Table S-1. *Results of multivariate logistic regressions for cross-influence of each isolation type and smoking status.*

| Variables | Model 1 | Model 2 |  | Model 3 |
| --- | --- | --- | --- | --- |
|  | Cigarette |  | Avoided |  | Cigarette |  | Withdrawn |  | Cigarette |  | External |  |
| *Level 1: Within Person* |  |  |  |  |  |  |  |  |  |  |
| *Baseline effects* |  |  |  |  |  |  |  |  |  |  |  |
| Cigarette Use t-1 (ρ) | 1.531(0.100) | \*\*\* | -0.260(0.168) |  | 1.744(0.097) | \*\*\* | 0.243(0.142) | + | 1.154(0.074) | \*\*\* | -0.143(0.050) | \*\* |
| Avoided t-1 (ρ) | -0.242(0.129) | + | 1.319(0.082) | \*\*\* |  |  |  |  |  |  |  |  |
| Withdrawn t-1 (ρ) |  |  |  |  | 0.080(0.113) |  | 0.707(0.099) | \*\*\* |  |  |  |  |
| External t-1 (ρ) |  |  |  |  |  |  |  |  | 0.080(0.053) |  | -0.440(0.041) | \*\*\* |
| Grade | 0.772(0.037) | \*\*\* | 0.046(0.033) |  | 0.678(0.035) | \*\*\* | -0.025(0.033) |  | 0.560(0.023) | \*\*\* | -0.079(0.013) | \*\*\* |
| *High School Effects (ref=Middle School)* |  |  |  |  |  |  |  |  |  |
| HSxCigarette t-1 (ρ) | -0.076(0.112) |  | 0.486(0.178) | \*\* | -0.131(0.108) |  | 0.068(0.152) |  |  |  |  |  |
| HSxAvoided t-1 (ρ) | -0.006(0.145) |  | -0.453(0.093) | \*\*\* |  |  |  |  |  |  |  |  |
| HSxWithdrawn t-1 (ρ) |  |  |  |  | -0.122(0.127) |  | -0.156(0.112) |  |  |  |  |  |
| High School | 0.192(0.062) | \*\* | 0.181(0.064) | \*\* | 0.257(0.060) | \*\*\* | 0.241(0.065) | \*\*\* |  |  |  |  |
| HSxGrade | -0.307(0.040) | \*\*\* | 0.302(0.038) | \*\*\* | -0.244(0.038) | \*\*\* | 0.494(0.038) | \*\*\* |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| *Level 2: Between Person Effects* |  |  |  |  |  |  |  |  |  |  |
|  | $$α\_{cigarettes}$$ |  | $$α\_{avoided}$$ |  | $$α\_{cigarettes}$$ |  | $$α\_{withdrawn}$$ |  | $$α\_{cigarettes}$$ |  | $$α\_{external}$$ |  |
| Intercept | 2.153(0.157) | \*\*\* | 2.531(0.094) | \*\*\* | 0.801(0.104) | \*\*\* | 2.318(0.118) | \*\*\* | 2.211(0.140) | \*\*\* | -0.149(0.090) | \*\*\* |
| Initial ObsCigarette t=0 | 2.405(0.092) | \*\*\* |  |  | 1.970(0.083) | \*\*\* |  |  | 3.167(0.112) | \*\*\* |  |  |
| Initial ObsAvoided t=0 |  |  | 1.157(0.060) | \*\*\* |  |  |  |  |  |  |  |  |
| Initial ObsWithdrawn t=0 |  |  |  |  |  |  | 1.028(0.064) | \*\*\* |  |  |  |  |
| Initial ObsExternal t=0 |  |  |  |  |  |  |  |  |  |  | 1.281(0.045) | \*\*\* |
| Initial ObsHigh School t=0 | 0.335(0.234) |  | 0.261(0.203) |  | 0.741(0.226) | \*\* | -0.437(0.205) | \* |  |  |  |  |
| Proportion ObsIn HS | 0.621(0.363) | + | -0.154(0.309) |  | -1.453(0.333) | \*\*\* | 0.255(0.338) |  |  |  |  |  |
| Grade | 0.342(0.038) | \*\*\* | 0.262(0.033) | \*\*\* | 0.321(0.036) | \*\*\* | 0.414(0.033) | \*\*\* | 0.435(0.065) | \*\*\* | -0.069(0.042) | + |
| Mean Grade | -0.702(0.090) | \*\*\* | -0.256(0.083) | \*\* | -0.004(0.085) |  | -0.426(0.088) | \*\*\* | -1.185(0.075) | \*\*\* | 0.100(0.042) | \* |
| InitialHSxGrade t=0 | 0.050(0.141) |  | -0.067(0.121) |  | -0.126(0.135) |  | -0.055(0.119) |  |  |  |  |  |
| Proportion HSxGrade = 1 | -0.591(0.148) | \*\*\* | -0.165(0.140) |  | -0.976(0.140) | \*\*\* | -0.080(0.142) |  |  |  |  |  |
| Male | -0.050(0.044) |  | 0.578(0.038) | \*\*\* | -0.137(0.042) | \*\* | 0.997(0.039) | \*\*\* | 0.110(0.055) | \* | 0.212(0.036) | \*\*\* |
| White | 0.319(0.062) | \*\*\* | -0.360(0.049) | \*\*\* | 0.163(0.056) | \*\* | -0.577(0.051) | \*\*\* | 0.348(0.078) | \*\*\* | 0.080(0.046) |  |
| Cohort | -0.226(0.044) | \*\*\* | -0.080(0.038) | \* | -0.250(0.042) | \*\*\* | -0.102(0.039) | \*\* | -0.103(0.056) | + | -0.146(0.035) | \*\*\* |
| Treatment Group | -0.006(0.044) |  | 0.005(0.038) |  | -0.028(0.042) |  | -0.134(0.039) | \*\* | -0.014(0.055) |  | -0.208(0.035) | \*\*\* |
| *Variance of Between-Person Effects* |  |  |  |  |  |  |  |  |  |
| Variance | 3.056(0.104) | \*\*\* | 1.502(0.052) | \*\*\* | 2.585(0.077) | \*\*\* | 1.911(0.065) | \*\*\* | 3.796(0.216) | \*\*\* | 1.454(0.077) | \*\*\* |
| Covariance (with Cigarette) |  |  | 0.338(0.052) | \*\*\* |  |  | 0.409(0.049) | \*\*\* |  |  | 0.221(0.060) | \*\*\* |
| Observations | 63410 |  | 63410 |  | 33353 |  |
| BIC | 961069 |  | 960957 |  | 364827 |  |
| LL | -480098 |  | -480053 |  | -182244 |  |

Note: + p < 0.1 \* p < 0.05; \*\* p < .01; \*\*\* p < .001.

| Table S-2. *Full Results of multivariate logistic regression (Model 4).* |
| --- |
| Variables | Cigarette |  | Avoided |  | Withdrawn |  | External |  |
| *Within Person* |  |  |  |  |  |  |
| Cigarette t-1 (ρ) | 1.282(0.072) | \*\*\* | 0.352(0.070) | \*\*\* | 0.383(0.068) | \*\*\* | -0.128(0.051) | \* |
| Avoided t-1 (ρ) | -0.083(0.078) |  | 0.607(0.075) | \*\*\* | 0.041(0.070) |  | -0.068(0.056) |  |
| Withdrawn t-1 (ρ) | 0.036(0.077) |  | 0.119(0.069) | + | 0.355(0.076) | \*\*\* | 0.145(0.053) | \*\* |
| External t-1 (ρ) | -0.092(0.053) | + | -0.067(0.052) |  | -0.188(0.050) | \*\*\* | -0.458(0.041) | \*\*\* |
| Grade | 0.523(0.021) | \*\*\* | 0.405(0.021) | \*\*\* | 0.551(0.025) | \*\*\* | -0.075(0.014) | \*\*\* |
| *Between Person* |  |  |  |  |  |  |  |
|  | $$α\_{cigarettes}$$ |  | $$α\_{avoided}$$ |  | $$α\_{withdrawn}$$ |  | $$α\_{external}$$ |  |
| Intercept | 2.181(0.116) | \*\*\* | -0.288(0.090) | \*\* | 2.415(0.112) | \*\*\* | 1.893(0.126) | \*\*\* |
| Initial ObsCigarette t=0 | 2.887(0.105) | \*\*\* |  |  |  |  |  |  |
| Initial ObsAvoided t=0 |  |  | 1.661(0.081) | \*\*\* |  |  |  |  |
| Initial ObsWithdrawn t=0 |  |  |  |  | 1.536(0.083) | \*\*\* |  |  |
| Initial ObsExternal t=0 |  |  |  |  |  |  | 1.176(0.045) | \*\*\* |
| Initial ObsGrade t=0 | 0.418(0.059) | \*\*\* | 0.496(0.056) | \*\*\* | 0.651(0.060) | \*\*\* | -0.065(0.043) |  |
| Mean Grade | -1.084(0.060) | \*\*\* | -0.691(0.055) | \*\*\* | -0.927(0.081) | \*\*\* | 0.054(0.042) |  |
| Male | 0.103(0.053) | + | 0.576(0.050) | \*\*\* | 0.988(0.050) | \*\*\* | -0.227(0.036) | \*\*\* |
| White | 0.330(0.073) | \*\*\* | -0.518(0.068) | \*\*\* | -0.605(0.070) | \*\*\* | 0.086(0.049) | + |
| Cohort | -0.103(0.052) | \* | -0.024(0.050) |  | -0.073(0.048) |  | -0.151(0.036) | \*\*\* |
| Treatment Group | -0.023(0.052) |  | -0.034(0.050) |  | -0.193(0.050) | \*\*\* | -0.216(0.035) | \*\*\* |
| *Between-Person Covariance* |  |  |  |  |  |  |
| Cigarette | 3.261(0.192) | \*\*\* | 0.127(0.057) |  | 0.466(0.084) | \*\*\* | 0.199(0.061) | \*\* |
| Avoided |  |  | 1.533(0.075) | \*\*\* | 1.456(0.082) | \*\*\* | -0.214(0.052) | \*\*\* |
| Withdrawn |  |  |  |  | 2.253(0.139) | \*\*\* | -1.226(0.064) | \*\*\* |
| External |  |  |  |  |  |  | 2.522(0.173) | \*\*\* |

Note: N=33,353; BIC=459,724. Gray shading indicates parameters not estimated in Models 1-3. + p < 0.1 \* p < 0.05; \*\* p < .01; \*\*\* p < .001.

Table S-3: Comparison of effects estimated by ALT & Siena

|  |  |
| --- | --- |
|  | **Within Person** |
|  | Smoking | Avoided | Withdrawn | External |
| Smoking |  |  |  |  |
| Avoided |  |  |  |  |
| Withdrawn |  |  |  |  |
| External |  |  |  |  |
|  |  |  |  |  |
|  | **Between Person** |
|  | Smoking | Avoided | Withdrawn | External |
| Smoking |  |  |  |  |
| Avoided |  |  |  |  |
| Withdrawn |  |  |  |  |
| External |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Possible with SAOM. |  | Intractable with current SAOM software. |  | No estimates available in current SAOM software. |  |

Note: Table design is consistent with dynamic relationships: rows measure smoking or isolation dimensions at a given time, and columns represent a subsequent (future) measure. All effects are estimated in the ALT in Model 4. Within-person effects are reported in Table 2 and Table S-2, with between-person effects and the associated covariance matrix reported only in Table S-2. More particularly, the within-person effects are the ρ effects constituting the first 4x4 matrix of the ALT table. The between-person relationship is the combination of the between-person intercept and the covariance matrix (reported as the upper-right triangular portion of a symmetrical matrix at the bottom of Table S-2). This covariance is easily converted to a correlation matrix by pre- and post- multiplying by the inverse of the variance (which are the diagonals). These provide the between-person correlations for individual propensities to exhibit the behaviors. For purposes of this table, we also assume that external orientation will be treated as a behavior parameter in the SAOM.