The (In)congruence Between Stated and Revealed Preferences: The Role of Substance Use Dependence

by

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Examining the congruence, or consistency, between stated (expressed attitudes, beliefs) and revealed preferences (observed behavior) may be instrumental in understanding criminal decision making. To study this, we focus on the incongruence between stated preferences for staying out of trouble with the law and self-reported criminal behavior and draw from trait theories, social control and behavioral addictions to develop exploratory hypotheses. Data from the Pathways to Desistance and Crossroads studies were used to estimate group-based trajectory models. Results show heterogeneous trends in congruence. Specifically, substance dependence is significantly related to an increase in the probability of incongruence across all trajectory groups.

Keywords: preferences, decision-making, offending, substance use

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1 Introduction

Preference is a key concept used to understand decision-making and behavior across a variety of disciplines. While different disciplines approach and define preferences in decision-making according to its own focus and methodologies, economics and criminology both have unique perspectives. In economics, preferences are clearly defined as the ranking or ordering of a particular outcome or choice between alternatives (Arrow, 1951). Economists often assume that individuals have stable and consistent preferences that guide their choices in ways that maximize their utility or satisfaction. Accordingly, preferences in economics are comparative evaluations and

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not just a mere expression of taste (Schultz, 2015). In criminology, the definition and measurement of preferences is relatively underdeveloped. Preferences are used broadly and have been referred to as individuals' expressed attitudes, beliefs, or intentions related to criminal activities. Preferences have been referred to as "a taste or penchant for something" (Paternoster and Bushway, 2009) or "changes in the meaning and desirability of deviant/criminal behavior itself" (Giordano, Cernkovich, and Rudolph, 2002).[1] Preferences are seldom studied in criminological discourse and when they are, research largely focuses on risk preferences and time preferences and how these preferences are formed, and how they may explain criminal behavior (Nagin and Pogarsky, 2001; Loughran et al., 2012; Thomas, O'Neill, and Loughran, 2023).

There are two distinct approaches to understanding preferences in both economics and criminology: stated preferences, which is what people report they prefer or would choose, and revealed preferences, which are preferences that are inferred from individuals' actual choices and behaviors (Samuelson, 1938). The relationship between stated preferences and revealed preferences is central to understanding how individuals express their desires and make choices in both hypothetical and real-world scenarios. The relationship between stated and revealed preferences has been fundamental in a variety of domains including consumer behavior (Hensher, 1994), environmental goods (Adamowicz, Louviere, and Williams, 1994), transportation policy (Ben-Akiva and Morikawa, 1990) and healthcare decisions (Whitty et al., 2014). While these two concepts are distinct, they are closely related and should be highly correlated given that stated preferences should reflect underlying utility or satisfaction, which should drive actual choices. However, some scholars have pointed to the lack of congruence, or consistency between stated and revealed preferences and have referred to it as the stated-revealed preference gap (Fifer, Rose, and Greaves, 2014).[2]

The objective of our study is to introduce the idea of incongruence in stated and revealed preferences in criminology and to provide a descriptive illustration of how theoretical perspectives can guide expectations on the relationship between stated preferences for staying out of trouble with the law and revealed preferences for self-reported criminal behavior. We draw from several theoretical perspectives to guide our expectations on the relationship between stated and revealed preferences on offending. First, theories of population heterogeneity would suggest that stated preferences should align with revealed preferences and remain relatively stable over time (e.g., Gottfredson and Hirschi, 1990). Other perspectives would posit that stated preferences towards staying out of trouble with the law should increase over time and criminal behavior would be congruent with these stated preferences (Hirschi, 1969). Thirdly, behavioral addiction models suggest that stated and revealed

[1] Stated and revealed preferences have also been elicited in cost of crime estimates (Cohen 1988; 2005).

[2] In psychology, the attitudes-behavior gap similarly describes the discrepancy between what people say they believe (attitudes) and how they actually behave (behavior).

preferences may sometimes be incongruent due to a temporary loss of control often driven by substance dependency (Bickel and Marsch, 2001). Substance dependence has been shown to contribute to elevated levels of impulsivity (e.g., Grant and Chamberlain, 2014) and risk-taking (e.g., Crowley et al., 2006). In this explanation, stated preferences are stable over time and revealed preferences may vary over time due to changing experiences with substance dependency (Grant et al., 2010).

Given the nascency of research examining the development of congruency in stated and revealed preferences related to anti-social behavior, we use data from the Pathways to Desistance study and the Crossroads study to estimate group-based trajectory models (GBTM) to 1) assess patterns in stated and revealed preferences and 2) evaluate the time-varying role of substance dependency on trajectories of congruence. Results show support for several trends in incongruence that align with predictions from existing criminological theories but importantly demonstrate that substance use dependency is positively related to the probability of incongruence across all trajectory groups. This underscores the role of substance use dependency in preference reversals or a temporary "loss of control" among groups of adolescents characterized by different stated preferences for staying out of trouble with the law.

2 *The Importance of the Relationship Between Stated and Revealed Preferences*

There is considerable evidence documenting how criminal involvement varies over the life course (e.g., Laub and Sampson, 1993; Blokland and Nieuwbeerta, 2005; Nagin, 2005) and in some of this work, scholars have considered how values and preferences are related to offending over time (e.g., Rocque, Posick, and Paternoster, 2016; Thomas, O'Neill, and Loughran, 2023). However, it is important to determine if this variation reflects a change in individuals' preferences. For example, Thomas and Vogel (2019) use data from the Pathways to Desistance Study to assess how changes in expectations and preferences for the costs and rewards to offending contribute to changes in offending. They find that expectations of social costs and risk of arrest from offending are associated with small changes in criminal behavior and must be accompanied by changes in preferences to promote substantial declines in offending. Similarly, Thomas, O'Neill, and Loughran (2023) assess structural and identity theories of desistance and find high or increasing prosocial value orientations help explain within-person offending patterns. While scholars have found that changes in preferences are related to changes in offending behavior, there is little attention to uncovering variation in this relationship. By considering the variation in incongruence of stated preferences and revealed preferences, we can directly assess individuals' beliefs, attitudes, and values and how they may align with the choices they make in the real world.

Among theories of identity change and desistance, prosocial values and preferences can change over time and are inversely related to criminal behavior. When individuals are ready to begin the desistance process, they develop "tastes for non-criminal actions and the newly perceived 'comforts' of a non-criminal life"(Paternoster and

Bushway, 2009, p.1127). Giordano, Cernkovich, and Rudolph (2002) characterize this process as "changes in the meaning and desirability of deviant/criminal behavior itself" (p. 992). However, desistance scholars have neglected the possibility that even though individual preferences move towards being prosocial, actual criminal behavior may not consistently be congruent. Identifying structural or physiological constraints or biases could illuminate both the limits of the positive effects of turning points or more directly illustrate the salience of substances in altering decision-making.

In a policy context, understanding incongruence can inform the design and evaluation of interventions. For example, policymakers may need to consider whether stated desires to stay out of trouble with the law translate into actual behavioral change among individuals. For example, research shows that well-implemented, properly resourced treatment programs can reduce substance use disorders and accompanying crime, when focused on the proper populations (Pollack, 2017). Interventions may be even more effective when there is a preference or desire towards law abiding behavior. Substance-dependent offenders are particularly vulnerable to long-term patterns of relapse and re-offending; thus, readiness to change may not be apparent and be obfuscated by only examining criminal behavior.

In sum, little is known about how and when stated preferences align or misalign with revealed preferences and we heed McCarthy (2002) call for "criminologists [to] develop more compelling explanations of the origins and sources of variation in the preferences that encourage crime" (p. 437). Tracking changes in both stated and revealed preferences over time can provide insights into how and when they converge or diverge, helping refine theoretical models and program development.

3 Theoretical Explanations of (In)congruence

To examine the potential value of jointly assessing stated and revealed preferences in criminological discourse, we draw on several theoretical traditions to guide our expectations.

3.1 Trait Perspectives

Theories of population heterogeneity would predict that both preferences to staying out of trouble with the law and criminal behavior would be congruent and relatively stable over time. Most notably, Gottfredson and Hirschi (1990) suggest that low self-control is the root cause of criminal and analogous behaviors. The most recent definition of self-control is the "tendency to forego immediate or near-term pleasures that also have negative consequences for the actor and to the tendency to act in favor of longer term interests" (Gottfredson and Hirschi, 2019, p. 6). Self-control develops early in childhood which is encouraged by effective parenting practices, and individuals with low self-control are prone to engaging in criminal and deviant behaviors throughout their lives. Hirschi argues that a person who commits

delinquent acts becomes "a person relatively free of the intimate attachments, the aspirations, and moral beliefs that bind most people to a life within the law" (Hirschi, 2004, p. xxi). Importantly, Gottfredson and Hirschi (2019) note that self-control and prosocial values/beliefs are produced the same way (through an interaction between a child's temperament and effective child rearing) and are difficult to distinguish. Thus, for self-control theory, individuals who have low self-control are less likely to have strong attachments and less likely to have strong law-abiding preferences. This is one of the key distinctions between control theory and cultural deviance theories – control theory focuses on variation in adherence to conventional values rather than adherence to different values.

Substance dependence, like criminal behavior, is a manifestation of low self-control. Gottfredson and Hirschi (1990) propose that individuals with low self-control are more likely to indulge in drug and alcohol abuse. This propensity stems from their impulsivity, sensation-seeking tendencies, and a lack of consideration for long-term consequences. Such individuals may find it difficult to resist the immediate gratification offered by substance use, even if they understand the potential risks involved. Research demonstrates support for the relationship between low self-control and substance use and alcohol-related behaviors among a variety of populations (Arneklev et al., 1993; Keane, Maxim, and Teevan, 1993; Wood et al., 1993; Winfree and Bernat, 1998; Tibbetts and Whittimore, 2002). Because self-control is manifested through criminal and analogous behaviors, stated and revealed preferences are expected to be congruent and stable over time. Further, substance dependence should have no bearing on the congruence between stated and revealed preferences.

3.2 Social Control

In social control theory, Hirschi (1969) argued that the absence or weakening of social bonds increases the likelihood of delinquency while strong social bonds act as effective controls that prevent individuals from deviating from societal norms and engaging in criminal or delinquent behavior. From a static point of view, we would anticipate that those with strong social bonds would have preferences in favor of avoiding getting into trouble with the law that is mirrored by a lack of offending behavior. Hirschi (1969) original formulation of social control theory specifically allowed for the elements of the social bond to change over time. Building on these ideas, Laub and Sampson (1993) argued that bonds to prosocial institutions, like employment, family, and education become more salient during adulthood and can alter individual pathways away from delinquency (Hirschi, 1969; Laub and Sampson, 1993). These protective factors, or turning points, facilitate processes of desistance because attachments to these sources of social control become incompatible with antisocial behavior and lifestyles. Risks of engaging in crime or using drugs become aversive in terms of the overall consequences of being caught and because of the conflict that is generated by developing prosocial identities (i.e., law-abider, parent, employee) (Giordano, Cernkovich, and Rudolph, 2002). Importantly, Laub, Nagin,

and Sampson (1998, p. 225) note that, "social bonds do not arise intact and full-grown but develop over time like a pension plan funded by regular instalments." As such, social control perspectives would anticipate that as social bonds strengthen over time, so do preferences for staying out of trouble with the law. Offending is expected to decrease over the same period that coincides with the acquisition and investment of social bonds.

Still, the success of these social controls may be impeded by "snares" that disrupt or delay the desistance process even during periods in the life-course when desistance is considered normative and among individuals lower in criminal propensity (Moffitt 1993). Moffitt (1993) specifically references addiction to drugs and alcohol as a detractor from desistance among adolescent-limited offenders. Substance dependence may be particularly problematic because its physiological effects may disrupt the ability of individuals to engage in successful self-control and limit the capacity of other social controls to bind individuals to prosocial attachments and values (e.g. Hussong et al., 2004; Higgins et al., 2010; Craig et al., 2015). Indeed, Hussong et al. (2004) observed greater time-specific elevation of antisocial behavior among men in the Dunedin sample during periods of substance use. Substance use has been linked to challenges in marriage (e.g., Schulenberg et al., 1997), education (e.g., King et al., 2006), and employment (e.g., Compton et al., 2014). Substance use in social control theory should be positively related to the incongruence between stated and revealed preferences for staying out of trouble with the law.

3.3 Behavioral Addictions

While not a formal theoretical perspective, recent reconceptualization of self-control and the literature on behavioral addictions suggest that the relationship between stated and revealed preferences for law-abiding behavior may be incongruent some of the time. Alternative statements on self-control depart from Gottfredson and Hirschi's model of relatively stable self-control and attempt to parcel out situational variability in an individual's capacity or desire/effort for self-control (see Burt, 2020). Here, self-control is an effortful act of restraint against "immediate temptation in the service of more enduringly valued goals" Burt (2020). When individuals hold prosocial preferences or values in conflict with their impulses, it triggers self-control processes (Kotabe and Hofmann, 2015; Baumeister, Tice, and Vohs, 2018). Situational precursors and characteristics (e.g., substance dependence) impact the capacity to exercise self-control, thus producing variation in self-control (e.g., Muraven, Tice, and Baumeister, 1998, 1999; Baumeister, Tice, and Vohs, 2018). This conceptualization of self-control suggests that those with preferences for law-abiding behavior should remain high and stable with temporary lapses in regulation, resulting in situational incongruence between stated and revealed preferences.

Similarly, research in behavioral addiction suggests that while preferences may be stable, behavior may vary due to temporary loss of control.[3] Most directly, the physiological effects of substance use contribute to a myopic view of decision-making

and impede the implementation of self-control such that considerations of long-term goals or values become out of view (e.g. Giancola et al., 2010). In an effort to understand whether the impulsivity of drug-dependent individuals is an enduring trait or situational, Bickel and Marsch (2001) posit that individuals with enduring traits will exhibit preferences for smaller immediate rewards and this will be consistent over time and contexts. Conversely, temporary "loss of control" occurs when individuals demonstrate a reversal of preferences. For example, they may state that they prefer staying out of trouble with the law but choose to engage in criminal behavior (incongruence between stated and revealed preferences). Similarly, Bickel and Marsch (2001) note that "drug dependent individuals often express a strong preference for employment or participation with family and friends over drug use, yet a short time later they may use drugs instead of going to work or spending time with family" (p. 74).

In sum, conceptualizations of self-control outside of criminology and research in behavioral addiction provide additional commentary on the possible relationship between stated and revealed preferences. Even though individuals may hold preferences to stay out of trouble with the law, behavior may sometimes be incongruent because congruency may be impaired by substance dependence.

4 The Current Study

From extant theories, we draw exploratory hypotheses about stated and revealed preferences on staying out of trouble with the law. Exploratory hypotheses are particularly useful in areas where there is little prior data or when research is relatively in its infancy (Swedberg, 2020). We rely on these theoretical perspectives to posit on the developmental form of congruency in stated and revealed preferences.

Trait perspectives suggest that:

Hypothesis 1: *Stated and revealed preferences are congruent and stable over time*.

Hypothesis 2: *Substance use is not to be related to the congruency of stated and revealed preferences*.

Social control perspectives suggest the following hypotheses:

Hypothesis 3: *Stated preferences increase over time and are congruent with revealed preferences*.

[3] Addiction researchers have coined the term "moral incongruence" to define a mismatch between values and behaviors (Grubbs et al., 2022). "For an individual struggling with an addiction, that addiction almost always involves some set of actions that are incongruent with some of that person's values, beliefs or aspirations" (Grubbs, 2021). Some work has observed that the stronger a person is morally disapproving of a behavior, the more likely they are to self-report addiction (e.g., gambling, pornography, substances) (Lewczuk et al., 2021). The research on moral incongruence focuses on self-reported addiction as a coping mechanism for cognitive dissonance and departs from the focus of the current research.

HYPOTHESIS 4: *Substance use reduces the congruency of stated and revealed preferences*.

Extensions of self-control and behavioral addiction models provide us with the following hypotheses:

HYPOTHESIS 5: *Stated preferences are stable over time and revealed preferences are variably congruent*.

HYPOTHESIS 6: *Substance use reduces the congruency of stated and revealed preferences*.

The main goal of this exercise is discovery rather than confirmation. We use exploratory hypotheses to the relatively understudied relationship and patterns in stated and revealed preferences.

5 Data and Methods

5.1 Data Sources

The two sources of data that we use, the Pathways to Desistance Study (Pathways) and the Crossroads Study (Crossroads) are two longitudinal samples of justice involved adolescent and young adults which were drawn from an array of sites across the United States. Participants in the Pathways sample were all convicted of a felony offense as part of the criteria in the study whereas participants in the Crossroads project were arrested for the first time for a range of low-level offenses. Coupled, the datasets offer perspective on the congruence between stated and revealed preferences across a range of justice involved youth. Notably, the Crossroads study was designed similarly to the Pathways study and has some identical measures. Each of the datasets is discussed in detail below.

Pathways to Desistance Study. The Pathways study is a longitudinal examination of the transition from adolescence to young adulthood in a sample of adolescents who have committed serious offenses. The adolescents were selected for the study after a review of court documents indicated that they had been found guilty of a serious offense, predominately felony offenses (Schubert et al., 2004). Originally, 1,354 participants were enrolled, and were between the ages of 14 and 17 years at the time of committing the offense and followed for seven years. Participants were recruited from two sites: Maricopa County, Arizona (N = 654) and Philadelphia County, Pennsylvania (N = 700). The first three years were tracked by six-month observational periods and the last four were annual observational periods. The current study uses interviews collected from the first three years due to the consistency in the time frame with both data sources. To ensure that there was no overrepresentation of drug

offenders, the researchers capped the drug offenders at 15% of the sample at each of the sites.

Crossroads Study. The second sample includes 1,216 justice-involved male adolescents from the Crossroads Study (Cauffman et al., 2021). Participants were recruited from three sites: Orange County, California (N = 532); Philadelphia, Pennsylvania (N = 533); and Jefferson Parish, Louisiana (N = 151). Participants were arrested for the first time for a range of low-level offenses such as vandalism (17.5%) and theft (16.7%). Youth were included in the study because they had no prior offenses and were charged with specific offenses that on average (based on 5 years of historical court record data) had a 0.35–0.65 probability of being formally processed (see Cauffman et al. (2021) for details on sampling). Adolescents were between the ages of 13 and 17 at their first interview and were representative of the disproportionate number of racial/ethnic minority adolescents who encounter the justice system. After listwise deletion of respondents who did not have valid measures of key covariates, a total of 2,515 respondents (N = 1,326, Pathways; N = 1,189, Crossroads) were retained for the analyses.

5.2 Measures

Stated Preferences: Respondents in the Pathways and Crossroads studies were asked to rate, on a five-point Likert scale (1 = not at all important, 2 = not too important, 3 = somewhat important, 4 = pretty important, 5 = very important), "How important is it for you to stay out of trouble with the law?". Across all waves, respondents overwhelmingly reported "very important". We, therefore, recoded this measure as binary with 1 = very important and 0 = otherwise.

There are many ways that scholars have measured stated preferences. Individuals can be asked on a survey to choose or rank their options among a set of alternatives, asked their willingness to pay for a service or good, or asked questions regarding the level of agreement or importance of specific statements (Carlsson 2010). For example, in labor supply studies that use survey data to ask individuals questions like "It is more important for a wife to help her husband's career than to pursue her own career" (Kawaguchi and Miyazaki, 2009).

Self-Reported Offending: To account for offending, participants completed the Self-Report of Offending scale on a total of 22 illegal behaviors during each recall period. All items were combined to create a binary variable indicating whether the participant engaged in any criminal behavior during the recall period. To be sure, because of the interest in understanding the role of substance dependence in shaping decision-making processes, we do not include drug offenses in the offending measure. As a sensitivity analysis, based on an evaluation of the cut points in the overall frequency distribution of offending we also operationalize offending as 1 = two or more crimes and 0 = otherwise. For sensitivity analyses we create an alternative cut point of 1 = three or more crimes and 0 = otherwise. This alternative cut point is to exclude relatively minor offending over the recall period (online Appendix A).

Incongruence: To assess incongruence, we examined the overlap of stated preferences at T-1 and offending at T. Participants whose stated preferences aligned with the subsequent offending behavior were coded as a 0. These individuals include those who stated it was very important for them to stay out of trouble with the law and did not report engaging in any offending, those who said it was otherwise not very important to stay out of trouble and engaged in crime, and those who said it was otherwise not very important to stay out of trouble and did not engage in any crime. Participants were categorized as being incongruent in their stated and revealed preferences if they indicated that it was very important for them to stay out of trouble and reported engaging in crime. There is a very small group that stated it was not very important to stay out of trouble with the law yet did not report any offending ($N = 33$). As sensitivity analyses (online Appendix C), this group was removed and the results are almost identical to the results presented here.

Substance Use Dependency: Our measure of substance use dependency stems from a count of symptoms in the recall period attributed to drug use (i.e. "Have you wanted drugs so badly that you could not think ~~of~~ about anything else?") (Chassin, Rogosch, and Barrera, 1991). If a participant endorsed at least one of the items, he/she was coded as being substance use dependent.

Impulse Control: Due to the strong relationship between offending and substance use, impulse control was included as a time varying covariate. Impulsivity was examined using a subset of the Weinberger Adjustment Inventory (Weinberger and Schwartz, 1990). Eight items assessed participants' impulsivity (e.g., "I stop and think things through before I act"). Youth were asked to self-report the degree to which each statement reflected their behavior, with responses ranging from 1 "False" to 5 "True." Some of the eight items were reverse coded and then averaged to create an overall indicator of impulsivity wherein higher scores indicate greater impulse control.

Incarceration Time: To account for variation in the opportunity to engage in criminal behavior, we included a measure of the proportion of time that participants spent incarcerated or in other types of facilities. During each recall period, participants reported the number of days that they spent in a detox/drug treatment program, psychiatric hospital, residential treatment program, or secure institution.

5.3 Analytic Plan

We examine the patterns of incongruence over time using semi-parametric group-based trajectory models (Nagin, 2005). Group-based trajectory models (GBTM) is an extension of finite mixture modeling for longitudinal data. According to Nagin (1999) GBTM has three purposes: 1) to identify distinctive groups of trajectories, 2) to estimate the proportion of the sample that follows each of the trajectory groups, 3) to estimate an individual's conditional probability of belonging to each of the model's groups, given their longitudinal vector of observations.

Using GBTM is beneficial ~~for a number of reasons. First,~~ it allows us to identify distinctive developmental paths in longitudinal data and to capture the heterogeneity

of incongruence over time. Incongruence between stated and revealed preferences to stay out of trouble with the law can have patterns that reflect subpopulations of which the sources of heterogeneity may not be readily observable.

~~The second~~ analytic consideration is the inclusion of an exposure time correction. Accounting for the time an individual is incapacitated is necessary for calculating unbiased estimates of an individual's offending (Blumstein and Cohen, 1979). Correcting for exposure time essentially "adjusts" what the outcome would be if the individual was not incapacitated, which can impact the true shapes of the trajectories. To examine the role of substance use dependency in the incongruence between stated and revealed preferences, we include substance use dependency and impulse control as time varying covariates to account for their influence on each trajectory group.

We hard classify individuals as incongruent according to the criteria above and estimate trajectories of incongruence over time. Another possibility is we may estimate dual trajectory models which estimate the development of both stated preferences and revealed preferences separately over time and provide the interrelationship between the trajectories (Nagin, 2005). Multi trajectory models are an extension of the dual model and identify common patterns or clusters of trajectories that can include stated and revealed preferences and substance dependency (Nagin et al., 2018). We refrain from estimating these extensions and model incongruence as a single outcome as a first step in understanding the evolution of incongruence over time. We encourage future work to consider other methodologies.

6 Results

We begin with a description of the sample and key measures. Table 1 displays basic demographic baseline characteristics of our merged sample and by data source. Consistent with the sampling strategies of both studies, on average, participants from the Pathways study report engaging in more offending, have a greater prevalence of substance dependency issues, lower levels of impulse control, and spend a much higher proportion of time not in the community at baseline.

Overall probabilities, however, may mask heterogeneity in the patterns of these measures over time. Table 2 displays the number of waves that respondents reported stated preferences, self-reported offending and substance use dependency. Approximately 40% of respondents reported that it was very important for them to stay out of trouble with the law in all six waves, suggesting that the majority of respondents demonstrated some variability in their stated preference across the study period. Similarly, 22.8% self-reported no criminal behavior and 52.1% did not report substance use dependency.

To investigate the heterogeneous patterns of incongruence, we estimated GBTM. Model selection followed a two-stage model selection process. First, we followed the lead of D'Unger et al. (1998) and used the Bayesian information criterion (BIC) as a basis for choosing the optimal number of groups in the mixture model, which requires estimating models with varying numbers of groups and selecting the largest BIC

Table 1
Description of Key Measures at Baseline

	Pathways $N = 1326$			Crossroads $N = 1189$		
Baseline	Mean	SD	Range	Mean	SD	Range
Age	16.03	1.14	14, 19	15.29	1.29	13, 18
Black	0.41	--	0, 1	0.37	--	0, 1
White	0.20	--	0, 1	0.15	--	0, 1
Hispanic	0.34	--	0, 1	0.46	--	0, 1
Other	0.05	--	0, 1	0.03	--	0, 1
Stated Pref	0.78	--	0, 1	0.77	--	0, 1
Offending	0.78	--	0, 1	0.62	--	0, 1
Impulse Control	2.96	0.95	1, 5	3.25	0.86	1, 5
Substance Dep	0.32	--	0, 1	0.24	--	0, 1
Incarceration time	0.48	--	0, 1	0.00	0.04	0, 1

Table 2
Number of Waves Respondents Reported Key Measures

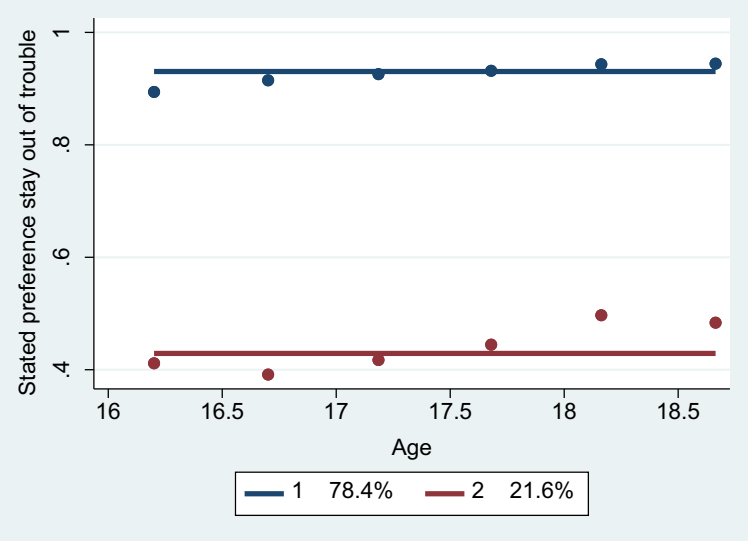
	Pathways $N = 1,326$			Crossroads $N = 1,189$			Combined sample $N = 2,515$		
Number of Waves	Stated	Offending	Substance Dep	Stated	Offending	Substance Dep	Stated	Offending	Substance Dep
0	3.32	18.83	53.25	4.52	27.14	50.74	3.89	22.76	52.06
1	3.62	20.68	19.87	4.44	18.59	16.04	4.01	19.69	18.05
2	7.09	17.58	12.41	5.35	14.95	10.86	6.26	16.34	11.67
3	11.15	14.48	7.02	7.65	13.98	7.15	9.49	14.24	7.08
4	13.74	12.04	3.77	12.91	10.77	5.84	13.35	11.44	4.75
5	23.93	8.94	2.29	22.78	7.89	5.59	23.39	8.44	3.85
6	37.15	7.46	1.40	42.35	6.66	3.78	39.61	7.08	2.53

score. Second, we also consider the mixture probabilities (proportion of the sample that follows each trajectory) and the average posterior assignment probabilities for the final models. Posterior probabilities that are above .70 indicate reasonable classification (Roeder, Lynch, and Nagin, 1999).

First, we considered patterns in stated preferences. Figure 1 displays the stated preference trajectory groups, accounting for exposure time. Two groups emerged – most of the sample (78.4%) have mid and stable probability of reporting it is very important to stay out of trouble with the law. The second group is characteristic of high and stable probability of reporting it is very important to stay out of trouble with the law. Model fit statistics show good fit (BIC = −5,983.81, Entropy = 0.75) with posterior probabilities over 0.90. Importantly, while both trajectories appear stable over time, Table 2 suggests that there is some variability within trajectory groups.[4]

Given the potential masking of variability in stated preferences, we construct an indicator of incongruence between stated and revealed preferences and estimate

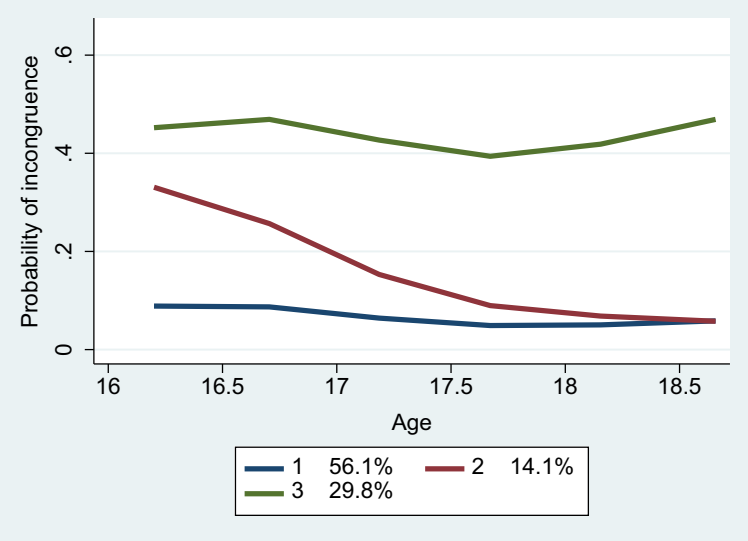
Figure 1
Trajectories of Stated Preference to Stay Out of Trouble (N = 2,515)



GBTM (Figure 2). The models include exposure time, substance use dependency and impulse control as time varying covariates. We find a three-group model is the best fit (Figure 2). Fit statistics show reasonable BIC = −7,636.75 and Entropy = 0.469). The average posterior probabilities are 0.79, 0.56 and 0.73 for groups 1, 2 and 3, respectively. The first group, the low-stable group, incongruency between stated and revealed preferences is low and stable over time, is the largest group (56.1%). We also observe a mid-declining group (14.1%), in which the congruency between stated and revealed preferences increase over time. This pattern supports hypothesis three, stemming from social control theories. Although the low-stable group and the mid-declining group start at different levels of incongruence, by the end of the study period both groups report identical levels of low incongruency. The third group is the mid-stable group (29.8%), suggesting variability in incongruence over time. Overall, we find heterogeneous patterns of incongruency in stated and revealed preferences for abiding the law, potentially reflecting some of our hypotheses.

To further investigate our three trajectory groups, we display the probability of stated and revealed preferences by trajectory group. The low-stable group (Group 1) appears to have stronger preferences for staying out of trouble with the law and a decreasing probability of self-reported offending over time. This is supportive of our expectations stemming from social control perspectives. The mid-declining group (Group 2) starts with a strong preference for staying out of trouble with the law, but it weakens slightly over time. The probability of self-reported offending in this group, however, drops dramatically over time. By the end of the study period, both stated

Figure 2
Trajectory of Incongruence between Stated and Revealed Preferences (N = 2,515)



preferences and self-reported offending of the low stable group and the mid declining group are virtually identical. It is unclear how this group aligns with theoretical predictions. The mid-stable group (Group 3) has strong and stable preferences for staying out of trouble with the law, but also a high and relatively stable probability of offending over the study period. This group may be reflective of theories of population heterogeneity.

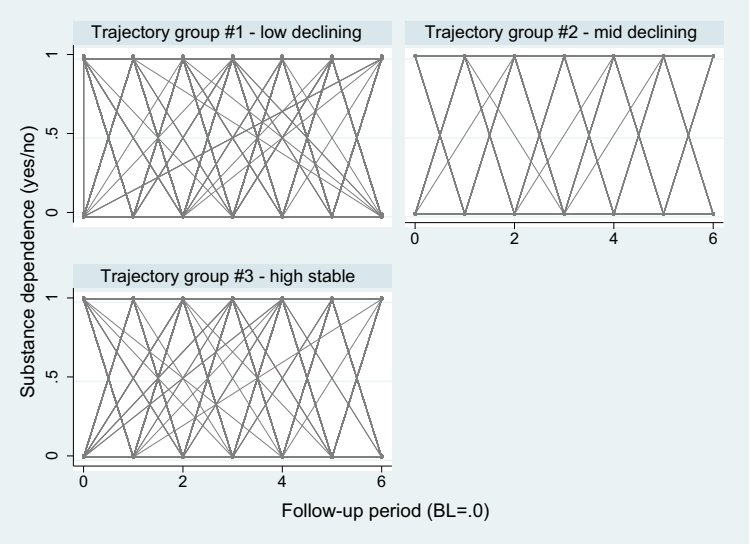
Substance use dependency is modeled as a time varying covariate. Table 3 shows that although approximately half the sample reported no substance use dependency across all six waves, a good portion of respondents reported substance use dependency between one to four waves. Figure 3 visually displays a plot of the individual trajectories of substance use dependency, within each of the three congruence trajectory groups.

Table 4 shows that substance use dependency is a positive and significant predictor of incongruence across all three trajectory groups, net of impulse control and incarceration time. This suggests that substance use dependency is a robust predictor of incongruence between stated and revealed preferences. This finding does not support Hypothesis 2, which stated that substance use dependency is not related to incongruence. Hypotheses 4 and 6 stated that substance use would be inversely related to incongruence due to the strengthening of social bonds and the decline in criminal behavior as individuals enter adulthood or the temporary loss of control due to the physiological effects of substance use dependency. Overall, we find some

Table 3
Probability of Stated Preference and Offending by Trajectory Group (N = 2,515)

	Low-Stable (Group 1)		Mid-Declining (Group 2)		Mid-Stable (Group 3)	
Age	Stated	Offending	Stated	Offending	Stated	Offending
14	0.76	0.50	0.99	0.87	0.85	0.72
15	0.71	0.45	0.98	0.88	0.86	0.76
16	0.74	0.38	0.93	0.76	0.87	0.75
17	0.76	0.33	0.90	0.62	0.88	0.75
18	0.80	0.24	0.87	0.49	0.89	0.69
19	0.82	0.19	0.84	0.33	0.89	0.69
20	0.83	0.14	0.85	0.13	0.90	0.65

Figure 3
Scatterplot of Variability of Substance Use Dependency by Trajectory Group (N = 2,515)



support for our expectations regarding the patterns of incongruence over time and the relationship the patterns have with substance use dependency.

We conduct several sensitivity analyses in our exploratory research. First, we estimate the trajectory of incongruence with an offending measure of two or more self-reported crimes (excluding drug crimes). The best fit was a two-group solution with a low-stable group (75.3%) and a mid-stable group (24.7%). The relationship between substance use dependency and the probability of incongruence is positive and significant across both groups. Second, we estimate GBTM without ages 20 and 21 because they predominately consist of Pathways respondents. Results are nearly

Table 4
Time Varying Covariates by Trajectory Group (N = 2,515)

	Low-Stable (Group 1)			Mid-Declining (Group 2)			Mid-Declining (Group 3)		
	Estimate	SE		Estimate	SE		Estimate	SE	
Substance Dep	1.16	0.11	***	3.16	0.55	***	0.62	0.14	***
Impulse Control	−0.36	0.05	***	−0.35	0.15	*	−0.27	0.05	***
Incarceration	0.65	0.13		1.47	0.47			0.13	
Time			***			**	−0.03		

*$p < 0.05$ **$p < 0.01$ ***$p < 0.001$

identical to our main results. Third, we removed the small group of respondents who are also "incongruent" in their stated and revealed preferences (staying out of trouble with the law not very important and not offend). Exclusion of this group did not impact our main results. The results of the sensitivity analyses are presented in the online Appendix A-C.

7 *Discussion*

The purpose of our study was to introduce the concept of incongruence and provide an illustrative example of developmental patterns. While the concept of preferences underlies rational choice perspectives (McCarthy, 2002) and has been argued to be central to identity theories of desistance (Thomas, O'Neill, and Loughran, 2023), limited attention has been devoted to evaluating the interplay between stated and revealed preferences. As such, this study was motivated by the question of whether stated preferences on the importance of staying out of trouble with the law are congruent with self-reported offending behavior. We drew on theoretical traditions of self-control, social control, and behavioral addictions to formulate exploratory hypotheses on the emergence of congruence and specifically considered the role of substance use dependency in altering the probability of congruence.

First, most respondents reported that it was very important to stay out of trouble with the law. This suggests that even among a sample of adolescents who are justice involved, stated preferences are largely toward law-abiding behavior. Although there is some variation in stated preferences (Table 2), this lends some support to the idea that many individuals adhere to prosocial beliefs and prefer to stay out of trouble with the law (Sykes and Matza, 1957; Matza, 1964). Additionally, the proportion of respondents that stated it was important to stay out of trouble with the law increased over time, which is consistent with the evidence in support of the development of psychosocial maturity and desistance processes (Giordano, Cernkovich, and Rudolph, 2002; Paternoster and Bushway, 2009; Monahan et al., 2009). Nonetheless, approximately half of the respondents who reported it is very important to stay out

of trouble with the law also reported engaging in criminal behavior in the following six months.[5] This finding is suggestive that at least for some individuals, there is incongruence between stated and revealed preferences and there may be time-varying factors that contribute to this gap.

Three groups of congruence emerged from our GBTMs (low-stable, mid-declining and mid-stable), which suggests heterogeneity in the development of incongruence over time. We formulated exploratory hypotheses, which appear to be reflected in two of the trajectories. On the surface, the mid-stable group provides partial support for trait theories. This group is characteristic of a relatively high and stable probability of offending and relatively stable moderate preferences for staying out of trouble with the law. Gottfredson and Hirschi (1990) contend that preferences and values about prosocial institutions are congruent with individuals' criminal and analogous behaviors. Specifically, individuals who are low in self-control are less likely to have strong preferences for law abiding behavior and are more likely to engage in criminal behavior and have substance use dependency (Gottfredson and Hirschi 1990). Importantly, self-control and accompanying preferences and behaviors are posited to be relatively stable over the life course. While we find some support for stability of preferences and offending, even among the group with the highest probability of offending, there is some preference for staying out of trouble with the law. Theoretical and empirical work has highlighted the importance of supervision and monitoring by parents and caregivers (e.g., Hay, 2001; Wright and Beaver, 2005; Burt, Simons, and Simons, 2006) but relatively little work has focused on how preferences, values, and beliefs are distributed across the population.

The emergence of a low-stable group of incongruency aligns with the arguments outlined by social control and theories of desistance. As individuals age, become attached to prosocial institutions, and alter their routines away from criminogenic patterns it was expected that there would be declines in the incongruence of stated and revealed preferences. This decline in incongruence may similarly be reflected in Paternoster and Bushway's (2009)argument that the working identity of "offender" becomes less satisfying and individual agency is expressed through a change in one's preferences. While the causal ordering of the role of agency and structural factors in this process is untested in the current study, our findings illuminate an additional avenue to observe differences in the extent to which individuals are both willfully changing their identity and how this may be supported by other "hooks" for change.

The mid-declining group (Group 2) requires more investigation into the patterns of the relationship between stated and revealed preferences. If we examine the pattern of incongruency, it appears to decrease over time and is supportive of social control perspectives. However, Table 3 shows that contrary to expectations, preferences for staying out of trouble with the law weakens over time and the decreasing trend in

[4] GBTMs reduce within group variability because population variability is modeled across trajectory groups (Nagin and Odgers, 2010).

[5] As expected, a smaller portion of respondents reported incongruency when we operationalized incongruence with two or more criminal behaviors (approximately 30%).

incongruence is driven by the dramatic drop in the probability of offending. Notably, this is the only trajectory group that experiences a decline in the proportion of respondents who report that it is very important to stay out of trouble with the law. It is possible that this group may look very different when we map out incongruence with two or more crimes. Appendix A shows that when incongruence is operationalized as reporting it is very important to stay out of trouble with the law and self-reported two or more crimes, the best fitting GBTM is a two-group solution that excludes the previously observed mid-declining group. Thus, this group is comprised largely of adolescents who were generally low-rate offenders that desist into adulthood and exhibit trends in offending that are more similar to the low-stable group. Still, the decline in the stated preference for staying out of trouble with the law is interesting. Thomas, O'Neill, and Loughran (2023) stress that *both* subjective expectations (e.g., perceptions of risks, costs, and rewards from crime) and preferences matter in decision-making; therefore, it would be important to explore the extent to whether these groups report different subjective expectations about crime that could explain the differences in degree in incongruence patterns. It may also be worth expanding efforts to measure stated preferences beyond the dichotomized measure in the current study to explore if there is more variation in the extent to which youth report having specific preferences.

Taken as a whole, the prior findings illustrate that for most youth congruence is "achieved" as individuals reduce their offending to align with gradually increasing stated preferences regarding staying out of trouble with the law. Still, these patterns potentially ignore variation in this experience or how time-varying situational changes in both personal and or contextual factors can disrupt this process independent of one's reported levels of impulsivity. Results from the analyses indicated that substance use dependency is a positive time-varying predictor of incongruence across all trajectory groups. This finding provides preliminary support for the role of substance-related issues to temporarily contribute to delayed discounting of longer-term rewards (i.e., staying out of trouble with the law) in favor of more immediate rewards (i.e., crime, drugs) (Prelec and Loewenstein, 1991). Although the behavioral addictions model focuses more on the impact of substances on decision-making for those at the more extreme end of substance use, these findings align more generally with the deleterious effects that substance use has on cognitive functioning and executive deficits (e.g., Oscar-Berman and Marinković, 2007; Verdejo-García and Pérez-García, 2007).

From a behavioral economics perspective, this finding illustrates how individuals in states characterized by substance dependence may engage in preference reversals that depart from the traditional rational choice models and expectations derived from self-control theory. Instead, this finding aligns with other models that explicitly account for the hyperbolic nature of intertemporal decisions (Laibson 2003). For instance, in the context of explaining the decision to engage in crime, Loughran et al. (2012) observed hyperbolic discounting of rewards such that short-term delays in receiving a reward were more heavily discounted than long-term delays. Findings from the current study imply that substance dependence may be an important

time-varying lens through which this type of discounting emerges and can amplify the reward-cost calculus of criminal behavior. Thus, it is not just that substance dependence predicts changes in offending because of the interdependency between the need for substances and offending, but that substance dependency informs the intertemporal decision-making that leads to a temporary "loss of control" or shifts in time preferences.

Behavioral addiction models argue that substance dependence contributes to temporary lapses in the consistency between stated and revealed preferences. Here we are only able to examine six-month intervals between the measurement of these preferences and are unable to observe the type of decision-making outcomes that are altered by substance dependence. It would also be important to consider whether there are within-person changes in intertemporal decision-making across different levels or the absence of substance dependence. Relatedly, it is necessary to consider the variation in patterns of stated preferences. Although the aggregate results suggest individuals trend towards increasing stated preferences for staying out of trouble with the law, the variation in stated preferences across time observed in Table 2 indicates that these changes may not necessarily be unidirectional. Future work should disentangle how incongruence is impacted separately by changes in preferences versus changes in offending. In addition to substance use dependency, work in other disciplines has pointed to various factors that contribute to the stated and revealed preference gap. Criminologists may look to explanations such as inconsistent time preferences (Loughran et al., 2012), emotions in decision making (van Gelder et al., 2018), and psychological factors that can be related to discrepancies between stated and revealed preferences.

We note there are several limitations of our stated preference measure. First, although there have been variations in eliciting stated preferences, in economics, stated preferences are an ordering of choices, thus requiring a set of alternative choices (see Johnston et al., 2017) or how much an individual is willing to pay or give up for a particular for non-market goods such as neighborhood safety (e.g., Bayer, Ferreira, and McMillan, 2007). Ideally, we would have a) multiple questions tapping into the importance of staying out of trouble with the law and b) include alternative choices for staying out of trouble with the law such as having respondents directly compare this to the importance of being employed or being in school. Nonetheless, we are satisfied that our measure provides a useful foray into studying stated and revealed preference in criminology.

The findings of the current study offer preliminary examination of the incongruence between stated and revealed preferences, an area in criminology where little is known. The incongruence between stated and revealed preferences has potential to be a critical concept in criminology. It highlights the difference between what people want to do and what they actually do. Understanding and addressing this gap is essential for greater theoretical precision and more effective policies. We are hopeful that we succeeded in laying the foundation for more inquiry and structure into future research on the variation in the development of this gap.

APPENDIX A

Online Appendix

Figure A1
Trajectory of Incongruence between Stated and Revealed Preferences (2+ Crimes)

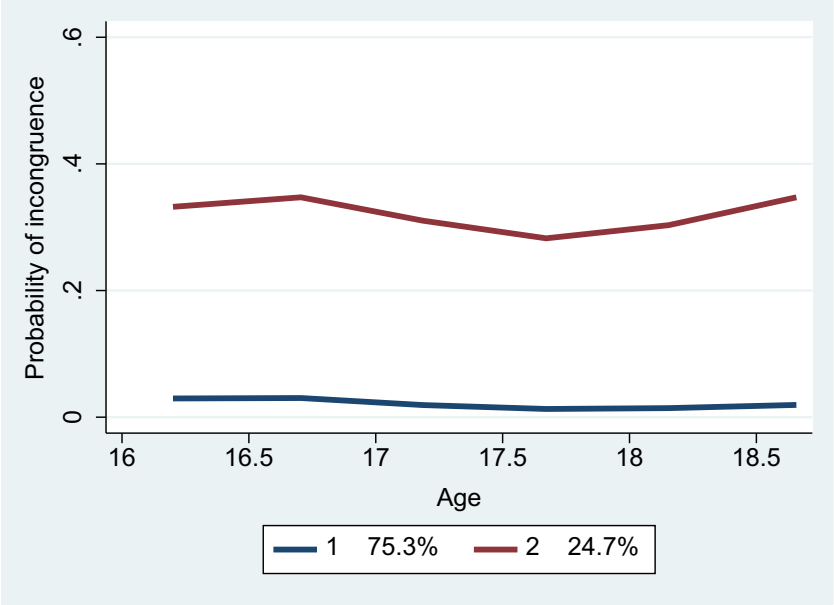


Table A1
Time Varying Covariates by Trajectory Group (N = 2,515)

	Group 1 (75.3%)			Group 2 (24.7%)		
	Estimate	SE		Estimate	SE	
Substance Dep	1.60	0.10	***	1.21	0.12	***
Impulse Control	−0.57	0.05	***	−0.27	0.05	***
Street Time	1.20	0.12	***	0.08	0.12	

*p < 0.05 **p < 0.01 ***p < 0.001

APPENDIX B

Figure B1

Trajectory of Incongruence between Stated and Revealed Preferences (Removal of 13, 20+ year olds)

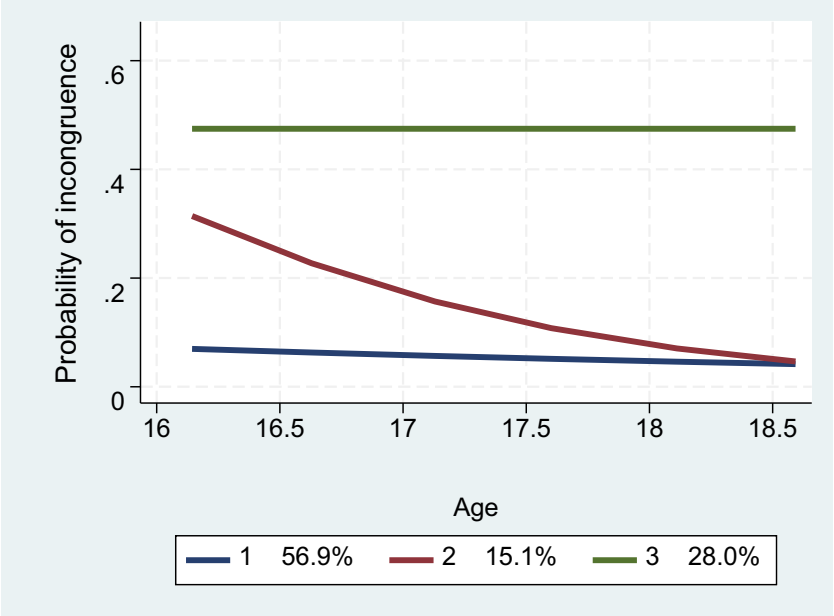


Table B1

Time Varying Covariates by Trajectory Group (N = 2,188)

	Low-Stable (Group 1)			Mid-Declining (Group 2)			Mid-Stable (Group 3)		
	Estimate	SE		Estimate	SE		Estimate	SE	
Substance Dep	1.13	0.11	***	3.10	0.54	***	0.60	0.15	**
Impulse Control	−0.35	0.05	***	−0.37	0.15	*	−0.30	0.06	*
Street Time	0.64	0.13	***	1.14	0.46	*	0.11	0.14	

*$p < 0.05$ **$p < 0.01$ ***$p < 0.001$

APPENDIX C

Figure C1
Trajectory of Incongruence between Stated and Revealed Preferences (Removal of other incongruent group)

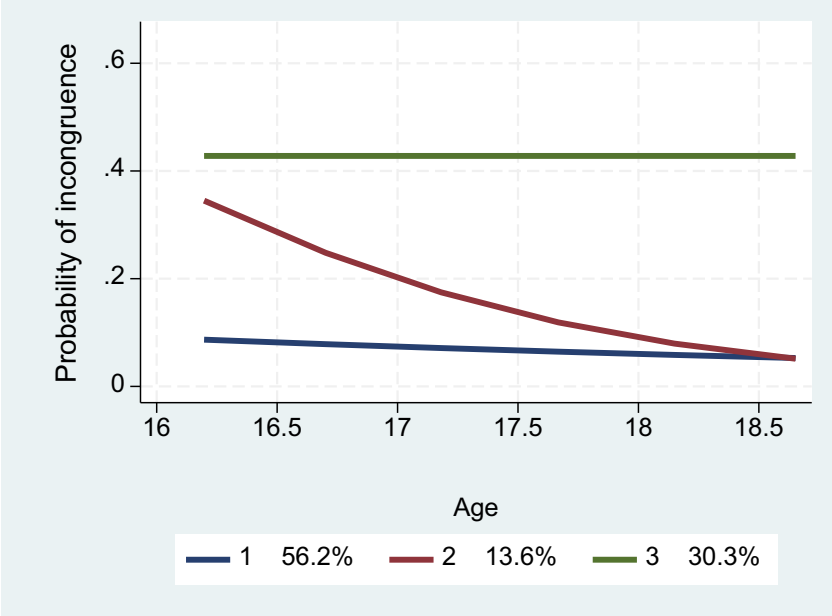


Table C1
Time Varying Covariates by Trajectory Group (N = 2,482)

	Low-Stable (Group 1)			Mid-Declining (Group 2)			Mid-Stable (Group 3)		
	Estimate	SE		Estimate	SE		Estimate	SE	
Substance Dep	1.17	0.11	***	3.27	0.58	***	0.63	0.14	***
Impulse Control	−0.38	0.05	***	−0.35	0.15	*	−0.27	0.05	***
Street Time	0.71	0.12	***	1.60	0.49	**	−0.02	0.13	

*$p < 0.05$ **$p < 0.01$ ***$p < 0.001$

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