

Supplemental Table 1: PATH Study Waves 1-3: Numbers of Individuals and Numbers of Observations that Could Contribute to GEE Analyses Using the 'All-Waves' Weights.

Age group† in W1, W2, W3	Description	Contributes to adult vs. youth tables for each wave pair in GEE analyses using Waves 1-3		N individuals ¹	N observations ¹
		W1-W2	W2-W3		
AAA	Adults at all three waves	adult	adult	23,670	47,340
YYY	Youth at all three waves	youth	youth	7,595	15,190
YYA	Youth who aged into adults at W3	youth	youth	1,737	3,474
YAA	Youth who aged into adults at W2	youth	adult	1,714	1,714
SYY	Shadow youth who aged into youth at W2	does not contribute	youth	1,947	1,947
SSY	Shadow youth who aged into youth at W3	does not contribute	does not contribute	0	0

Abbreviations: W1= Wave 1; W2= Wave 2; W3= Wave 3, GEE= generalized estimating equation
†Age group key: A= Adult; Y=Youth; S=Shadow youth
¹Unweighted numbers of individuals and number of observations used will vary by outcome and covariates included in a model
Maximum number of individuals for adult analyses (A + A) = 25,384
Maximum number of observations for adult analyses ((A X 2) + A) = 49,054
Maximum number of individuals for youth analyses (Y + Y + Y+ Y) = 12,993
Maximum number of observations for youth analyses ((Y X 2) + (Y X 2) + Y + Y) = 22,325

Supplemental Table 2: Correlates of Discontinuing P30D Use Among P30D Users (Youth 12-17) at Baseline.

	No P30D use at follow-up																			
	Cigarettes				ENDS				Cigars				Hookah				Smokeless			
Correlates at baseline	%	95% CI	aOR ¹	95% CI	%	95% CI	aOR ¹	95% CI	%	95% CI	aOR ¹	95% CI	%	95% CI	aOR ¹	95% CI	%	95% CI	aOR ¹	95% CI
Overall	32.5	(29.0-36.1)	N/A	N/A	55.6	(51.5-59.6)	N/A	N/A	54.8	(49.1-60.3)	N/A	N/A	70.8	(65.4-75.6)	N/A	N/A	36.3	(29.2-44.1)	N/A	N/A
DEMOGRAPHIC CHARACTERISTICS																				
Age group																				
12-14	44.8	(36.6-53.3)	--	--	67.7	(59.5-74.9)	--	--	†	†	--	--	†	†	--	--	54.7	(38.4-70.1)	--	--
15-17	30.4	(26.5-34.5)	0.6	(0.4-0.9)*	52.8	(48.2-57.2)	0.6	(0.2-2.3)	52.5	(46.1-58.8)	.	.	67.3	(61.3-72.8)	.	.	31.8	(25.6-38.9)	.	.
Sex																				
Female	35.4	(31.0-40.0)	--	--	58.1	(50.9-65.1)	--	--	55.9	(45.2-66.1)	--	--	69.0	(61.6-75.6)	--	--	†	†	--	--
Male	29.5	(24.6-35.0)	0.8	(0.5-1.1)	54.0	(48.4-59.5)	0.8	(0.4-1.7)	54.2	(47.6-60.7)	.	.	73.0	(64.9-79.8)	.	.	30.2	(24.0-37.2)	.	.
Race/ethnicity																				
Non-Hispanic White	30.1	(25.9-34.7)	--	--	48.4	(42.5-54.3)	--	--	55.2	(47.5-62.6)	--	--	70.1	(61.7-77.2)	--	--	32.5	(25.5-40.3)	--	--
Non-Hispanic Black	37.7	(27.3-49.5)	1.4	(0.9-2.4)	†	†	†	†	46.2	(33.2-59.7)	.	.	†	†	.	.	†	†	.	.
Non-Hispanic Other (includes two or more races)	28.4	(19.3-39.6)	0.7	(0.4-1.3)	65.5	(50.3-78.1)	1.8	(0.5-6.9)	†	†	.	.	†	†	.	.	†	†	.	.
Hispanic	40.9	(33.6-48.6)	1.3	(0.8-2.1)	68.7	(60.9-75.6)	2.4	(0.9-6.7)	62.8	(52.4-72.2)	.	.	69.6	(58.2-79.0)	.	.	†	†	.	.
Sexual orientation (ages 14+)																				
Straight/Heterosexual	32.5	(28.7-36.5)	--	--	56.2	(51.6-60.6)	--	--	52.9	(46.9-58.8)	--	--	70.1	(63.8-75.6)	--	--	32.3	(25.0-40.5)	--	--
Other (includes gay, lesbian, bisexual, other)	25.2	(19.0-32.6)	0.5	(0.3-0.9)*	51.7	(39.8-63.5)	.	.	55.0	(40.7-68.6)	.	.	68.2	(53.6-80.0)	.	.	†	†	.	.
TOBACCO USE CORRELATES																				
Use of cigarettes																				
No P30D use	N/A	N/A	N/A	N/A	59.5	(54.2-64.6)	--	--	57.6	(48.2-66.5)	--	--	71.6	(64.8-77.6)	--	--	34.9	(26.8-44.1)	--	--
P30D use	N/A	N/A	N/A	N/A	50.4	(43.9-57.0)	0.8	(0.5-1.4)	52.5	(45.7-59.1)	.	.	69.3	(60.2-77.1)	.	.	38.8	(27.3-51.7)	.	.
Use of ENDS																				
No P30D use	32.1	(28.1-36.4)	--	--	N/A	N/A	N/A	N/A	55.6	(47.9-63.1)	--	--	71.8	(65.2-77.6)	--	--	35.0	(27.7-43.0)	--	--
P30D use	34.0	(27.8-40.8)	1.2	(0.8-1.7)	N/A	N/A	N/A	N/A	53.3	(44.6-61.8)	.	.	67.6	(57.1-76.7)	.	.	38.8	(27.1-51.9)	.	.
Use of cigars																				
No P30D use	31.5	(27.8-35.5)	--	--	57.7	(53.1-62.3)			N/A	N/A	N/A	N/A	71.3	(65.2-76.8)	--	--	35.1	(27.0-44.2)	--	--
P30D use	34.2	(27.4-41.8)	1.4	(0.9-2.2)	47.1	(37.7-56.8)	0.9	(0.2-5.0)	N/A	N/A	N/A	N/A	71.2	(55.3-83.2)	.	.	40.5	(29.1-53.0)	.	.
Use of hookah																				
No P30D use	32.1	(28.3-36.1)	--	--	56.2	(51.9-60.3)	--	--	55.3	(49.4-61.0)	--	--	N/A	N/A	N/A	N/A	35.5	(27.8-43.9)	--	--
P30D use	33.9	(25.7-43.2)	1.1	(0.6-2.0)	52.0	(40.8-63.0)	1.1	(0.2-5.3)	51.6	(36.2-66.7)	.	.	N/A	N/A	N/A	N/A	†	†	.	.
Use of smokeless																				
No P30D use	33.3	(29.6-37.3)	--	--	56.9	(52.7-61.0)	--	--	56.7	(50.9-62.2)	--	--	71.0	(65.3-76.2)	--	--	N/A	N/A	N/A	N/A
P30D use	23.0	(15.4-32.8)	0.6	(0.3-1.1)	44.7	(33.5-56.4)	0.8	(0.3-2.3)	49.6	(37.6-61.6)	.	.	†	†	.	.	N/A	N/A	N/A	N/A
Frequency of use of the given product (in the past 30 days)																				
1-19 days	41.6	(37.0-46.3)	--	--	57.8	(53.3-62.1)	--	--	55.2	(48.7-61.4)	--	--	62.0	(52.7-70.4)	--	--	54.7	(44.3-64.6)	--	--
20-30 days	12.4	(8.6-17.6)	0.2	(0.1-0.4)***	34.9	(25.2-46.1)	0.5	(0.0-4.3)	†	†	.	.	†	†	.	.	10.5	(5.9-17.9)	.	.

Notes:

Abbreviations: P30D = past 30-day; ENDS = electronic nicotine delivery system; aOR = adjusted odds ratio; CI = confidence interval; N/A = not applicable

The percentages and odds ratios in the table are based on weighted data.

Denominator N (unweighted number of observations) for aOR in "Cigarettes" = 799 without sexual orientation, 745 with sexual orientation

Denominator N (unweighted number of observations) for aOR in "ENDS" = 592 without sexual orientation, 557 with sexual orientation

Denominator N (unweighted number of observations) for aOR in "Cigars" = 355 without sexual orientation, 341 with sexual orientation

Denominator N (unweighted number of observations) for aOR in "Hookah" = 137 without sexual orientation, 133 with sexual orientation

Denominator N (unweighted number of observations) for aOR in "Smokeless" = 244 without sexual orientation, 229 with sexual orientation

Tobacco product types were categorized into five groups: cigarettes, ENDS (e-cigarettes at Wave 1, and e-cigarettes, e-cigars, e-pipes, and e-hookah at Waves 2 & 3), cigars (traditional cigars, cigarillos, filtered cigars), hookah, and smokeless tobacco (loose snus, moist snuff, dip, spit, chewing tobacco, and snus pouches).

For each of the five tobacco products, and for any tobacco product, use is defined with respect to the given tobacco product/any tobacco product:

P30D use is defined as using the product at least once in the past 30 days.

The outcome 'discontinuing P30D use' is defined as no P30D use at follow-up (vs. P30D use at follow-up) among P30D users at baseline. Since no P30D use at baseline is defined with respect to each tobacco product, P30D use of 'other' tobacco products are considered as correlates of no P30D use of the given tobacco product at follow-up.

Tobacco dependence was not assessed among all P30D users and thus is not included in these analyses.

GEE logistic regression analyses were used to assess correlates of no P30D use at follow-up among P30D users at baseline over a one-year period of time (i.e., Wave 1-Wave 2 and Wave 2-Wave 3), including up to two change data points per individual and statistically controlling for the correlation among observations from the same individuals.

All correlates reflect baseline measurement for each wave pair (e.g., when evaluating change between Wave 1 and Wave 2, the age correlate reflects a person's age at Wave 1, and when evaluating change between Wave 2 and Wave 3, the age correlate reflects a person's age at Wave 2).

Data consist of those who are youth at all three waves, youth who age into the adult cohort at Wave 3, shadow youth who age into the youth cohort at Wave 2, and Wave 1-Wave 2 data only from youth who age into the adult cohort at Wave 2 (their Wave 2-Wave 3 data are included in adult tables).

¹Analyses adjusted for age group, sex, race/ethnicity, each tobacco use correlate, and wave. Sexual orientation (asked only of those 14 and older) was run separately and not included as a covariate in the other aORs.

† Estimates with either a relative standard error greater than 30 or a corresponding denominator less than 50 have been suppressed.

GEE models failed to converge for discontinuing use of cigars, hookah, and smokeless tobacco.

* p < 0.05

** p < 0.01

*** p < 0.001

"." Indicates the adjusted GEE model was not able to converge, likely due to small cell sizes.

Supplemental Table 3: Correlates of Making a Quit Attempt Among P30D Nonlight Users (Youth 12-17) at Baseline.

Correlates at baseline	Quit attempt at follow-up			
	Cigarettes			
	%	95% CI	aOR ¹	95% CI
Overall	57.8	(53.4-62.0)	N/A	N/A
DEMOGRAPHIC CHARACTERISTICS				
Age group				
12-14	75.0	(59.9-85.7)	--	--
15-17	55.5	(51.0-59.9)	0.5	(0.2-1.3)
Sex				
Female	57.2	(50.2-64.0)	--	--
Male	58.3	(52.6-63.8)	1.1	(0.7-1.7)
Race/ethnicity				
Non-Hispanic White	56.0	(50.1-61.6)	--	--
Non-Hispanic Black	†	†	1.7	(0.6-4.5)
Non-Hispanic Other (includes two or more races)	64.5	(48.6-77.8)	1.1	(0.5-2.4)
Hispanic	56.5	(45.7-66.8)	1.1	(0.6-1.9)
Sexual orientation (ages 14+)				
Straight/Heterosexual	57.8	(53.0-62.4)	--	--
Other (includes gay, lesbian, bisexual, other)	52.2	(42.0-62.3)	0.7	(0.4-1.3)
TOBACCO USE BEHAVIORS				
Use of cigarettes				
No P30D use	N/A	N/A	N/A	N/A
P30D use	N/A	N/A	N/A	N/A
Use of ENDS				
No P30D use	56.8	(51.6-61.8)	--	--
P30D use	59.9	(51.6-67.7)	1.1	(0.7-1.7)
Use of cigars				
No P30D use	57.4	(51.8-62.8)	--	--
P30D use	57.7	(49.0-65.9)	1.0	(0.6-1.6)
Use of hookah				
No P30D use	56.8	(52.0-61.5)	--	--
P30D use	63.4	(50.8-74.4)	1.4	(0.7-2.7)
Use of smokeless				
No P30D use	59.0	(53.7-64.1)	--	--
P30D use	47.4	(35.1-60.0)	0.6	(0.3-1.2)
Frequency of use of the given product (in the past 30 days)				
10-19 days	63.8	(57.1-70.0)	--	--
20-30 days	50.9	(44.3-57.4)	0.9	(0.5-1.4)
Mean tobacco dependence score²	52.2	(49.2-55.1)	0.8	(0.6-1.0)*
Notes: Abbreviations: P30D = past 30-day; ENDS = electronic nicotine delivery system; aOR = adjusted odds ratio; CI = confidence interval; N/A = not applicable				
The percentages and odds ratios in the table are based on weighted data. Denominator N (unweighted number of observations) for aOR in "Cigarettes" = 500 with sexual orientation, 472 without sexual orientation				
Use is defined with respect to the given tobacco product (e.g., Cigarettes): Making a cigarette quit attempt is defined as having tried to quit smoking cigarettes in the past 12 months at follow-up or not being a past 30-day cigarette smoker at follow-up. P30D use is defined as using the product at least once in the past 30 days. P30D non-light cigarette use is defined as use on at least 10 of the past 30 days.				
The outcome 'making a quit attempt' is defined as a quit attempt at follow-up (vs. no quit attempt at follow-up) among those who were P30D non-light users at baseline. Since no P30D use at baseline is defined with respect to each tobacco product, P30D use of 'other' tobacco products at baseline are considered as correlates of 'making a quit attempt' of the given tobacco product at follow-up.				
GEE logistic regression analyses were used to assess correlates of making a quit attempt at follow-up among those who were P30D nonlight users at baseline over a one-year period of time (i.e., Wave 1-Wave 2 and Wave 2-Wave 3), including up to two change data points per individual and statistically controlling for the correlation among observations from the same individuals. All correlates reflect baseline measurement for each wave pair (e.g., when evaluating change between Wave 1 and Wave 2, the age correlate reflects a person's age at Wave 1, and when evaluating change between Wave 2 and Wave 3, the age correlate reflects a person's age at Wave 2). Data consist of those who are youth at all three waves, youth who age into the adult cohort at Wave 3, shadow youth who age into the youth cohort at Wave 2, and Wave 1-Wave 2 data only from youth who age into the adult cohort at Wave 2 (their Wave 2-Wave 3 data are included in adult tables).				
¹ Analyses adjusted for age group, sex, race/ethnicity, each tobacco use correlate, and wave. Sexual orientation (asked only of those 14 and older) was run separately and not included as a covariate in the other aORs.				
² Tobacco dependence score was defined as described and validated by Strong et al. (2017). Weighted means are presented with 95% confidence intervals. To estimate odds ratios and 95% confidence intervals, the tobacco dependence variable was scaled to a mean of 0 with standard deviation of 1 for each tobacco product (therefore, ORs indicate the likelihood of the outcome per standard deviation unit increase in the level of tobacco dependence for each tobacco product).				
† Estimates with either a relative standard error greater than 30 or a corresponding denominator less than 50 have been suppressed.				
* p <0.05				
** p <0.01				
*** p <0.001				

Supplemental Table 4: Correlates of Quitting Among Quit Attempters Who were P30D Nonlight Users (Youth 12-17) at Baseline and Made a Quit Attempt at Follow-Up.

Correlates at baseline	No P30D use at follow-up			
	Cigarettes			
	%	95% CI	aOR ¹	95% CI
Overall	38.9	(32.9-45.3)	N/A	N/A
DEMOGRAPHIC CHARACTERISTICS				
Age group				
12-14	49.9	(36.7-63.1)	--	--
15-17	37.0	(30.7-43.7)	.	
Sex				
Female	42.9	(35.1-51.0)	--	--
Male	35.3	(26.4-45.3)	.	
Race/ethnicity				
Non-Hispanic White	38.9	(31.1-47.2)	--	--
Non-Hispanic Black	†	†	.	
Non-Hispanic Other (includes two or more races)	†	†	.	
Hispanic	32.3	(20.6-46.8)	.	
Sexual orientation (ages 14+)				
Straight/Heterosexual	37.7	(30.9-45.0)	--	--
Other (includes gay, lesbian, bisexual, other)	34.7	(23.8-47.4)	.	
TOBACCO USE BEHAVIORS				
Use of cigarettes				
No P30D use	N/A	N/A	N/A	N/A
P30D use	N/A	N/A	N/A	N/A
Use of ENDS				
No P30D use	38.2	(31.3-45.6)	--	--
P30D use	41.0	(30.9-52.0)	.	
Use of cigars				
No P30D use	37.9	(31.6-44.7)	--	--
P30D use	40.3	(28.7-53.1)	.	
Use of hookah				
No P30D use	38.2	(31.5-45.4)	--	--
P30D use	†	†	.	
Use of smokeless				
No P30D use	38.1	(31.6-45.1)	--	--
P30D use	†	†	.	
Frequency of use of the given product (in the past 30 days)				
10-19 days	50.6	(42.2-58.9)	--	--
20-30 days	22.9	(16.0-31.5)	.	
Mean tobacco dependence score²	48.2	(44.2-52.2)	.	
Notes: Abbreviations: P30D = past 30-day; ENDS = electronic nicotine delivery system; aOR = adjusted odds ratio; CI = confidence interval; N/A = not applicable				
The percentages and odds ratios in the table are based on weighted data. Denominator N (unweighted number of observations) for aOR in "Cigarettes" = 279 with sexual orientation, 257 without sexual orientation				
Use is defined with respect to the given tobacco product (e.g., Cigarettes): P30D use is defined as using the product at least once in the past 30 days. P30D nonlight cigarette use is defined as use on at least 10 of the past 30 days.				
The outcome 'quitting' is defined as no P30D use at follow-up (vs. P30D use at follow-up) among those who were P30D non-light users at baseline and made a quit attempt at follow-up. Since no P30D use at baseline is defined with respect to each tobacco product, P30D use of 'other' tobacco products at baseline are considered as correlates of 'quitting' for the given tobacco product at follow-up.				
GEE logistic regression analyses were used to assess correlates of no P30D use at follow-up among P30D nonlight users at baseline who made a quit attempt at follow-up using two wave pairs (i.e., Wave 1-Wave 2 and Wave 2-Wave 3), including up to two change data points per individual and statistically controlling for the correlation among observations from the same individuals. All correlates reflect baseline measurement for each wave pair (e.g., when evaluating change between Wave 1 and Wave 2, the age correlate reflects a person's age at Wave 1, and when evaluating change between Wave 2 and Wave 3, the age correlate reflects a person's age at Wave 2). Data consist of those who are youth at all three waves, youth who age into the adult cohort at Wave 3, shadow youth who age into the youth cohort at Wave 2, and Wave 1-Wave 2 data only from youth who age into the adult cohort at Wave 2 (their Wave 2-Wave 3 data are included in adult tables). ¹ Analyses adjusted for age group, sex, race/ethnicity, each tobacco use correlate, and wave. Sexual orientation (asked only of those 14 and older) was run separately and not included as a covariate in the other aORs. ² Tobacco dependence score was defined as described and validated by Strong et al. (2017). Weighted means are presented with 95% confidence intervals. To estimate odds ratios and 95% confidence intervals, the tobacco dependence variable was scaled to a mean of 0 with standard deviation of 1 for each tobacco product (therefore, ORs indicate the likelihood of the outcome per standard deviation unit increase in the level of tobacco dependence for each tobacco product). † Estimates with either a relative standard error greater than 30 or a corresponding denominator less than 50 have been suppressed. GEE model failed to converge for cigarettes. * p <0.05 ** p <0.01 *** p <0.001 "." Indicates the adjusted GEE model was not able to converge, likely due to small cell sizes.				

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/*****
* PATH_GEE_MACRO_CORRELATESPAPERS_12072018.SAS
*
* THIS SAS MACRO WAS CREATED FOR PATH CORRELATES PAPERS, TO
* 1. RUN GENERALIZED ESTIMATING EQUATIONS (GEE) MODELS WITH BINARY RESPONSE/OUTCOME VARIABLES AND
* PREDICTORS, USING FULL-SAMPLE AND REPLICATE WEIGHTS (100 HERE).
* (AUTHOR NOTES: THIS IS A QCED TEMPLATE; THIS MACRO CAN BE MODIFIED TO RUN FOR OTHER TYPES OF
* RESPONSE VARIABLES BY SPECIFYING APPROPRIATE DISTRIBUTION AND LINK FUNCTION)
* 2. COMPUTE VARIANCES USING THE BALANCED REPEATED REPLICATION (BRR) METHOD WITH FAY'S ADJUSTMENT (0.3).
* 3. COMPUTE TEST STATISTICS, P VALUES, AND 95% CONFIDENCE LIMITS.
* 4. OUTPUT GEE ODDS RATIO POINT ESTIMATES, 95% CONFIDENCE LIMITS, AND P VALUES, LABELLED WITH RESPONSE
* AND PREDICTOR VARIABLE NAMES AND EFFECT LEVELS (IF CATEGORICAL PREDICTORS).
*
* WHO: CO-AUTHOR OF PATH CORRELATES PAPERS
* WHEN: 1/23/2018
* 12/7/2018: CO-AUTHOR MODIFIED COMMENTS AND FORMATS FOR JOURNAL SUBMISSION
*****/

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*LIBNAME IN '~\PATH\CORRELATES_PAPERS\ANALYSIS\DATA';
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TITLE 'PROJECT PATH: MULTI-WAVE DERIVED DATASETS (FINAL DRAFT)';
```

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OPTIONS NOCENTER NOFMterr LS=155 PS=87;
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%MACRO MAC_GEE0(VAR=, COV=);
%LET WHERE= EVR_&VAR = 0 AND EVR_&VAR._FUP IN (0,1) AND WAVE IN (1,2) AND
    COVVAR >= 0
;
```

```
*NON-MISSING OUTCOME AND THE COVARIATES;
```

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DATA D2; SET D0; WHERE &WHERE; RUN;
```

```
TITLE2 "GENMOD (GEE) MACRO: MODELING NEW EVER USE OF &VAR AMONG NEVER USERS";
TITLE3 "GENMOD (GEE) MODELING: MAIN-EFFECT OF WAVE AND &COV (FULL-SAMPLE WEIGHTED)";
PROC GENMOD DATA=D2;
CLASS PID WAVE (REF='1')
/PARAM=REF;
MODEL EVR_&VAR._FUP (EVENT='1') = WAVE &COV/DIST = BIN LINK = LOGIT;
REPEATED SUBJECT = PID/ TYPE = UN COVB CORR;
ODS OUTPUT GEEEMPEST=_EST ;
WEIGHT WGT;
RUN;
DATA EST0; SET _EST;
LENGTH OUTCOME $20;
OUTCOME="&VAR";
WHERE PARM^="INTERCEPT";
OBS=_N_;
RUN;
PROC SORT DATA=EST0;
BY OBS;
RUN;
DATA EST; SET EST0;
VAR=0;
RUN;
%MEND;
```

```
%MACRO MAC_GEE1(VAR=, COV=, N=);
%DO I=1 %TO &N;
TITLE3 "GENMOD (GEE) MODELING: MAIN-EFFECT OF WAVE AND &COV (REPLICATE WEIGHT † &I)";
PROC GENMOD DATA=D2;
CLASS PID WAVE (REF='1')
/PARAM=REF;
```

```

MODEL EVR_&VAR._FUP (EVENT='1') = WAVE &COV/DIST = BIN LINK = LOGIT;
REPEATED SUBJECT = PID/ TYPE = UN COVB CORRW;
ODS OUTPUT GEEEMPEST=_EST_&I;
WEIGHT WGT&I;
RUN;
DATA EST_&I; SET _EST_&I;
LENGTH OUTCOME $20;
OUTCOME="&VAR";
WHERE PARM^="INTERCEPT";
OBS=_N_;
RENAME ESTIMATE=EST_&I;
RUN;
PROC SORT DATA=EST_&I;
BY OBS;
RUN;
DATA EST; MERGE EST EST_&I(KEEP=OBS EST_&I); BY OBS;
VAR_&I=(EST_&I-ESTIMATE)**2;
VAR=VAR+VAR_&I;
RUN;
%END;
%MEND;

%MAC_GEE0(VAR=OUTCOMEVAR, COV=COVVAR);
%MAC_GEE1(VAR=OUTCOMEVAR, COV=COVVAR, N=100);

DATA EST1; SET EST;
SE_BRR=SQRT(VAR*0.01); *1/100;
SE_BRRFAY=SQRT(VAR*0.020408); *1/(100*(1-0.3)^2);
TVALUE_BRR=ESTIMATE/SE_BRR;
TVALUE_BRRFAY=ESTIMATE/SE_BRRFAY;
PVALUE_BRR=(1-PROBT(ABS(TVALUE_BRR),100))*2;
PVALUE_BRRFAY=(1-PROBT(ABS(TVALUE_BRRFAY),100))*2;
PVALUE_QC1984=(1-PROBT(ABS(1.984),100))*2;
RENAME
Z=WGT0_ZVALUE
PROBZ=WGT0_PVALUE
PARM=VARIABLE
LEVEL1=EFFECT;
RUN;

DATA EST2; SET EST1;
ODDSRATIOEST=EXP(ESTIMATE);
LOWERCL=EXP(ESTIMATE-1.984*SE_BRRFAY);
UPPERCL=EXP(ESTIMATE+1.984*SE_BRRFAY);
RENAME PVALUE_BRRFAY=PVALUE;
RUN;

TITLE2 'GEE (ADJUSTED): MODELING INITIATION- NEW NEW EVER USE AMONG NEVER USERS';
TITLE3 'GENMOD (GEE) MACRO PRODUCED BRR SES AND TEST STATS (WITH FAY ADJUSTMENT), OUTPUT GENERATED ON &JOBDATE';

PROC PRINT DATA=EST2;
VAR OUTCOME VARIABLE EFFECT OD: LOWER: UPPER: PVALUE;
RUN;

```