UAI partners during the past 12 months. It is assumed that if a participant had more than 2 UAI partners in a 12-month period then at least one of those partners was a casual partner. Additionally, instead of dichotomizing the sample into high and low delay discounters, those participants with the highest 20% of *k* scores were considered high discounters. Those in the bottom 80% of *k* scores were the comparison group and considered to be average or low discounters. In this analysis, high delay discounting was a significant predictor of reporting more than 2 different UAI partners in the previous 12 months.

The current study might also suffer from limited generalizability to other populations due to potential selection bias. The recruitment advertisement was only displayed to male Facebook users that report being interested in men in their profiles. Many gay and bisexual men might not report being interested in men on their profiles, and these men may differ in important ways from the current sample. It is also quite possible that men who are willing to participate in an uncompensated survey differ with respect to delay discounting from men who are not willing to participate. Further research will be necessary to determine if rates of compensation affect the outcomes of delay discounting measures.

Misclassification bias could also be an issue for the current study. Although the survey was completed anonymously online, social desirability might have resulted in underreporting of UAI. There is no reason to believe, however, that social desirability would affect responses to the delay-discounting task. If this were the case, then the distribution of number of UAI partners would be artificially right-skewed. As a result, the variability of number of UAI partners across levels of delay discounting would be reduced, limiting our ability to observe a significant association.

Previous research has also not resulted in an empirically derived cut point for determining impulsivity based on delay-discounting scores. Typically, delay-discounting scores are determined for two groups (e.g., substance abusers and non-substance abusers) and the group scores are compared to determine if they are significantly different. Across studies, however, the obtained discounting scores vary. Thus, in the current study we examined two different definitions of impulsivity (above-median and high delay discounting). We also examined two different measures of sexual risk-taking – any UAI in the past 12 months and > 2 UAI partners in the past 12 months.

Future Directions

Future studies should continue to explore the relationship between delay discounting and risky sexual behavior. As indicated in the secondary analysis discussed above, high delay discounting was predictive of reporting multiple UAI partners in a 12-month period. It might be the case that high delay discounters are more likely to engage in UAI with casual partners than are low discounters.

One avenue for further research is the development of a delay discounting task specific to sexual risk-taking. The current study explored monetary delay discounting and its relationship

with UAI. However, a context-specific delay-discounting task might provide more robust results in addition to the benefit of face validity. Such a task might involve weighing the choices of waiting to have sex if a condom is not available versus having unprotected intercourse. Such context-dependent tasks have previously been employed (14). It would also be beneficial to compare the results of monetary and sexual-risk-taking-specific delay discounting tasks to determine if there are within subject differences in the discounting measures generated from the different tasks.

Although this survey employed the Kirby Delay Discounting Questionnaire, other, more specific assessments of delay discounting have been developed (6). These methods involve a computer-adaptive tool that, via a titration procedure, hones in on a participant's delay discounting parameter. Future research should consider these more specific and more intensive methods of assessing delay discounting in relation to sexual risk-taking. Internet-based surveys provide the tools to be able to conduct such research on a large scale.

Delay discounting has the potential to be used as a diagnostic tool to identify individuals most in need of HIV prevention interventions. Furthermore, delay discounting might prove to be a viable behavioral target for future HIV prevention interventions. Currently, interventions are being developed to decrease the degree to which substance-abusing individuals discount delayed rewards and these methods could be adapted into an HIV prevention intervention (25, 26). These interventions are targeted at delay discounting itself, a putative underlying mechanism of substance abuse (and potentially risky sexual behavior). Thus, if these interventions are successful, they could affect multiple behavioral risk factors for HIV, such as substance abuse, including intravenous drug use, and UAI.

The relationship between delay discounting and other HIV risk factors should be explored. For example, Koblin, Husnik, Colfax et al. identified having four or more sex partners, receptive UAI, and drug or alcohol use prior to intercourse as risk factors for HIV acquisition (16). Future analyses should examine the relationship between these behavioral variables and delay discounting. Although the current analysis included drug use reported in the past 12 months, it is unknown how many participants used drugs or alcohol prior to a sexual encounter. Additionally, participants were not asked to differentiate between insertive and receptive anal intercourse.

In the current analysis, we observed a significant association between high rates of monetary delay discounting and reporting > 2 UAI partners in the past 12 months among a sample of Internet-using MSM. This is an important potential contribution to the HIV intervention literature given the dearth of interventions available targeting HIV-risk in MSM. Delay discounting represents a new behavioral target for identification of MSM who could benefit from HIV risk-reduction interventions. Further research should be conducted to further investigate delay discounting's utility as a tool to classify people based on their risk level, as well as interventions targeting delay discounting directly to reduce impulsivity and sexual risk-taking.

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Appendix A. Tables and Figures

Table 1. Demographics

	N (%)
Gender	
Male	1400 (99.9)
Male-to-Female	2 (0.1)
Race	
White	1083 (77.3)
Black	37 (2.6)
Hispanic	122 (8.7)
Other/Multiracial	160 (11.4)
Education	
High School or Less	306 (21.8)
Some College/Associate's Degree/Technical School	583 (41.6)
College Graduate	513 (36.6)
Income	
$0-4999	206 (14.7)
$5,000 to $9,999	155 (11.1)
$10,000 to $14,999	153 (10.9)
$15,000 to $19,999	110 (7.9)
$20,000 to $29,999	169 (12.1)
$30,000 to $39,999	131 (9.3)
$40,000 to $49,999	109 (7.8)
$50,000 to $74,999	134 (9.6)
$75,000+	165 (11.8)
Don't know	70 (5.0)

Table 2. Bivariate analyses of above-median delay discounting with demographic and behavioral variables.

	Delay Discounting		
	Above-Median	Below-Median	
	n (%)	n (%)	χ^2 (p-value)
Race			
White	687 (63.4)	396 (36.6)	ref
Black	27 (73.0)	10 (27.0)	1.4 (.24)
Hispanic	86 (70.5)	36 (29.5)	2.4 (.12)
Other/Multiracial	108 (67.5)	52 (32.5)	1.0 (.32)
Education			
Some College/Associate's Degree/Technical School	381 (65.4)	202 (34.7)	ref
College Graduate	301 (58.7)	212 (41.3)	5.2 (.02**)
High School or Less	226 (73.9)	80 (26.1)	6.7 (.01**)
Income			
$0-4999	141 (68.5)	65 (31.6)	ref
$5,000 to $9,999	104 (67.1)	51 (32.9)	0.1 (.79)
$10,000 to $14,999	110 (71.9)	43 (28.1)	0.5 (.48)
$15,000 to $19,999	69 (62.7)	41 (37.3)	1.1 (.31)
$20,000 to $29,999	106 (62.7)	63 (37.3)	1.4 (.24)
$30,000 to $39,999	84 (64.1)	47 (35.9)	0.7 (.41)
$40,000 to $49,999	68 (62.4)	41 (37.6)	1.2 (.28)
$50,000 to $74,999	78 (58.2)	56 (41.8)	3.7 (.05)
$75,000+	94 (57.0)	71 (43.0)	5.2 (.02**)
Don't know	54 (77.1)	16 (22.9)	n/a
Drug Use - Past 12 months			
No	519 (57.2)	320 (64.8)	ref
Yes	389 (42.8)	174 (35.2)	7.7 (.005**)

**Significant at alpha = .05

Table 3. Bivariate analyses of high delay discounting with demographic and behavioral variables.

	Delay Discounting		
	High	Low	
	n (%)	n (%)	χ^2 (p-value)
Race			
White	210 (19.4)	873 (80.6)	ref
Black	7 (18.92)	30 (81.1)	0.0 (.94)
Hispanic	34 (27.9)	88 (72.1)	4.9 (.03**)
Other/Multiracial	34 (21.3)	126 (78.8)	0.3 (.58)
Education			
Some College/Associate's Degree/Technical School	137 (23.5)	446 (76.5)	ref
College Graduate	66 (12.9)	447 (87.1)	20.4 (<.0001**)
High School or Less	82 (26.8)	224 (73.2)	1.2 (.28)
Income			
$0-4999	56 (27.2)	150 (72.8)	ref
$5,000 to $9,999	26 (16.8)	129 (83.2)	5.5 (.02**)
$10,000 to $14,999	39 (25.5)	114 (74.5)	0.1 (.72)
$15,000 to $19,999	25 (22.7)	85 (77.3)	0.7 (.39)
$20,000 to $29,999	33 (19.5)	136 (80.5)	3.0 (.08)
$30,000 to $39,999	24 (18.3)	107 (81.7)	3.5 (.06)
$40,000 to $49,999	23 (21.1)	86 (78.9)	1.4 (.24)
$50,000 to $74,999	21 (15.7)	113 (84.3)	6.1 (.01**)
$75,000+	24 (14.6)	141 (85.5)	8.7 (.003**)
Don't know	14 (20.0)	56 (80.0)	n/a
Drug Use - Past 12 months			
No	163 (19.43)	676 (80.6)	ref
Yes	122 (21.7)	441 (78.3)	1.0 (.31)

**Significant at alpha = .05

Table 4. Adjusted odds ratios for reporting UAI in the previous 12 months.

Variable	aOR ($CI_{95\%}$)
Above-median delay discounting	1.19 (0.94-1.50)
Education[1]	1.13 (0.97-1.32)
Any drug use, past 12 months	1.17 (0.93-1.47)

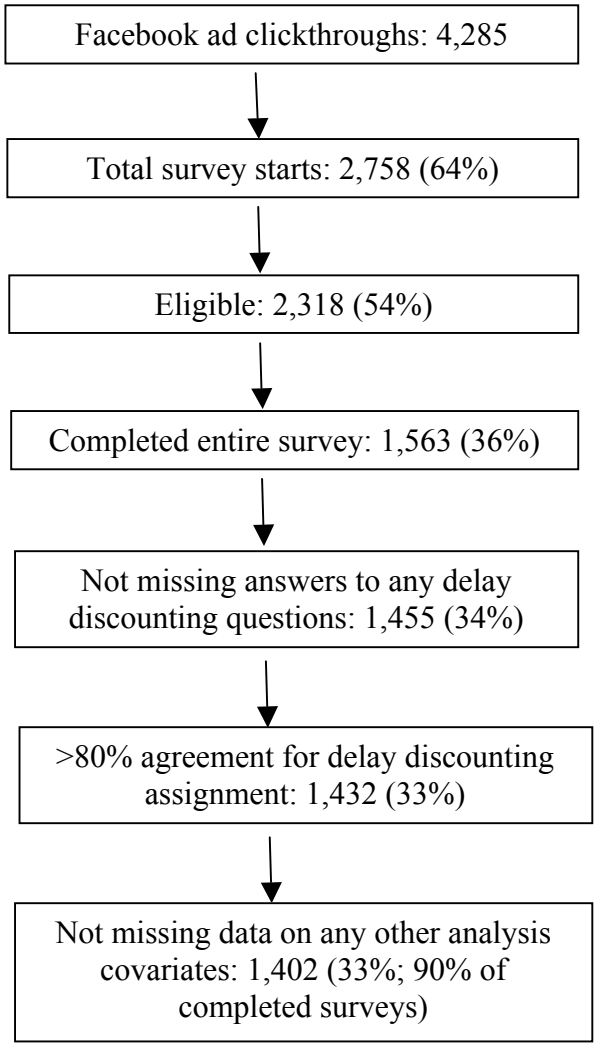
[1]Education was coded such that college graduate = 1, some college = 2, and high school or less = 3; drug use was dichotomous (1 = yes, 0 = no), and delay discounting was dichotomous (above-median = 1, below-median = 0).

Table 5. Adjusted odds ratios for reporting 3 or more UAI partners in the previous 12 months.

Variable	aOR ($CI_{95\%}$)
High delay discounting	1.55 (1.13-2.12)
Income[1]	1.04 (0.99-1.09)

[1]Income was coded as an ordinal variable using the categories presented in Table 1.

Figure 1. Flow chart of study population inclusion.



Appendix B. Emory University Men's Health and Behavior Survey

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Intro Page

Thank you for your interest in our survey. The survey should only take 5-10 minutes to complete. Please take note of the following information:

1. Your answers are anonymous: we don't have any information about who you are beyond the questions you answer.

2. Some questions are about sensitive topics; you can choose not to answer any question that you are not comfortable with.

3. If you have any questions or comments, you may contact the Principal Investigator, Dr. Rob Stephenson of Emory University, at rbsteph@emory.edu.

Screener

What is your gender?*
( ) Male
( ) Female
( ) Male-To-Female
( ) Female-To-Male

What is your age? (in years)*
[Drop down menu]

Have you had sex with a man in the past 12 months?*
( ) Yes
( ) No

Demographics

What is your race? Check all that apply.
[ ] Black/African American
[ ] White/Caucasian
[ ] Hispanic
[ ] Asian
[ ] Native Hawaiian/Pacific Islander
[ ] American Indian/Alaska Native
[ ] Other
[ ] I don't know
[ ] I decline to answer

What is the highest level in school that you completed?
( ) College, post graduate, or professional school
( ) Some college, Associate's degree, and/or Technical school

( ) High school or GED
( ) Some high school
( ) Less than high school
( ) Never attended school
( ) Don't Know

What is your annual income?
( ) 0 to $417 (monthly) / 0 to $4,999 (yearly)
( ) $418 to $833 (monthly) / $5,000 to $9,999 (yearly)
( ) $834 to $1250 (monthly) / $10,000 to $14,999 (yearly)
( ) $1251 to $1667 (monthly) / $15,000 to $19,999 (yearly)
( ) $1668 to $2500 (monthly) / $20,000 to $29,999 (yearly)
( ) $2501 to $3333 (monthly) / $30,000 to $39,999 (yearly)
( ) $3334 to $4167 (monthly) / $40,000 to $49,999 (yearly)
( ) $4168 to $6250 (monthly) / $50,000 to $74,999 (yearly)
( ) $6251 or more (monthly) / $75,000 or more (yearly)
( ) Don't know

Sex Hx 1
Do you think of yourself as:
( ) Heterosexual (Straight)
( ) Homosexual (Gay)
( ) Bisexual
( ) Other:: _____

In the past 12 months have you had sex with...
( ) Men
( ) Women
( ) Men and women
( ) No sex in last 12 months

During the past 12 months, how many different men have you had anal sex with? Estimates are ok if you don't remember the exact number.

_____

During the past 12 months, how many different women have you had vaginal or anal sex with? Estimates are ok if you don't remember the exact number.

_____

Sex Hx 2

Of the [question("value"), id="70"] men you had anal sex with in the past 12 months, how many did you have unprotected anal sex with?

_____
Of the [question("value"), id="70"] men that you had anal sex with in the past 12 months, how many of them were:

_____HIV Positive
_____HIV Negative
_____Did not know partner's HIV status

Of all of the times that you had anal sex with a man in the previous 12 months, what percentage of the time did you use a condom?
( ) 0-20%
( ) 21-40%
( ) 41-60%
( ) 61-80%
( ) 81-100%

Sex Hx 3
Have you ever used the internet to meet sex partners?
( ) Yes
( ) No

Have you ever been diagnosed with any of the following (select all that apply)?
[ ] Gonorrhea
[ ] Chlamydia
[ ] Syphilis
[ ] HIV (the disease that causes AIDS)
[ ] None of the above

Sex Hx 4
Have you been diagnosed with any of the following in the past 12 months?
[ ] Gonorrhea
[ ] Chlamydia
[ ] Syphilis
[ ] HIV (the disease that causes AIDS)
[ ] None of the above

CSBI
Please select the appropriate answer for each question below.

	Very Frequently	**Frequently**	**Occasionally**	**Rarely**	**Never**
How often have you had trouble controlling your sexual urges?	( )	( )	( )	( )	( )
Have you felt unable to control your sexual behavior?	( )	( )	( )	( )	( )
How often have you used sex to deal with worries or problems in your life?	( )	( )	( )	( )	( )
How often have you felt	( )	( )	( )	( )	( )

guilty or shameful about aspects of your sexual behavior?					
How often have you concealed or hidden your sexual behavior from others?	( )	( )	( )	( )	( )
How often have you been unable to control your sexual feelings?	( )	( )	( )	( )	( )
How often have you made pledges or promises to change or alter your sexual behavior?	( )	( )	( )	( )	( )
How often have your sexual thoughts or behaviors interfered with the formation of friendships?	( )	( )	( )	( )	( )
How often have you developed excuses and reasons to justify your sexual behavior?	( )	( )	( )	( )	( )
How often have you missed opportunities for productive and enhancing activities because of your sexual activity?	( )	( )	( )	( )	( )
How often have your sexual activities caused financial problems for you?	( )	( )	( )	( )	( )
How often have your felt emotionally distant when you were engaging in sex with others?	( )	( )	( )	( )	( )
How often have you had sex or masturbated more than you wanted to?	( )	( )	( )	( )	( )

Drug/Alcohol Hx

Have you used any drugs, including marijuana, in the past 12 months?

( ) Yes

( ) No

Drug/Alcohol Hx

In the past 12 months how often did you use the follow drugs?

	Didn't use	**More than once a day**	**Once a day**	**More than once a week**	**Once a week**	**More than once a month**	**Once a month**	**Less than once a month**
Crystal meth (tina, crank, or ice)	( )	( )	( )	( )	( )	( )	( )	( )
Crack cocaine	( )	( )	( )	( )	( )	( )	( )	( )
Powered cocaine that is smoked or snorted	( )	( )	( )	( )	( )	( )	( )	( )
Downers such as Valium, Ativan, or Xanax	( )	( )	( )	( )	( )	( )	( )	( )
Painkillers such as Oxycontin, Vicodin, or Percocet	( )	( )	( )	( )	( )	( )	( )	( )
Hallucinogens such as LSD or mushrooms	( )	( )	( )	( )	( )	( )	( )	( )
X or Ectasy	( )	( )	( )	( )	( )	( )	( )	( )
Special K (ketamine)	( )	( )	( )	( )	( )	( )	( )	( )
GHB	( )	( )	( )	( )	( )	( )	( )	( )
Heroin that is smoked or snorted	( )	( )	( )	( )	( )	( )	( )	( )
Marijuana	( )	( )	( )	( )	( )	( )	( )	( )
Poppers (amyl nitrate)	( )	( )	( )	( )	( )	( )	( )	( )

Have you ever injected a drug not prescribed to you by a doctor or other health care provider?

( ) Yes

( ) No

Kirby Instructions

You're almost finished! On the following pages you will be asked to answer a series of questions about your preferences about receiving different amounts of money. For example, you might be asked if you would prefer to receive $10 today or $17 in two weeks.

Please read each question carefully, and answer as if you would really receive the money referenced in the question.

Kirby Questionnaire - 1

Would you prefer $54 today or $55 in 117 days?
( ) $54 today
( ) $55 in 117 days

Would you prefer $55 today or $75 in 61 days?
( ) $55 today
( ) $75 in 61 days

Would you prefer $19 today or $25 in 53 days?
( ) $19 today
( ) $25 in 53 days

Would you prefer $31 today or $85 in 7 days?
( ) $31 today
( ) $85 in 7 days

Would you prefer $14 today or $25 in 19 days?
( ) $14 today
( ) $25 in 19 days

Kirby Questionnaire - 2

Would you prefer $47 today or $50 in 160 days?
( ) $47 today
( ) $50 in 160 days

Would you prefer $15 today or $35 in 13 days?
( ) $15 today
( ) $35 in 13 days

Would you prefer $25 today or $60 in 14 days?
( ) $25 today
( ) $60 in 14 days

Would you prefer $78 today or $80 in 162 days?
( ) $78 today
( ) $80 in 162 days

Would you prefer $40 today or $55 in 62 days?
( ) $40 today
( ) $55 in 62 days

Kirby Questionnaire - 3

Would you prefer $11 today or $30 in 7 days?
( ) $11 today
( ) $30 in 7 days

Would you prefer $67 today or $75 in 119 days?
( ) $67 today
( ) $75 in 119 days

Would you prefer $34 today or $35 in 186 days?
( ) $34 today
( ) $35 in 186 days

Would you prefer $27 today or $50 in 21 days?
( ) $27 today
( ) $50 in 21 days

Would you prefer $69 today or $85 in 91 days?
( ) $69 today
( ) $85 in 91 days

Kirby Questionnaire - 4

Would you prefer $49 today or $60 in 89 days?
( ) $49 today
( ) $60 in 89 days

Would you prefer $80 today or $85 in 157 days?
( ) $80 today
( ) $85 in 157 days

Would you prefer $24 today or $35 in 29 days?
( ) $24 today
( ) $35 in 29 days
Would you prefer $33 today or $80 in 14 days?
( ) $33 today
( ) $80 in 14 days

Would you prefer $28 today or $30 in 179 days?
( ) $28 today
( ) $30 in 179 days

Kirby Questionnaire - 5

Would you prefer $34 today or $50 in 30 days?
( ) $34 today
( ) $50 in 30 days

Would you prefer $25 today or $30 in 80 days?
( ) $25 today
( ) $30 in 80 days

Would you prefer $41 today or $75 in 20 days?
( ) $41 today
( ) $75 in 20 days

Would you prefer $54 today or $60 in 111 days?
( ) $54 today
( ) $60 in 111 days

Kirby Questionnaire – 6

Would you prefer $54 today or $80 in 30 days?
( ) $54 today
( ) $80 in 30 days

Would you prefer $22 today or $25 in 136 days?
( ) $22 today
( ) $25 in 136 days

Would you prefer $20 today or $55 in 7 days?
( ) $20 today
( ) $55 in 7 days

Thank You!

Thank you for taking our survey. Your response is very important to us.
If you have questions or comments, you may contact the Principal Investigator, Dr. Rob Stephenson of Emory University, at rbsteph@emory.edu.
To find an HIV testing location near you, please visit:
www.hivtest.org
To get more information about HIV, please visit:
www.cdc.gov/hiv
Otherwise, you can close your browser.

Appendix C. Annotated SAS Code

```
*************************************************
*     Program: assign k                                    *
*     Purpose: determine delay discounting           *
*                        parameters                                *
*     Author:  Jeb Jones                                        *
*************************************************


%let datafile = "H:\Thesis\Export_11-11-2011_CSV.csv";
%let datasheet = 'data$';


libname jj 'h:\thesis';
%include 'h:\thesis\DD_assignk_smallmag.sas';
%include 'h:\thesis\DD_assignk_mediummag.sas';
%include 'h:\thesis\DD_assignk_largemag.sas';

PROC IMPORT out = work.raw
     DATAFILE= &datafile
     DBMS=csv REPLACE;
     *RANGE=&datasheet; *name of the sheet in workbook to be read;
     GETNAMES=YES;  *tells SAS that the first row in excel is var names;
       GUESSINGROWS = 100;
     *MIXED=NO;
     *SCANTEXT=YES;
     *USEDATE=YES;
     *SCANTIME=YES;
RUN;

************************************
*     The following data step will  *
*           determine the %agreement      *
*           between a participant's       *
*           responses and the 10          *
*           idealized patterns for        *
*           the Kirby questionnaire       *
************************************;
data assign;
      set raw;
      k1 = 0;
      k2 = 0;
      k3 = 0;
      k4 = 0;
      k5 = 0;
      k6 = 0;
      k7 = 0;
      k8 = 0;
      k9 = 0;
      k10 = 0;

      *0.00016;
      k1_1  =     2     ;
```

```
k1_2  =     2     ;
k1_3  =     2     ;
k1_4  =     2     ;
k1_5  =     2     ;
k1_6  =     2     ;
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k1_8  =     2     ;
k1_9  =     2     ;
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k1_13 =     2     ;
k1_14 =     2     ;
k1_15 =     2     ;
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k1_19 =     2     ;
k1_20 =     2     ;
k1_21 =     2     ;
k1_22 =     2     ;
k1_23 =     2     ;
k1_24 =     2     ;
k1_25 =     2     ;
k1_26 =     2     ;
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*0.00056;
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k2_5  =     2     ;
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k2_7  =     2     ;
k2_8  =     2     ;
k2_9  =     1     ;
k2_10 =     2     ;
k2_11 =     2     ;
k2_12 =     2     ;
k2_13 =     1     ;
k2_14 =     2     ;
k2_15 =     2     ;
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k2_18 =     2     ;
k2_19 =     2     ;
k2_20 =     2     ;
k2_21 =     2     ;
k2_22 =     2     ;
k2_23 =     2     ;
k2_24 =     2     ;
k2_25 =     2     ;
k2_26 =     2     ;
k2_27 =     2     ;
*0.0014;
k3_1  =     1     ;
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k3_12 =     2     ;
k3_13 =     1     ;
k3_14 =     2     ;
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k5_27 =     2     ;
*0.022;
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k8_13 =     1     ;
k8_14 =     1     ;
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*0.25;
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k10_24      =     1     ;
k10_25      =     1     ;
k10_26      =     1     ;
k10_27      =     1     ;

param_1     =     0.00016     ;
param_2     =     0.000252982 ;
param_3     =     0.000632456 ;
param_4     =     0.001581139 ;
param_5     =     0.003872983 ;
param_6     =     0.009797959 ;
```

```
param_7     =     0.025612497 ;
param_8     =     0.064031242 ;
param_9     =     0.158113883 ;
param_10    =     0.25  ;

array patterns {10, 27} k1_1-k1_27 k2_1-k2_27
      k3_1-k3_27 k4_1-k4_27 k5_1-k5_27 k6_1-k6_27
      k7_1-k7_27 k8_1-k8_27 k9_1-k9_27 k10_1-k10_27;

array dda{27} DD1-DD27;

***************get k's;
*k1;
do i = 1 to 27;
            if dda{i} = . then k1 = .;
            else if dda{i} = patterns{1,i} then k1 = k1 + 1;
            else k1 = k1 + 0;
end;
kp1 = (k1/27)*100;

*k2;
do i = 1 to 27;
            if dda{i} = . then k2 = .;
            else if dda{i} = patterns{2,i} then k2 = k2 + 1;
            else k2 = k2 + 0;
end;
kp2 = (k2/27)*100;

*k3;
do i = 1 to 27;
            if dda{i} = . then k3 = .;
            else if dda{i} = patterns{3,i} then k3 = k3 + 1;
            else k3 = k3 + 0;
end;
kp3 = (k3/27)*100;

*k4;
do i = 1 to 27;
            if dda{i} = . then k4 = .;
            else if dda{i} = patterns{4,i} then k4 = k4 + 1;
            else k4 = k4 + 0;
end;
kp4 = k4/27*100;

*k5;
do i = 1 to 27;
            if dda{i} = . then k5 = .;
            else if dda{i} = patterns{5,i} then k5 = k5 + 1;
            else k5 = k5 + 0;
end;
kp5 = k5/27*100;

*k6;
do i = 1 to 27;
            if dda{i} = . then k6 = .;
            else if dda{i} = patterns{6,i} then k6 = k6 + 1;
            else k6 = k6 + 0;
```

```
      end;
      kp6 = k6/27*100;

      *k7;
      do i = 1 to 27;
                  if dda{i} = . then k7 = .;
                  else if dda{i} = patterns{7,i} then k7 = k7 + 1;
                  else k7 = k7 + 0;
      end;
      kp7 = k7/27*100;

      *k8;
      do i = 1 to 27;
                  if dda{i} = . then k8 = .;
                  else if dda{i} = patterns{8,i} then k8 = k8 + 1;
                  else k8 = k8 + 0;
      end;
      kp8 = k8/27*100;

      *k9;
      do i = 1 to 27;
                  if dda{i} = . then k9 = .;
                  else if dda{i} = patterns{9,i} then k9 = k9 + 1;
                  else k9 = k9 + 0;
      end;
      kp9 = k9/27*100;

      *k10;
      do i = 1 to 27;
                  if dda{i} = . then k10 = .;
                  else if dda{i} = patterns{10,i} then k10 = k10 + 1;
                  else k10 = k10 + 0;
      end;
      kp10 = k10/27*100;
      output;


      keep response_id k1-k10 kp1-kp10 smallkp1-smallkp10 param_1-param_10
dd1-dd27;

run;


************************************
*     This data step determines           *
*           which pattern(s) has/         *
*           have maximum agreement        *
*           and retains the %agree        *
*           score and the associated      *
*           paramter value(s)             *
************************************;

************************************
*     This data step determines           *
*           which pattern(s) has/         *
*           have maximum agreement        *
*           and retains the %agree        *
```

```
*           score and the associated      *
*           paramter value(s)             *
************************************;

data finalk;
      set assign;

      array agree{10} kp1-kp10;
      array param {10} param_1-param_10;



      maxagree = max (of kp1-kp10);
      nagree=0;
      do i = 1 to 10;
            if maxagree = . then agree{i} = .;
            if maxagree = . then param{i} = .;
            if agree{i} ne maxagree then agree{i} = .;
            if agree{i} ne maxagree then param{i} = .;
            if agree{i} = maxagree then nagree = nagree+1;
      end;

      finalk = geomean(of param_1-param_10);

      *the final values for k are:
            0.00016
            0.0004
            0.0006324556
            0.0015811391
            0.0025130774
            0.0038729832
            0.0039359798
            0.004449374
            0.0097979595
            0.0099597578
            0.0250316333
            0.0250474656
            0.025612498
            0.0636371871
            0.0640312438
            0.1265219791
            0.1581138861
            0.2500000036
      these are grouped below such that similar
            final values are in the same group:
      1 = 0.00016
      2 = 0.0004
      3 =   0.0006324556
      4 =   0.0015811391
      5 =   0.0025130774
      6 =   0.0038729832
      6 =   0.0039359798
      7 =   0.004449374
      8 =   0.0097979595
      8 =   0.0099597578
      9 =   0.0250316333
      9 =   0.0250474656
```

```
      9 =   0.025612498
      10 = 0.0636371871
      10 = 0.0640312438
      11 = 0.1265219791
      12 = 0.1581138861
      13 = 0.2500000036;

      if finalk = . then kgroup = .;
      else if finalk < 0.00017 then kgroup = 1;
      else if finalk < 0.0005 then kgroup = 2;
      else if finalk < 0.0007 then kgroup = 3;
      else if finalk < 0.002 then kgroup = 4;
      else if finalk < 0.003 then kgroup = 5;
      else if finalk < 0.004 then kgroup = 6;
      else if finalk < 0.004 then kgroup = 6;
      else if finalk < 0.005 then kgroup = 7;
      else if finalk < 0.01 then kgroup = 8;
      else if finalk < 0.01 then kgroup = 8;
      else if finalk < 0.03 then kgroup = 9;
      else if finalk < 0.03 then kgroup = 9;
      else if finalk < 0.03 then kgroup = 9;
      else if finalk < 0.07 then kgroup = 10;
      else if finalk < 0.07 then kgroup = 10;
      else if finalk < 0.13 then kgroup = 11;
      else if finalk < 0.16 then kgroup = 12;
      else if finalk < 0.3 then kgroup = 13;


      keep response_id maxagree finalk kgroup param_1-param_10 nagree;

run;


data finalassign;
      merge finalk finalsmallk finalmediumk finallargek;
      by response_id;
run;
```

```
*************************************************
*     Program: DD_clean_v2                                    *
*     Purpose: call assignk.sas and clean              *
*                        up the dataset                              *
*     Author:  Jeb Jones                                          *
*************************************************


*call assignk.sas;
%include 'h:\thesis\dd_assignk.sas';

data merged;
      merge raw finalassign;
      by response_id;
run;

data clean;
      set merged;
      if nagree=1 or nagree=2; *remove records with no k parameter or with >2
matching patterns;
      if maxagree ge 80; *remove 23 obs with maximum agreement with assigned
parameter < 80%;

      *create an indicator variable for condomfreq;
            *if condom use is 21-80% then condom = 1;
            *else if condom usage is 0-20% then condom = 0;
            *done for the chi square test because expected counts too
                  low for the three categories (condomfreq = 1,2,3)
                  in pairwise comparisons;
      if condomfreq = 1 or condomfreq = 2 or condomfreq = 3 then condom = 1;
      else if condomfreq = 0 then condom = 0;

                  *variable for condom use 60% or greater vs 60% or less;
                  if condomfreq in(0,1,2) then condom60 = 0;
                  else if condomfreq in (3,4) then condom60 = 1;

      *create NUMBER vars out of CHARACTER vars;
      chl12mo = chl12mochar*1;
      chlever = chleverchar*1;
      fsexnumber = fsexnumberchar*1;
      gon12mo = gon12mochar*1;
      gonever = goneverchar*1;
      hiv12mo = hiv12mochar*1;
      race_hisp = race_hispchar*1;
      race_asian = race_asianchar*1;
      race_indak = race_indakchar*1;
      race_other = race_otherchar*1;
      race_nhpi = race_nhpichar*1;
      race_dk = race_dkchar*1;
      race_noans = race_noanschar*1;
      syph12mo = syph12mochar*1;
      syphever = sypheverchar*1;

      *natural log of k;
      lnk = log(finalk);
      lnsmallk = log(finalsmallk);
      lnmediumk = log(finalmediumk);
```

```
lnlargek = log(finallargek);


if lnk < -5 then kdichot = 0;*low discounting;
      else if lnk > -5 then kdichot = 1; *high discounting;

******CSBI*******;
*score the csbi;
if n(of csbi1-csbi13) ne 13 then csbitotal = .;
else csbitotal = sum(of csbi1-csbi13);

      *reverse score the csbi (higher = more compulsive);
      array csbirev{13} csbirev1 - csbirev13;
      array csbi{13} csbi1 - csbi13;
      do i=1 to 13;
            csbirev{i} = csbi{i};
      end;
      do i = 1 to 13;
            csbirev{i} = 6-csbirev{i};
      end;
      if n (of csbirev1 - csbirev13) ne 13 then csbitotalrev = .;
      else csbitotalrev = sum(of csbirev1 - csbirev13);

      *log transform of csbi;
      lncsbi = log(csbitotalrev);


*******MSEXNUMBER*******;
*set msexnumber = 0 (instead of missing) if sexmf = 4 (no sex in past
12 months);
if sexmf = 4 then msexnumber = 0;
*set msexnumber to missing if >100;
if msexnumber > 100 then msexnumber = .;

*******UAISEXNUMBER*******;
*if msexnumber = 0 then uaisexnumber = 0 (not missing);
if msexnumber = 0 then uaisexnumber = 0;
*uaisexnumber = . if > 100;
if uaisexnumber > 100 then uaisexnumber = .;

      *code a dichotomous uaisex indicator;
      if uaisexnumber = 0 then uaiyn = 0;
      else if uaisexnumber > 0 then uaiyn = 1;

      *dichotomous with uai 2 or fewer vs 3 or more;
      if uaisexnumber in(0,1,2) then uaigt2 = 0;
      else if uaisexnumber ge 3 then uaigt2 = 1;

      *code as ordinal;
      if uaisexnumber = 0 then uaiord = 0;
      else if uaisexnumber in(1,2) then uaiord = 1;
      else if uaisexnumber > 2 then uaiord = 2;

      *risk variable if uai > 0 or unknown status partner;
      if uaisexnumber > 0 or statusdk > 0 then risky = 1;
      else if uaisexnumber = 0 and statusdk le 0 then risky = 0;
```

```
            if condomfreq in (0,1) then condomrisk = 1;
            else if condomfreq > 1 then condomrisk = 0;

            *ordinal uai for trend test;
            if uaisexnumber = 0 then uaitrend = 0;
            else if uaisexnumber in(1,2) then uaitrend = 1;
            else if uaisexnumber in (3,4,5,6) then uaitrend = 2;
            else if 7 le uaisexnumber le 15 then uaitrend = 3;
            else if uaisexnumber > 6 then uaitrend = 4;



      ********RACE**************;
      *use an array to determine if multiracial;
      array raceN{9} race_black race_white race_hisp race_asian race_indak
race_other race_nhpi race_dk race_noans;
      racenum=0;
      do i = 1 to 9;
            if raceN{i} > 0 then racenum = racenum + 1;
      end;
      *if more than one race reported then code as other;
      if racenum > 1 then race = 7; *other;
      else if race_black gt 0 then race = 1; *black;
      else if race_white gt 0 then race = 2; *white;
      else if race_hisp gt 0 then race = 3; *hispanic;
      else if race_asian gt 0 then race = 4; *asian;
      else if race_nhpi gt 0 then race = 5; *native hawaiian/pacific
islander;
      else if race_indak gt 0 then race = 6; *american indian/alaska native;
      else if race_other gt 0 then race = 7; *other;
      else if race_dk gt 0 then race = 8; *don't know;
      else if race_noans gt 0 then race = 9; *no answer;

            *recode race;
            if race in(1,2,3,9) then racecond = race;
                  else if race in(4,5,6,7,8) then racecond = 5;

      *********EDUCATION********;
      if educa in(1,2,9) then educacond = educa;
      else if educa in(3,4,5,6) then educacond = 3;

      *********PARTNER HIV STATUS********;
            *if statusdk, statusneg, and statuspos are all missing
                  then set statustotal to missing (SurveyGizmo stored
                  it as zero);
            if statusdk = . and statusneg = . and statuspos = . then
statustotal = .;

            *check that statustotal is never larger than the sum of the three
                  status vars (should be prevented by SG);
            if sum (of statusdk statusneg statuspos) ne statustotal then
statuserror = 1;

            *code a categorical status variable;
            if statusneg gt 0 then part_status = 0;
            else if statuspos gt 0 or statusdk gt 0 then part_status = 1;
```

```
      *********STD diagnosis ever********;
      if gonever in(.) and chlever in(.) and syphever in(.) and nostdever
in(.) then stdyn = .;
      else if gonever in(1) or chlever in(2) or syphever in(3) then stdyn =
1;
      else if nostdever in(9) then stdyn = 0;

            *hiv;
            if gonever in(.) and chlever in(.) and syphever in(.) and hivever
in(.) and nostdever in(.) then hivyn = .;
            else if hivever = 4 then hivyn = 1;
            else  hivyn = 0;

      ****************
      ****LABELS******
      ***************;
      label sex12mo = 'Sex with man in past 12 months';
      label educa = 'Education';
      label sexid = 'Sexual Identification';
      label sexmf = 'Types of sex partners, past 12 months';
      label msexnumber = 'Number of male sex partners, past 12 months';
      label fsexnumber = 'Number of female sex parnters, past 12 months';
      label uaisexnumber = 'Number of male anal sex partners, past 12
months';
      label condomfreq = 'Frequency of condom use during anal sex';
      label meet = 'Used the internet to meet sex partners';

      *STDs;
      label gonever = 'Ever dx with gonorrhea';
      label chlever = 'Ever dx with chlamydia';
      label syphever = 'Ever dx with syphilis';
      label hivever = 'Ever dx with HIV';
      label nostdever = 'Never dx with STD';
      label gon12mo = 'Dx with gonorrhea, past 12 mos';
      label chl12mo = 'Dx with chlamydia, past 12 mos';
      label syph12mo = 'Dx with syphilis, past 12 mos';
      label hiv12mo = 'Dx with HIV, past 12 mos';
      label nostd12mo = 'No STD dx, past 12, mos';

      *Compulsive Sexual Bx Inventory;
      label csbi1 =     "How often have you had trouble controlling your
sexual urges?";
      label csbi2 =     "Have you felt unable to control your sexual
behavior?";
      label csbi3 =     "How often have you used sex to deal with worries or
problems in your life?";
      label csbi4 =     "How often have you felt guilty or shameful about
aspects of your sexual behavior?";
      label csbi5 =     "How often have you concealed or hidden your sexual
behavior from others?";
      label csbi6 =     "How often have you been unable to control your
sexual feelings?";
      label csbi7 =     "How often have you made pledges or promises to
change or alter your sexual behavior?";
      label csbi8 =     "How often have your sexual thoughts or behaviors
interfered with the formation of friendships?";
```

```
      label csbi9 =     "How often have you developed excuses and reasons to
justify your sexual behavior?";
      label csbi10 =    "How often have you missed opportunities for
productive and enhancing activities because of your sexual activity?";
      label csbi11 =    "How often have your sexual activities caused
financial problems for you?";
      label csbi12 =    "How often have your felt emotionally distant when
you were engaging in sex with others?";
      label csbi13 =    "How often have you had sex or masturbated more than
you wanted to?";
      label csbitotal = "Total CSBI (Control Index) Score - Lower = more
compulsive";
      label csbitotalrev = "Total CSBI (Control Index) Score - Higher = more
compulsive";
      *DRUGS;
      label meth12mo = "Crystal Meth";
      label crack12mo = "Crack Cocaine";
      label coc12mo     = "Powdered Cocaine, smoked or snorted";
      label downers12mo = "Downers (e.g., Valium, Ativan, Xanax)";
      label painkill12mo = "Painkillers (e.g., Oxycontin, Vicodin,
Percocet)";
      label halluc12mo = "Hallucinogens (e.g., LSD, mushrooms)";
      label ecs12mo     = "X or Ecstasy";
      label keta12mo = "Special K (ketamine)";
      label ghb12mo     = "GHB";
      label heroin12mo = "Heroin, smoked or snorted";
      label mj12mo = "Marijuana";
      label poppers12mo = "Poppers (amyl nitrate)";
      label inject = "Injected drugs for non-medical reason";

      drop chl12mochar chleverchar fsexnumberchar gon12mochar goneverchar
hiv12mochar race_hispchar
            race_asianchar race_indakchar race_otherchar race_nhpichar
race_dkchar race_noanschar
            syph12mochar sypheverchar;

run;


*****FORMATS*********;
proc format;
      value kdichotf
            0 = 'Low'
            1 = 'High'
      ;
      value khighddf
            0 = 'Low'
            1 = 'High'
      ;
      value sexf
            1 = 'Male'
            2 = 'Female'
            3 = 'Male-to-female'
            4 = 'Female-to-male'
      ;
      value yesnof
            0 = 'No'
```

```
      1 = 'Yes'
;
value racecatf
      . = 'Missing'
      3 = 'Hispanic'
      1 = 'White'
      2 = 'Black'
      4 = 'Other'
;
value racecondf
      . = 'Missing'
      3 = 'Hispanic'
      1 = 'Black'
      2 = 'White'
      4 = 'Asian'
      5 = 'Other/Multiracial'
      9 = 'Decline to Answer'
;
value educaf
      1 = 'College, post grad, professional'
      2 = 'Some college, assoc., &/| tech school'
      3 = 'H.S. or GED'
      4 = 'Some H.S.'
      5 = 'Less than H.S.'
      6 = 'Never attended school'
      9 = "Don't know"
;
value educacondf
      1 = 'College, post grad, professional'
      2 = 'Some college, assoc., &/| tech school'
      3 = 'H.S. or Less'
      9 = "Don't know"
;
value incomef
      1 = '$0-$417(mo)/$0-$4,999(year)'
      2 = '$418-$833(mo)/$5000-$9,999(year)'
      3 = '$834-$1,250(mo)/$10,000-$14,999(year)'
      4 = '$1251-$1,667(mo)/$15,000-$19,999(year)'
      5 = '$1668-$2500(mo)/$20,000-$29,999(year)'
      6 = '$2501-$3333(mo)/$30,000-$39,999(year)'
      7 = '$3334-$4167(mo)/$40,000-$49,999(year)'
      8 = '$4168-$6250(mo)/$50,000-$74,999(year)'
      9 = '$6251+(mo)/$75,000+(year)'
      10 = "Don't know";
;
value incomecat
      1 = '$0-9,999'
      2 = '$10k-29,999'
      3 = '$30k-49,999'
      4 = '$50k+'
;
Value sexidf
      0 = "Heterosexual"
      1 = "Homosexual"
      2 = "Bisexual"
      9 = "Other"
;
```

```
      Value sexmf
            1 = 'Men'
            2 = 'Women'
            3 = 'Men and Women'
            4 = 'No sex in last 12 months'
      ;
      Value condomfreqf
            0 = '0-20%'
            1 = '21-40%'
            2 = '41-60%'
            3 = '61-80%'
            4 = '81-100%'
      ;
      Value csbif
            1 = 'Very frequently'
            2 = 'Frequently'
            3 = 'Occasionally'
            4 = 'Rarely'
            5 = 'Never'
      ;
      Value drugsf
            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"
      ;
      Value racef
            1 = "Black"
            2 = "White"
            3 = "Hispanic"
            4 = "Asian"
            5 = "Native Hawaiian/Pacific Islander"
            6 = "American Indian/Alaskan Native"
            7 = "Other"
            8 = "Don't know"
            9 = "Decline to answer"
      ;
      Value uaiynf
            0 = 'No'
            1 = 'Yes'
      ;
run;
/*
*************************
      CONTENTS
*************************;
proc contents data = clean;
run;

*************************
      CONTINUOUS VARIABLES
*************************;
      proc univariate normal plot data = clean;
```

```
            var finalk lnk msexnumber uaisexnumber csbitotal csbitotalrev
lncsbi age;
            histogram;
      run;

            proc univariate normal plot data = clean;
                  var lnk finalk;
            run;
            *compare msexnumber and uaisexnumber to sexmf (who have you had
sex with in past 12 months);
            proc freq data = clean;
                  tables sexmf*msexnumber/missing;
            run;
            proc freq data = clean;
                  tables msexnumber*uaisexnumber/missing;
            run;

      proc freq data = clean;
            tables lnk finalk;
      run;

*************************
      CATEGORICAL VARIABLES
*************************;
      *condompct income education race;
      proc freq data = clean;
            tables condomfreq income educa race sex sexid sex12mo/missing;
            format condomfreq condomfreqf. income incomef. educa educaf. race
racef. sex sexf. sexid sexidf.;
      run;

            *check distribution of race among those selecting other;
            proc print data = clean;
                  var race race_black race_white race_hisp race_asian
race_nhpi
                        race_indak race_other race_dk race_noans;
                  where race = 7;
            run;

            *investigate missings in condomfreq;
            proc freq data = clean;
                  tables condomfreq*msexnumber/missing;
                  format condomfreq condomfreqf.;
            run;

                  *check records with multiple races reported;
                  proc print data=clean;
                              var race_black race_white race_hisp race_asian
race_indak
                                    race_other race_nhpi race_dk race_noans;
                              where racenum gt 1;
                  run;
      *partner HIV status;
            *if statusdk, statusneg, and statuspos are all missing
                  then set statustotal to missing (SurveyGizmo stored
                  it as zero);
      proc freq data = clean;
```

```
            tables part_status;
      run;

      *drug use;
      proc freq data = clean;
            tables drug12mo inject meth12mo/missing;
      run;

      proc freq data = clean;
            tables meth12mo crack12mo coc12mo downers12mo painkill12mo
halluc12mo
                        ecs12mo keta12mo ghb12mo heroin12mo mj12mo
poppers12mo;
            where drug12mo = 1;
            format meth12mo crack12mo coc12mo downers12mo painkill12mo
halluc12mo
                        ecs12mo keta12mo ghb12mo heroin12mo mj12mo
poppers12mo drugsf.;
      run;

            *examine response patterns
                  >=3 respondents answered every day for each drug - should
be set to missing;
            proc print data = clean;
                  var meth12mo crack12mo coc12mo downers12mo painkill12mo
halluc12mo
                        ecs12mo keta12mo ghb12mo heroin12mo mj12mo
poppers12mo;
                  where drug12mo=1;
            run;


****************************************
*** BIVARIATE ANALYSES ******************
***   OUTCOME = ln(k) ******************
****************************************
****************************************;

*************************
      ESTIMATED LOGIT PLOTS
*************************;
      *call macro;
      %include 'H:\Thesis\logitplots.sas';
      %logitplot(clean, 6, kdichot, age, age);
      %logitplot(clean, 6, kdichot, msexnumber, msexnumber);
      %logitplot(clean, 6, kdichot, uaisexnumber, uaisexnumber);
      %logitplot(clean, 6, kdichot, csbitotalrev, csbitotalrev);
      %logitplot(clean, 6, kdichot, lncsbi, lncsbi);

      %logitplot(clean, 6, uaiyn, age, age);
      %logitplot(clean, 6, uaiyn, msexnumber, msexnumber);
      %logitplot(clean, 6, uaiyn, uaisexnumber, uaisexnumber);
      %logitplot(clean, 6, uaiyn, csbitotalrev, csbitotalrev);
      %logitplot(clean, 6, uaiyn, lncsbi, lncsbi);

****************************
      CONTINUOUS VARIABLES
```

```
*****************************;
      title;
      proc npar1way data = clean wilcoxon median;
            var msexnumber csbitotalrev uaisexnumber age uaiyn;
            class kdichot;
      run;

            proc corr data = clean;
                  var lnk msexnumber csbitotalrev uaisexnumber age;
            run;

      proc npar1way data = clean wilcoxon median;
            var msexnumber csbitotalrev lnk age;
            class uaiyn;
      run;

****************************
      CATEGORICAL BIVARIATES
*****************************;
      *********
      *kdichot*
      ********;
      proc freq data = clean;
            tables kdichot*(condomfreq stdyn hivyn part_status
                                    educa race income meet)/chisq;
      run;

                  *pairwise - education;
            proc freq data = clean;
                  title 'college, post-grad, or professional';
                  tables kdichot*educacond/chisq norow nopercent;
                  where educacond = 1 or educacond = 2;
                  format educacond educacondf. kdichot kdichotf.;
            proc freq data = clean;
                  title 'some college';
                  tables kdichot*educacond/chisq norow nopercent;
                  where educacond = 2;
                  format educacond educacondf. kdichot kdichotf.;
            proc freq data = clean;
                  title 'h.s. or less';
                  tables kdichot*educacond/chisq norow nopercent;
                  where educacond = 3 or educacond = 2;
                  format educacond educacondf. kdichot kdichotf.;
            run;
            proc freq data = clean;
                  title 'dont know';
                  tables kdichot*educacond/chisq norow nopercent;
                  where educacond = 9 or educacond = 2;
                  format educacond educacondf. kdichot kdichotf.;
            run;

            proc freq data = clean;tables income/missing;run;
            *pairwise - income;
            proc freq data = clean;
                  title '$5k-10k';
                  tables kdichot*income/chisq norow nopercent;
                  where income = 1 or income = 2;
```

```
            format income incomef. kdichot kdichotf.;
      proc freq data = clean;
            title '$10k-15k';
            tables kdichot*income/chisq norow nopercent;
            where income = 1 or income = 3;
            format income incomef. kdichot kdichotf.;
      proc freq data = clean;
            title '$15k-20k';
            tables kdichot*income/chisq norow nopercent;
            where income = 1 or income = 4;
            format income incomef. kdichot kdichotf.;
      proc freq data = clean;
            title '$20k-30k';
            tables kdichot*income/chisq norow nopercent;
            where income = 1 or income = 5;
            format income incomef. kdichot kdichotf.;
      proc freq data = clean;
            title '$30k-40k';
            tables kdichot*income/chisq norow nopercent;
            where income = 1 or income = 6;
            format income incomef. kdichot kdichotf.;
      proc freq data = clean;
            title '$40k-50k';
            tables kdichot*income/chisq norow nopercent;
            where income = 1 or income = 7;
            format income incomef. kdichot kdichotf.;
      proc freq data = clean;
            title '$50k-75k';
            tables kdichot*income/chisq norow nopercent;
            where income = 1 or income = 8;
            format income incomef. kdichot kdichotf.;
      proc freq data = clean;
            title '$75k+';
            tables kdichot*income/chisq norow nopercent;
            where income = 1 or income = 9;
            format income incomef. kdichot kdichotf.;
      proc freq data = clean;
            title 'dont know';
            tables kdichot*income/chisq norow nopercent;
            where income = 1 or income = 10;
            format income incomef. kdichot kdichotf.;
      proc freq data = clean;
            title 'missing';
            tables kdichot*income/chisq norow nopercent missing;
            where income = 1 or income = .;
            format income incomef. kdichot kdichotf.;
      run;

********
*uaiyn**
*******;
proc freq data = clean;
      tables uaiyn*(kdichot condomfreq stdyn hivyn part_status
                              educa race income meet)/chisq;
run;
      *pairwise - condomfreq;
      proc freq data = clean;
```

```
            title '21-40%';
            tables uaiyn*condomfreq/chisq;
            where condomfreq = 0 or condomfreq = 1;
            format condomfreq condomfreqf.;
      proc freq data = clean;
            title '41-60%';
            tables uaiyn*condomfreq/chisq;
            where condomfreq = 0 or condomfreq = 2;
            format condomfreq condomfreqf.;
      proc freq data = clean;
            title '61-80%';
            tables uaiyn*condomfreq/chisq;
            where condomfreq = 0 or condomfreq = 3;
            format condomfreq condomfreqf.;
      proc freq data = clean;
            title '81-100%';
            tables uaiyn*condomfreq/chisq;
            where condomfreq = 0 or condomfreq = 4;
            format condomfreq condomfreqf.;
      run;
                  proc freq data = clean;
                        title '21-80%';
                        tables uaiyn*condom/chisq;
                  run;

      *pairwise - race;
      proc freq data = clean;
            title 'black';
            tables kdichot*racecond/chisq norow nopercent;
            where race = 2 or race = 1;
            format racecond racecondf. kdichot kdichotf.;
      proc freq data = clean;
            title 'hispanic';
            tables kdichot*racecond/chisq norow nopercent;
            where race = 2 or race = 3;
            format racecond racecondf. kdichot kdichotf.;
      proc freq data = clean;
            title 'other/multiracial';
            tables kdichot*racecond/chisq norow nopercent;
            where race = 2 or race = 5 or race = 6 or race = 7 or race
= 8;
            format racecond racecondf. kdichot kdichotf.;
      proc freq data = clean;
            title 'decline to asnwer';
            tables kdichot*racecond/chisq norow nopercent;
            where race = 2 or race = 9;
            format racecond racecondf. kdichot kdichotf.;
      run;


*predictors;
proc freq data = clean;
      tables condomfreq*(stdyn part_status educa race income meet
hivyn)
                  stdyn*(part_status educa race income meet hivyn)
                  part_status*(educa race income meet hivyn)
                  educa*(race income meet hivyn)
```

```
                        race*(income meet hivyn)
                        income*(meet hivyn)
                        meet*hivyn/chisq;
      run;


****************************
      MODELS
****************************;
      *uaiyn;
      proc logistic data = clean descending;
            model uaiyn = kdichot educacond drug12mo; *msexnumber; *income;
            title 'uaiyn';
      run;

      proc logistic data = clean descending;
            model kdichot = uaiyn educacond drug12mo;
      run;

      proc freq data = clean;
            tables educacond*income/chisq;
      run;

                  *check association between uaiyn and education, income, and
msexnumber;
                  *pairwise - education;
                        proc freq data = clean;
                              title 'college, post-grad, or professional';
                              tables uaiyn*educacond/chisq norow nopercent;
                              where educacond = 1 or educacond = 2;
                              format educacond educacondf. uaiyn uaiynf.;
                        proc freq data = clean;
                              title 'some college';
                              tables uaiyn*educacond/chisq norow nopercent;
                              where educacond = 2;
                              format educacond educacondf. uaiyn uaiynf.;
                        proc freq data = clean;
                              title 'h.s. or less';
                              tables uaiyn*educacond/chisq norow nopercent;
                              where educacond = 3 or educacond = 2;
                              format educacond educacondf. uaiyn uaiynf.;
                        run;
                        proc freq data = clean;
                              title 'dont know';
                              tables uaiyn*educacond/chisq norow nopercent;
                              where educacond = 9 or educacond = 2;
                              format educacond educacondf. uaiyn uaiynf.;
                        run;

                        proc freq data = clean;tables income/missing;run;
                        *pairwise - income;
                        proc freq data = clean;
                              title '$5k-10k';
                              tables uaiyn*income/chisq norow nopercent;
                              where income = 1 or income = 2;
                              format income incomef. uaiyn uaiynf.;
                        proc freq data = clean;
```

```
                              title '$10k-15k';
                              tables uaiyn*income/chisq norow nopercent;
                              where income = 1 or income = 3;
                              format income incomef. uaiyn uaiynf.;
                        proc freq data = clean;
                              title '$15k-20k';
                              tables uaiyn*income/chisq norow nopercent;
                              where income = 1 or income = 4;
                              format income incomef. uaiyn uaiynf.;
                        proc freq data = clean;
                              title '$20k-30k';
                              tables uaiyn*income/chisq norow nopercent;
                              where income = 1 or income = 5;
                              format income incomef. uaiyn uaiynf.;
                        proc freq data = clean;
                              title '$30k-40k';
                              tables uaiyn*income/chisq norow nopercent;
                              where income = 1 or income = 6;
                              format income incomef. uaiyn uaiynf.;
                        proc freq data = clean;
                              title '$40k-50k';
                              tables uaiyn*income/chisq norow nopercent;
                              where income = 1 or income = 7;
                              format income incomef. uaiyn uaiynf.;
                        proc freq data = clean;
                              title '$50k-75k';
                              tables uaiyn*income/chisq norow nopercent;
                              where income = 1 or income = 8;
                              format income incomef. uaiyn uaiynf.;
                        proc freq data = clean;
                              title '$75k+';
                              tables uaiyn*income/chisq norow nopercent;
                              where income = 1 or income = 9;
                              format income incomef. uaiyn uaiynf.;
                        proc freq data = clean;
                              title 'dont know';
                              tables uaiyn*income/chisq norow nopercent;
                              where income = 1 or income = 10;
                              format income incomef. uaiyn uaiynf.;
                        proc freq data = clean;
                              title 'missing';
                              tables uaiyn*income/chisq norow nopercent
missing;
                              where income = 1 or income = .;
                              format income incomef. uaiyn uaiynf.;
                        run;

      proc logistic data = clean;
            model uaiyn = lnk age educacond msexnumber income;
      run;

      *stdyn;
      proc freq data = clean;
            tables stdyn;
      run;
      proc logistic data = clean;
            model stdyn = kdichot age educacond msexnumber income;
```

```
            title 'stdyn';
      run;

      *part_status;
      proc logistic data = clean;
            model part_status = kdichot age educacond race msexnumber;
            title 'part_status';
      run;

      *met sex partner online;
      proc logistic data = clean;
            model meet = kdichot age educacond race msexnumber;
            title 'meet';
      run;


proc ttest data = clean;
      var lnk;
      class stdyn;
run;

*examine k for different magnitudes;
      proc univariate data = clean;
            var finalk finalsmallk finalmediumk finallargek;
      run;

      data comparek;
            set clean;
            lnfinalk = log(finalk);
            lnfinalsmallk = log(finalsmallk);
            lnfinalmediumk = log(finalmediumk);
            lnfinallargek = log(finallargek);
      run;
      proc univariate data = comparek;
            var lnfinalk lnfinalsmallk lnfinalmediumk lnfinallargek;
      run;


      proc logistic data = clean;
            model condom60 = kdichot;
      run;

*TABLE 4*;
      proc logistic data = clean descending;
            class racecond (ref='White');
            class educacond (ref='Some college, assoc., &/| tech school');
            model uaiyn = kdichot racecond age educacond drug12mo;
*msexnumber; *income;
            title 'uaiyn';
            format kdichot kdichotf. racecond racecondf. educacond
educacondf.;
      run;

proc logistic data = clean descending;
      model kdichot = uaiord;
run;
```

```
proc logistic data = clean descending;
      model uaiyn = kdichot educacond drug12mo kdichot*educacond
kdichot*drug12mo;
      contrast 'kdichot' kdichot 1;
      contrast 'kdichot1 educacond1' kdichot 1 educacond 1/estimate=both;
      contrast 'kdichot1 educacond2' kdichot 1 educacond 2/estimate=both;
      contrast 'kdichot1 educacond3' kdichot 1 educacond 3/estimate=both;
      contrast 'kdichot1 drug12mo' kdichot 1 drug12mo 1/estimate=both;
run;


proc logistic data = clean descending;
      model uaitrend = kdichot drug12mo;
run;


proc freq data = clean;
      tables uaiyn kdichot educacond drug12mo;
run;

*/
```

```
************************************************
      Programmer: Jeb Jones
      Program: DD_analysis
      Date: 11-7-2011
      Purpose: Analyze Thesis Data
************************************************;


*this statement will run the DD_assign_v2 program
      which imports the data from the SurveyGizmo file
      and calculates the %agreement of the DD
      questionnaire responses with the 10 idealized
      reponse patterns;
%include "h:\thesis\DD_clean_v2.sas";
data analysis;
      set clean;
      if uaiyn ne .;
      if educacond ne 9;
      if educacond ne .;
      if drug12mo ne .;
      if racecond ne 9;
      if income ne .;

      if uaisexnumber < 3 then uaitest3 = 0;
      else if uaisexnumber gt 2 then uaitest3 = 1;

      if lnk < -3 then khighdd = 0;
      else if lnk > -3 then khighdd = 1;

      if msexnumber ge 4 then msexrisk = 1;
      else if msexnumber < 4 and msexnumber > -1 then msexrisk = 0;
run;
libname dd "h:\thesis";

*this data step creates a merged data
      file with the original data as
      well as the %agreement data
      calculated in DD_assing_v2.sas
*this step is necessary because it
      gets rid of all of the arrays
      used to calculate the %agreement
      variables;
/*
data dd.analysis;
      merge raw finalparam;
      by response_id;
run;

data analysis;
      set dd.analysis;
run;

proc print data = analysis (obs=5); run;
*/

****************************
      TABLE 1
```

```
*****************************;
      proc freq data = analysis;
            tables condomfreq income educacond racecond sex sexid
sex12mo/missing;
            format condomfreq condomfreqf. income incomef. educacond
educacondf. racecond racecondf. sex sexf. sexid sexidf.;
      run;

*****************************
      TABLE 2
*****************************;

            *pairwise - race;
            proc freq data = analysis;
                  title 'black';
                  tables kdichot*racecond/chisq norow nopercent;
                  where race = 2 or race = 1;
                  format racecond racecondf. kdichot kdichotf.;
            proc freq data = analysis;
                  title 'hispanic';
                  tables kdichot*racecond/chisq norow nopercent;
                  where race = 2 or race = 3;
                  format racecond racecondf. kdichot kdichotf.;
            proc freq data = analysis;
                  title 'other/multiracial';
                  tables kdichot*racecond/chisq norow nopercent;
                  where racecond = 2 or racecond = 5;
                  format racecond racecondf. kdichot kdichotf.;
            run;

      *pairwise - education;
            proc freq data = analysis;
                  title 'college, post-grad, or professional';
                  tables kdichot*educacond/chisq norow nopercent;
                  where educacond = 1 or educacond = 2;
                  format educacond educacondf. kdichot kdichotf.;
            proc freq data = analysis;
                  title 'some college';
                  tables kdichot*educacond/chisq norow nopercent;
                  where educacond = 2;
                  format educacond educacondf. kdichot kdichotf.;
            proc freq data = analysis;
                  title 'h.s. or less';
                  tables kdichot*educacond/chisq norow nopercent;
                  where educacond = 3 or educacond = 2;
                  format educacond educacondf. kdichot kdichotf.;
            run;


            *pairwise - income;
            proc freq data = analysis;
                  title '$5k-10k';
                  tables kdichot*income/chisq norow nopercent;
                  where income = 1 or income = 2;
                  format income incomef. kdichot kdichotf.;
            proc freq data = analysis;
                  title '$10k-15k';
```

```
            tables kdichot*income/chisq norow nopercent;
            where income = 1 or income = 3;
            format income incomef. kdichot kdichotf.;
      proc freq data = analysis;
            title '$15k-20k';
            tables kdichot*income/chisq norow nopercent;
            where income = 1 or income = 4;
            format income incomef. kdichot kdichotf.;
      proc freq data = analysis;
            title '$20k-30k';
            tables kdichot*income/chisq norow nopercent;
            where income = 1 or income = 5;
            format income incomef. kdichot kdichotf.;
      proc freq data = analysis;
            title '$30k-40k';
            tables kdichot*income/chisq norow nopercent;
            where income = 1 or income = 6;
            format income incomef. kdichot kdichotf.;
      proc freq data = analysis;
            title '$40k-50k';
            tables kdichot*income/chisq norow nopercent;
            where income = 1 or income = 7;
            format income incomef. kdichot kdichotf.;
      proc freq data = analysis;
            title '$50k-75k';
            tables kdichot*income/chisq norow nopercent;
            where income = 1 or income = 8;
            format income incomef. kdichot kdichotf.;
      proc freq data = analysis;
            title '$75k+';
            tables kdichot*income/chisq norow nopercent;
            where income = 1 or income = 9;
            format income incomef. kdichot kdichotf.;
      proc freq data = analysis;
            title 'dont know';
            tables kdichot*income/chisq norow nopercent;
            where income = 1 or income = 10;
            format income incomef. kdichot kdichotf.;
      run;

      *pairwise - income;
      proc freq data = analysis;
            title 'drug use';
            tables drug12mo*kdichot/chisq norow nopercent;
            format kdichot kdichotf.;
      run;

*****************************
      TABLE 3
*****************************;

      *pairwise - race;
      proc freq data = analysis;
            title 'black';
            tables khighdd*racecond/chisq norow nopercent;
            where race = 2 or race = 1;
            format racecond racecondf. khighdd khighddf.;
```

```
	proc freq data = analysis;
		title 'hispanic';
		tables khighdd*racecond/chisq norow nopercent;
		where race = 2 or race = 3;
		format racecond racecondf. khighdd khighddf.;
	proc freq data = analysis;
		title 'other/multiracial';
		tables khighdd*racecond/chisq norow nopercent;
		where racecond = 2 or racecond = 5;
		format racecond racecondf. khighdd khighddf.;
	run;

*pairwise - education;
	proc freq data = analysis;
		title 'college, post-grad, or professional';
		tables khighdd*educacond/chisq norow nopercent;
		where educacond = 1 or educacond = 2;
		format educacond educacondf. khighdd khighddf.;
	proc freq data = analysis;
		title 'some college';
		tables khighdd*educacond/chisq norow nopercent;
		where educacond = 2;
		format educacond educacondf. khighdd khighddf.;
	proc freq data = analysis;
		title 'h.s. or less';
		tables khighdd*educacond/chisq norow nopercent;
		where educacond = 3 or educacond = 2;
		format educacond educacondf. khighdd khighddf.;
	run;


	*pairwise - income;
	proc freq data = analysis;
		title '$5k-10k';
		tables khighdd*income/chisq norow nopercent;
		where income = 1 or income = 2;
		format income incomef. khighdd khighddf.;
	proc freq data = analysis;
		title '$10k-15k';
		tables khighdd*income/chisq norow nopercent;
		where income = 1 or income = 3;
		format income incomef. khighdd khighddf.;
	proc freq data = analysis;
		title '$15k-20k';
		tables khighdd*income/chisq norow nopercent;
		where income = 1 or income = 4;
		format income incomef. khighdd khighddf.;
	proc freq data = analysis;
		title '$20k-30k';
		tables khighdd*income/chisq norow nopercent;
		where income = 1 or income = 5;
		format income incomef. khighdd khighddf.;
	proc freq data = analysis;
		title '$30k-40k';
		tables khighdd*income/chisq norow nopercent;
		where income = 1 or income = 6;
		format income incomef. khighdd khighddf.;
```

```
proc freq data = analysis;
      title '$40k-50k';
      tables khighdd*income/chisq norow nopercent;
      where income = 1 or income = 7;
      format income incomef. khighdd khighddf.;
proc freq data = analysis;
      title '$50k-75k';
      tables khighdd*income/chisq norow nopercent;
      where income = 1 or income = 8;
      format income incomef. khighdd khighddf.;
proc freq data = analysis;
      title '$75k+';
      tables khighdd*income/chisq norow nopercent;
      where income = 1 or income = 9;
      format income incomef. khighdd khighddf.;
proc freq data = analysis;
      title 'dont know';
      tables khighdd*income/chisq norow nopercent;
      where income = 1 or income = 10;
      format income incomef. khighdd khighddf.;
run;

*pairwise - drug use;
proc freq data = analysis;
      title 'drug use';
      tables khighdd*drug12mo/chisq norow nopercent;
      format khighdd khighddf.;
run;

*pairwise - hiv status;
proc freq data = analysis;
      title 'hiv status';
      tables khighdd*hivyn/chisq norow nopercent;
      format khighdd khighddf.;
run;


*****************************
      MODELS
*****************************;
      *uaiyn;
      proc logistic data = analysis descending;
            model uaiyn = kdichot educacond drug12mo; *msexnumber; *income;
            title 'uaiyn';
      run;

      proc logistic data = analysis descending;
            model kdichot = uaiyn educacond drug12mo;
      run;

      proc freq data = analysis;
            tables educacond*income/chisq;
      run;

                  *check association between uaiyn and education, income, and
msexnumber;
                  *pairwise - education;
```

```
proc freq data = analysis;
      title 'college, post-grad, or professional';
      tables uaiyn*educacond/chisq norow nopercent;
      where educacond = 1 or educacond = 2;
      format educacond educacondf. uaiyn uaiynf.;
proc freq data = analysis;
      title 'some college';
      tables uaiyn*educacond/chisq norow nopercent;
      where educacond = 2;
      format educacond educacondf. uaiyn uaiynf.;
proc freq data = analysis;
      title 'h.s. or less';
      tables uaiyn*educacond/chisq norow nopercent;
      where educacond = 3 or educacond = 2;
      format educacond educacondf. uaiyn uaiynf.;
run;
proc freq data = analysis;
      title 'dont know';
      tables uaiyn*educacond/chisq norow nopercent;
      where educacond = 9 or educacond = 2;
      format educacond educacondf. uaiyn uaiynf.;
run;

proc freq data = analysis;
      title 'black';
      tables uaiyn*racecond/chisq norow nopercent;
      where race = 2 or race = 1;
      format racecond racecondf. khighdd khighddf.;
proc freq data = analysis;
      title 'hispanic';
      tables uaiyn*racecond/chisq norow nopercent;
      where race = 2 or race = 3;
      format racecond racecondf. khighdd khighddf.;
proc freq data = analysis;
      title 'other/multiracial';
      tables uaiyn*racecond/chisq norow nopercent;
      where racecond = 2 or racecond = 5;
      format racecond racecondf. khighdd khighddf.;
run;

proc freq data = analysis;tables income/missing;run;
*pairwise - income;
proc freq data = analysis;
      title '$5k-10k';
      tables uaiyn*income/chisq norow nopercent;
      where income = 1 or income = 2;
      format income incomef. uaiyn uaiynf.;
proc freq data = analysis;
      title '$10k-15k';
      tables uaiyn*income/chisq norow nopercent;
      where income = 1 or income = 3;
      format income incomef. uaiyn uaiynf.;
proc freq data = analysis;
      title '$15k-20k';
      tables uaiyn*income/chisq norow nopercent;
      where income = 1 or income = 4;
      format income incomef. uaiyn uaiynf.;
```

```
                        proc freq data = analysis;
                              title '$20k-30k';
                              tables uaiyn*income/chisq norow nopercent;
                              where income = 1 or income = 5;
                              format income incomef. uaiyn uaiynf.;
                        proc freq data = analysis;
                              title '$30k-40k';
                              tables uaiyn*income/chisq norow nopercent;
                              where income = 1 or income = 6;
                              format income incomef. uaiyn uaiynf.;
                        proc freq data = analysis;
                              title '$40k-50k';
                              tables uaiyn*income/chisq norow nopercent;
                              where income = 1 or income = 7;
                              format income incomef. uaiyn uaiynf.;
                        proc freq data = analysis;
                              title '$50k-75k';
                              tables uaiyn*income/chisq norow nopercent;
                              where income = 1 or income = 8;
                              format income incomef. uaiyn uaiynf.;
                        proc freq data = analysis;
                              title '$75k+';
                              tables uaiyn*income/chisq norow nopercent;
                              where income = 1 or income = 9;
                              format income incomef. uaiyn uaiynf.;
                        proc freq data = analysis;
                              title 'dont know';
                              tables uaiyn*income/chisq norow nopercent;
                              where income = 1 or income = 10;
                              format income incomef. uaiyn uaiynf.;
                        proc freq data = analysis;
                              title 'missing';
                              tables uaiyn*income/chisq norow nopercent
missing;
                              where income = 1 or income = .;
                              format income incomef. uaiyn uaiynf.;
                        run;


      *uaitest3 - >2 UAI partners;
                  *check association between uaiyn and education, income, and
msexnumber;
                  *pairwise - education;
                        proc freq data = analysis;
                              title 'college, post-grad, or professional';
                              tables uaitest3*educacond/chisq norow
nopercent;
                              where educacond = 1 or educacond = 2;
                              format educacond educacondf. uaiyn uaiynf.;
                        proc freq data = analysis;
                              title 'some college';
                              tables uaitest3*educacond/chisq norow
nopercent;
                              where educacond = 2;
                              format educacond educacondf. uaiyn uaiynf.;
                        proc freq data = analysis;
                              title 'h.s. or less';
```

```
                        tables uaitest3*educacond/chisq norow
nopercent;
                        where educacond = 3 or educacond = 2;
                        format educacond educacondf. uaiyn uaiynf.;
                  run;
                  proc freq data = analysis;
                        title 'dont know';
                        tables uaitest3*educacond/chisq norow
nopercent;
                        where educacond = 9 or educacond = 2;
                        format educacond educacondf. uaiyn uaiynf.;
                  run;

                  proc freq data = analysis;
                        title 'black';
                        tables uaitest3*racecond/chisq norow nopercent;
                        where race = 2 or race = 1;
                        format racecond racecondf. khighdd khighddf.;
                  proc freq data = analysis;
                        title 'hispanic';
                        tables uaitest3*racecond/chisq norow nopercent;
                        where race = 2 or race = 3;
                        format racecond racecondf. khighdd khighddf.;
                  proc freq data = analysis;
                        title 'other/multiracial';
                        tables uaitest3*racecond/chisq norow nopercent;
                        where racecond = 2 or racecond = 5;
                        format racecond racecondf. khighdd khighddf.;
                  run;

                  proc freq data = analysis;tables income/missing;run;
                  *pairwise - income;
                  proc freq data = analysis;
                        title '$5k-10k';
                        tables uaitest3*income/chisq norow nopercent;
                        where income = 1 or income = 2;
                        format income incomef. uaiyn uaiynf.;
                  proc freq data = analysis;
                        title '$10k-15k';
                        tables uaitest3*income/chisq norow nopercent;
                        where income = 1 or income = 3;
                        format income incomef. uaiyn uaiynf.;
                  proc freq data = analysis;
                        title '$15k-20k';
                        tables uaitest3*income/chisq norow nopercent;
                        where income = 1 or income = 4;
                        format income incomef. uaiyn uaiynf.;
                  proc freq data = analysis;
                        title '$20k-30k';
                        tables uaitest3*income/chisq norow nopercent;
                        where income = 1 or income = 5;
                        format income incomef. uaiyn uaiynf.;
                  proc freq data = analysis;
                        title '$30k-40k';
                        tables uaitest3*income/chisq norow nopercent;
                        where income = 1 or income = 6;
                        format income incomef. uaiyn uaiynf.;
```

```
                        proc freq data = analysis;
                              title '$40k-50k';
                              tables uaitest3*income/chisq norow nopercent;
                              where income = 1 or income = 7;
                              format income incomef. uaiyn uaiynf.;
                        proc freq data = analysis;
                              title '$50k-75k';
                              tables uaitest3*income/chisq norow nopercent;
                              where income = 1 or income = 8;
                              format income incomef. uaiyn uaiynf.;
                        proc freq data = analysis;
                              title '$75k+';
                              tables uaitest3*income/chisq norow nopercent;
                              where income = 1 or income = 9;
                              format income incomef. uaiyn uaiynf.;
                        proc freq data = analysis;
                              title 'dont know';
                              tables uaitest3*income/chisq norow nopercent;
                              where income = 1 or income = 10;
                              format income incomef. uaiyn uaiynf.;
                        proc freq data = analysis;
                              title 'missing';
                              tables uaitest3*income/chisq norow nopercent
missing;
                              where income = 1 or income = .;
                              format income incomef. uaiyn uaiynf.;
                        run;

                        proc freq data = analysis;
                              title 'drug use';
                              tables uaitest3*drug12mo/chisq norow nopercent
missing;
                        run;

                        proc freq data = analysis;
                              title 'hiv';
                              tables uaitest3*hivyn/chisq norow nopercent
missing;
                        run;

*TABLE 4*;
      proc logistic data = analysis descending;
            class racecond (ref='White');
            class educacond (ref='Some college, assoc., &/| tech school');
            model uaiyn = kdichot racecond age educacond drug12mo;
*msexnumber; *income;
            title 'uaiyn';
            format kdichot kdichotf. racecond racecondf. educacond
educacondf.;
      run;

*Table 5*;
      proc logistic data = analysis descending;
            model uaitest3 = khighdd income;
            title 'uaiyn';
      run;
```

```
                  proc logistic data = analysis descending;
                        model uaitest3 = khighdd educacond;
                        title 'educa';
                  run;

                  proc logistic data = analysis descending;
                        model uaitest3 = khighdd drug12mo;
                        title 'drug';
                  run;

                  proc logistic data = analysis descending;
                        model uaitest3 = khighdd hivyn;
                        title 'hiv';
                  run;

                  proc logistic data = analysis descending;
                        model uaitest3 = khighdd racecond;
                        title 'race';
                  run;

                  proc logistic data = analysis descending;
                        model uaitest3 = khighdd age;
                        title 'age';
                  run;

      proc logistic data = analysis descending;
            model uaitest3 = khighdd educacond drug12mo racecond age;
            title 'hiv negative only';
      run;


      proc freq data = analysis; tables uaitest3*uaisexnumber;run;
**********************************
**********other stats************
**********************************;

      proc means data = analysis;
            var lnk;
            proc means data = analysis;
                  var lnk;
                  class kdichot;
      run;
```

Appendix D. IRB Approval Letter

EMORY UNIVERSITY

Institutional Review Board

October 17, 2011

Jeb Jones
Principal Investigator
Public Health

RE: **Exemption of Human Subjects Research**
IRB00053287
Delay discounting and sexual risk among U.S. MSM

Dear Principal Investigator:

Thank you for submitting an application to the Emory IRB for the above-referenced project. Based on the information you have provided, we have determined on 10/17/2011 that although it is human subjects research, it is exempt from further IRB review and approval.

This determination is good indefinitely unless substantive revisions to the study design (e.g., population or type of data to be obtained) occur which alter our analysis. Please consult the Emory IRB for clarification in case of such a change. Exempt projects do not require continuing renewal applications.

This project meets the criteria for exemption under 45 CFR 46.101(b)(2). Specifically, you will use an anonymous survey examining delayed gratification in the MSM community.

- Approved Document: ICF 10-3-2011
- Approved Document: Delay_Discounting Survey (9/22/2011)

Please note that the Belmont Report principles apply to this research: respect for persons, beneficence, and justice. You should use the informed consent materials reviewed by the IRB unless a waiver of consent was granted. Similarly, if HIPAA applies to this project, you should use the HIPAA patient authorization and revocation materials reviewed by the IRB unless a waiver was granted. CITI certification is required of all personnel conducting this research.

Unanticipated problems involving risk to subjects or others or violations of the HIPAA Privacy Rule must be reported promptly to the Emory IRB and the sponsoring agency (if any).

In future correspondence about this matter, please refer to the study ID shown above. Thank you.

Sincerely,

Aric Edwards
Analyst Assistant
This letter has been digitally signed

CC: There are no items to display

Sullivan Patrick Epidemiology

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