

# Role Playing Social Structure

Nick Bloom

*Duke University*

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This article empirically resolves a persistent disagreement between structural and constructional thinkers about the source and function of social role influence. I integrate recent arguments about cultural schemas with insights from institutional theory to articulate a modern cultural account of social influence. I then empirically adjudicate between structural and institutional hypotheses about the relationship between social structure, role beliefs, and action using two methods for causal inference, matching and fixed-effects models, and nationally-representative panel data from the National Study of Youth and Religion. Results show that institutional-schematic role beliefs are consistent, strong predictors of individuals' behavior, even when controlling for a number of social-structural measures. The reverse is not observed.

"Thus the first fact to be established is the physical organisation of these individuals and their consequent relation to the rest of nature."

- Marx and Engels, *The German Ideology*

Why do other people influence us? This question is of fundamental importance to sociological research; without social influence, we would have very little to study. Social theorists agree that social influence is the product of social roles, which are the facets of an actor's experience and action that reference or depend on other social actors. Though scholars since Marx and Weber have disagreed about the source of social roles (Simmel 1909, 2011; Weber and Fischhoff 1978; Marx 1993), a structural approach to social influence has dominated recent sociological research (Cohen 1983; Friedkin and Cook 1990; Moody 2001; Christakis and Fowler 2007, 2008, 2009; Liu, King, and Bearman 2010; Geven, Weesie, and Van Tubergen 2013; Bello and Rolfe 2014; Coviello et al. 2014).

Structural thinkers equate social roles with patterns of concrete relations in a group or population. Concrete relations can be based on sociodemographic position (Blau 1977), interactional ties to material resources (Marx 1993) and/or to other actors (Burt 1976; White, Boorman, and Breiger 1976). Structuralists argue that these patterns of concrete relations

cause individuals to engage in or refrain from behaviors (Friedkin and Cook 1990; Christakis and Fowler 2007, 2008, 2009), and that beliefs, identities, and attributes are the product of relational patterns (Friedkin and Cook 1990; Moody 2001; Liu et al. 2010; Geven et al. 2013). Consequently, structuralists claim that controlling for social-structural factors elides the predictive power of beliefs on behaviors, either by accounting for both beliefs and behaviors in their entirety (Burt 1982; White 1992, 2008), or by creating patterns of relations in the absence of relevant motivational beliefs (Bearman 1997; Bearman, Moody, and Stovel 2004). A persistent shortcoming in these arguments is that structuralists seek explanatory beliefs and norms at a superficially-explicit level,<sup>1</sup> and may therefore not solicit actually-existing beliefs from the individuals in the network.

Relatively new approaches to culture and action argue that culture motivates individual action as internalized cognitive “schemas,” which are sets of beliefs and heuristics that help individuals navigate the world by describing what who people and things are and what they (should) do (DiMaggio 1997; Lizardo 2004; Vaisey 2009, 2010; Martin and Desmond 2010; Frye 2012; Hunzaker 2014). Cultural schemas, like moral worldviews and musical preferences, influence both individual behavior and the patterns of concrete relations individuals form (Lizardo 2006a; Vaisey 2009; Vaisey and Lizardo 2010; Miles 2015). This research has two current limitations. First, it is largely silent on the link between individual schemas and broader social institutions (c.f., (Lizardo and Strand 2010)). Second, it does not measure beliefs about network ties themselves, and thus cannot respond directly to arguments about purely-structural influence on social behavior.

This paper resolves the existing limitations of both approaches and provides a more thorough test of structural and cultural explanations for social influence. I do this by first integrating recent arguments about cultural schemas with long-standing insights from institutional theory to develop a contemporary cultural account of roles as institutional schemas that motivate individual behavior. I then transparently adjudicate between the relative behavioral influence of structural and institutional social roles within the parent-child relationship, by using methods for determining causal inference with observational data with nationally-representative panel data from the National Study of Youth and Religion. My results indicate that the influence of concrete relationships on behavior is almost entirely mediated by institutional role schemas. In other words, individuals *perform* institutions by acting in accordance with internalized role beliefs, and these role performances undergird the influence previously attributed to patterns of concrete relations. The implications of these results apply to all investigations of social influence, and so I close by discussing the important consequences of my results for sociological theory and method.

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<sup>1</sup>For example, is there an explicit norm about who should marry whom among the Aborigines of Groote Eylandt?

## ROLES AS INDIVIDUAL, INSTITUTIONAL BELIEFS

A small group of sociologists have recently developed a new approach to culture that integrates insights from cognitive science and psychology and emphasizes culture's role in cognition and action (Lizardo 2004; Vaisey 2009; Ignatow 2010; Miles 2015). The central assumption of this approach is that culture manifests at the individual level in the form of individual "schemas," which are largely-unconscious cognitive beliefs and heuristics about what is and what should be (D'Andrade 1992, 1995; Strauss and Quinn 1997; Lizardo 2004; Vaisey 2009; Martin and Desmond 2010; Hunzaker 2014). These scholars consistently show that individual-level, cognitive "schemas" motivate patterns both in behavior (Vaisey 2009, 2010; Miles 2015) and in ego network structure (Lizardo 2006b; Vaisey 2009).

One of schema theory's existing limitations is that existing cultural schema research tends to focus on the role of already-existing schemas. Consequently, this research maintains the social construction and internalization of schema content in theory, but fails to provide clear elaborations about these processes.<sup>2</sup> In order to provide a more satisfying theory of cultural schemas in action, we must also be able to link individual-level schemas to social institutions. A second limitation is that extant work predicts interactional patterns with schemas that are tangential to tie formation and quality, like worldviews and tastes (Lizardo 2006a; Vaisey and Lizardo 2010). A more rigorous test of beliefs influence on network structure requires a framework and operationalization of relational, or role beliefs.

Institutional theory offers highly-compatible propositions that help to fill in these gaps in cultural schema theory. Institutional theory's assumptions about cognition and action bear close affinity to those of cultural schema scholars in four ways. First, both approaches both assume that culture manifests at the individual level in the form of largely-unconscious cognitive beliefs and heuristics about what is and what should be. Second, both approaches prioritize investigations of the *content* of these cognitive heuristics, given the similarity in formal cultural-cognitive function across actors. Third, both approaches assume that these beliefs are individually-held, but socially-constructed and therefore learned and internalized (Meyer 1977; Powell and DiMaggio 1991, Introduction; D'Andrade 1995; DiMaggio 1997). Fourth, both approaches assume that these socially-constructed, individually-held, cognitively-schematic beliefs shape, constrain, and motivate individual behavior over time (Meyer et al. 1997; Vaisey 2009; Vaisey and Lizardo 2010).

Institutional theory is most commonly associated with its organizational variant in contemporary research (Meyer and Rowan 1977; DiMaggio and Powell 1983; Powell and DiMaggio 1991). This recent work has tended to downplay the role of individuals in organizational outcomes, a trend that betrays institutional theory's roots in the most elemental aspects of

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<sup>2</sup>See (Lizardo 2004) for a review of the psychology of schema formation.

society.<sup>3</sup> Classic work by Berger and Luckmann (1966) provide two insights that are especially relevant to the focal shortcomings in schema theory. The first is that an institution is, at its core, “[a] reciprocal typification of habitualized actions by types of actors” (54). In other words, institutions begin as role beliefs, when the observation of repeated actions is interpreted into cognitively-held heuristics and assumptions about what kinds of actors exist, and what those different kinds of actors (should) do. As these beliefs institutionalize (by becoming reciprocally shared across a wider range of actors), they become taken-for-granted aspects of social life.

The second insight concerns integration of newcomers into established institutions, and explains that socialization “begins with the individual ‘taking over’ the world in which others already live.” Thus, individuals look to existing institutions for guidance on social behavior. However, this socialization process takes on features that reflect each person’s idiosyncratic experiences:

“Every individual is born into an objective social structure within which he encounters the significant others who are in charge of his socialization... Their definitions of his situation are posited for him as objective reality... The significant others who mediate this world to him... select aspects of it in accordance with their own location in the social structure, and also by virtue of their individual, biographically rooted idiosyncrasies.” (151)<sup>4</sup>

We should therefore expect the magnitude of influence one social actor has over another to vary systematically with the strength of social institutions about the roles in the relationship, and the valence of that influence to vary according to the idiosyncratic diffusion of that institution across particular cases. The patterns in concrete interactions are of little explanatory importance after controlling for these features.

- *Role Belief Hypothesis*: Social influence is the product of individuals behaving according internalized, institutionalized role schemas; social structures are of little, if any, importance, net of these schemas.

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<sup>3</sup>Institutional theory has a strong lineage that investigates the psychological and affective dimensions of institutional construction and performance (Cooley 1910; Garfinkel 1967; Zucker 1977; Goffman 1982; Hallett and Ventresca 2006; Hallett 2010).

<sup>4</sup>Social structure here refers to the uneven distributions of material resources – the concept of social structure as comprised of concrete ties had yet to form.

## STRUCTURAL ROLES AND INFLUENCE

Structuralists since Marx have taken the countervailing perspective to the one just described. Structuralists argue that social roles and social behavior are the product of one's position in social structure, which is derived from sociodemographic traits (Blau 1977), concrete patterns of interaction (Boorman and White 1976; White et al. 1976; Marx and Engels 1978), or both. If one can describe patterns in social structure, one can account for both behavior and beliefs (Burt 1982:351–52).

A contemporary example of these arguments is the depiction of so-called “network effects,” wherein social networks are shown to have causal influence over the behaviors and beliefs of their constituent nodes (Friedkin and Cook 1990; Moody 2001; Geven et al. 2013; Bello and Rolfe 2014). Initial versions of this finding illuminated network effects by referencing rational-choice assumptions (Burt 1976, 1982). Most contemporary network analysts elide these assumptions, but nevertheless demonstrate the causal power of networks across a variety of arenas: physical health (Christakis and Fowler 2007, 2008; Carrell, Hoekstra, and West 2011), mental health (Fowler et al. 2009; Cacioppo, Fowler, and Christakis 2009), status attainment (Zimmerman 2003; Rossman, Esparza, and Bonacich 2010), and deviant behavior (Akers et al. 1979; Cohen 1983; Matsueda and Heimer 1987; Haynie 2001; Geven, Weesie, and Tubergen 2013), among others. In many of these studies, the mere presence of individuals (“alters”) with particular attributes increases the probability that a given reference node (called “ego”) will adopt that attribute. This effect holds even for individuals who are multiple degrees of connection away from ego (e.g., ego's friends' friends' friends) (Christakis and Fowler 2009). Another set of contemporary analyses demonstrates the fundamental role of concrete interactions in determinations of outcomes as diverse as sexual activity (Bearman et al. 2004), social cohesion (Moody and White 2003), innovation (Burt 2004), and mental health diagnoses (Liu et al. 2010). In these studies, beliefs are of no importance for explaining social behavior, net of the structural explanation.

- *Structural Hypothesis*: Formal patterns of concrete social relations cause both social roles and behaviors, and therefore account for any relationship between the two; beliefs and roles have *no* explanatory power net of structure.

## ANALYTICAL APPROACH

There are two extant strategies for resolving the divergent expectations of institutional and structural approaches to roles and influence. The first strategy is to argue that beliefs and social structures are analytically separable, but ontologically “dual” or “mutually constitutive.” This integrative resolution is attractive for its commensurative potential, but at-

tempts either fail to produce clear, empirically-testable assumptions (Sewell Jr 1992; Emirbayer 1997), or revert to latent assumptions about structural or cultural priority (Mische and White 1998; Swidler 2003; Mohr and White 2008; White 2008). A second strategy embraces and examines the empirical mismatch between concrete structures of social relations and the cognitive representations of those structures (Bernard, Killworth, and Sailer 1980; Bernard et al. 1984; Krackhardt 1987). This approach is useful for highlighting the potential pitfalls in network solicitation methods, but provides little information about the role of relational beliefs in ongoing social behavior.

The present analysis diverges from both of these strategies. I affirm the analytical separability of structural and institutional components, but assume that structural and institutional views are neatly-opposing, mutually-exclusive claims about social roles and influence. Structuralists argue that patterns of relations generate cultural role beliefs and social behaviors; institutionalists argue that role beliefs generate behaviors and structures of relations.<sup>5</sup> This approach has a unique advantage over extant approaches: it enables an empirical adjudication between the competing theoretical arguments by determining the observed direction of influence between institutional beliefs and structures of relations.

I do this by leveraging two methods for causal inference with observational data, which allow me to assess the directional relationship among variables according to the counterfactual approach (Morgan and Winship 2007). First, I estimate a series of cross-sectional matching models to test the independent treatment effect of institutional beliefs and social structures on deviant behaviors, while controlling for a number of other elements. I use two different matching methods: entropy balancing (Hainmueller 2012) and Mahalanobis Distance matching (Mahalanobis 1936), which I discuss in more detail below. Second, I estimate a series of fixed-effects models on two waves of panel data (Allison 2009). Fixed-effects models allow me to test the independent effects of beliefs and social structures over time, while accounting for unobserved, time-invariant heterogeneity across individuals.

### **Empirical Case**

This paper examines institutional role schemas using the empirical context of the parent-child relationship. Society proscribes a wide range of institutions about families (Blair-Loy 2005, 2010; Benard and Correll 2010), but two of these institutional beliefs are of particular importance for the present analysis. The first is the legal institution that defines the two types of actors, parents and children, and says that “child” actors should obey “parent” actors.<sup>6</sup> The legal formalization of this institution reflects its salience in society, and leads

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<sup>5</sup>This statement oversimplifies the institutional view, which allows for some structural influence, but is not inaccurate.

<sup>6</sup>Francine M. Neilson v. Colgate-Palmolive Co., 199 f.3d 642 (2d Cir. 1999).

us to expect parents to have strong influence over their children. The second institution emerges from the aforementioned “filtered” socialization, and is a particular child’s understanding of what his family’s expectations are for him. Children may be legally required to obey their parents, but not all parents have the same rules; the second institution links the legal institution to particular behaviors for a given individual.

Consequently, variation in child behavior, net of individual-level time invariant traits (e.g. biology), is likely due to differences in perceived parental attitudes across children. In sum, my assumption is that children develop schematic beliefs about their parents’ attitudes toward particular behaviors based on their filtered socialization, and that the broader social institution about children obeying parents leads the majority of children to motivate their behavior (or behavioral abstention) with these beliefs.<sup>7</sup>

## DATA

I test hypotheses about social influence on behavior using data from Waves 1 and 2 of the National Study of Youth and Religion (NSYR). The NSYR is a nationally-representative panel study of American teenagers. Each wave of the NSYR consisted of an interview and a survey component with adolescent respondents, and Wave 1 included a survey of one parent. The survey was collected using a random-digit-dial telephone interview. The parental component of the survey asked questions about their household, their attitudes, their education and income, their religious beliefs, and their relationship with the teen in the study. Teens were asked questions about similar topics, and were also asked a complete set of network-solicitation questions. The methods for Wave 2 were the same as Wave 1, absent the parent interview component. I use data from both the parent and child surveys from Wave 1 (completed in 2003), and the survey data from Wave 2 (completed in 2005).<sup>8</sup>

In addition to its national representativeness, the NSYR’s collection process provides ideal data for testing these hypotheses. It is one of the only existing surveys that incorporates questions about respondents beliefs. It also is particularly well-designed to solicit accurate and valid social network data: it is a telephone survey, which has been shown to be more accurate than other methods in obtaining accurate ego-network data; it asks respondents to name 1-5 alters (as opposed to more than 5); and uses behavioral, rather than emotional solicitations of friendship ties (Kogovšek and Ferligoj 2005).

<sup>7</sup>This motivation often occurs without legal coercion, but legal coercion is just as compatible with the analysis.

<sup>8</sup>For more information on the study, see Smith and Denton (2005) and <http://youthandreligion.nd.edu/>

### Dependent Variables: “Edgy” Behavior

My dependent variables are three behaviors that are typically seen as deviant for teenagers, but for which there is wide variance in contemporary parental attitudes: marijuana use, premarital sexual activity, and skipping school. These behaviors are all represented in the network effect literature (Akers et al. 1979; Matsueda and Heimer 1987; Haynie 2001; Bearman et al. 2004), but have received less attention from scholars of culture and institutions (c.f. (Vaisey 2009)). *Marijuana Use* measures how often, if ever, respondents use marijuana: “Never”, “Tried it once or twice”, “Occasionally”, “Regularly”. This variable is recoded in Wave 2 from a 7-category variable: “Once a day or more”, “A few times a week”, and “About once a week” are recoded as “Regularly”; “A few times a month” and “Once a month” are recoded as “Occasionally”; and “A few times a year” is recoded as “Tried it once or twice.” This the only variable that differs in measurement across waves. *Sexual Activity* measures whether a respondent has ever had sexual intercourse (yes or no). *Skipping Class* measures how often, in the last year, a respondent skipped class: “Never”, “Once or Twice”, “3-5 times”, “5 or more times.” The cutting class variable is measured using the same scale in both waves. All variables are coded in ascending degree of frequency.

### Measuring Role Beliefs

Since children are legally required to obey their parents in the United States, we should expect the majority of behavioral variation to depend on a teen’s typifications of his or her parents’ particular attitudes toward those behaviors. I measure teens perceptions of their parents’ attitudes using the following three questions:

- How upset would your parent(s) be if (he/she/they) found out you were doing drugs?
- How upset would your parent(s) be if (he/she/they) found out you were having sex?
- How upset would your parent(s) be if (he/she/they) found out you were skipping school

Respondents were given a five-point scale: “Not upset at all”, “Not very upset”, “Somewhat upset”, “Very upset”, “Extremely Upset.” These questions were asked of all respondents, not only those who were already doing any of the behaviors. I assume that parents get upset at things they do not want their child to do, and thus their “upset-ness” about a particular behavior is a good proxy for their negative attitudes toward that behavior. I also assume that children will avoid doing what they think their parents would disapprove of. We should therefore expect a given behavior to *decrease* as perceived parental upset-ness increases. It is also important note that respondents were asked about their parents’ attitudes *as they relate to the respondent*. Thus, what is measured is the respondent’s perceived wrongness for him or herself, independently of any general attitudes parents might have. Acting



accord with parental preferences is thus the performance core aspects of the respondent's idiosyncratic internalizations of the "parent" and "child" institutions in that: namely, she set of reciprocal expectations the respondent and his parents share about his or her behavior, that the respondent should abide by them. Basic correlations between the belief and behavior variables for these three behaviors indicate a moderate to strong correlation of for drug use (-1), for sex (-1), and for cutting class (0).

It is likely that some respondents will answer these questions by speaking from experience - they *know* how their parent would respond because their parents *have already* found out about their behavior. This is unproblematic for my purposes for two reasons. First, role belief "priors" are not structural effects, because they represent the content of an interaction rather than its structural properties. Second, respondents may be sure of a *past* parental attitude, but cannot be completely certain of a future parental attitude. Nevertheless, to further control for "beliefs with priors," I include a number of reports from the respondent *and* the respondent's *parent* as well, including how often both respondent and parent report talking to each other about sex, drinking, and other personal subjects and how close a respondent feels to each particular parent. Finally, I also include a measure of how often a respondent's parents discipline them when they do something wrong. Thus, if a respondent's belief is informed by past disciplinary/leniency interactions with parents, these effects ought to be accounted for by these controls.

## Measuring Social Structure

### *Patterns of Interaction*

To control for the structural effect of parents, I only include individuals who have a male and female parental figure living in the home, meaning same sex couples with children and single-parent households are omitted. My structural treatment variable is how many nights per week a respondent usually eats dinner together with at least one of their parents or adult guardians (0-7). This is an ideal measure of social structure, since it references only observable aspects of face-to-face interaction, and not the content of those interactions (White et al. 1976; Burt 1982). I also include a number of other structural measures, including how often parents punish a respondent when he or she does something wrong, and how often a respondent talks to her mother and father about subjects like drinking, dating, and friendship. All of these measures use only interactional frequency to characterize the relationship, and therefore can be expected to produce good estimates of structural effects.

## Controls

Sociodemographic characteristics are omitted from analyses. A hybrid model (Allison 2009; Vaisey and Miles 2014), which allows for the inclusion of time-invariant attributes, demonstrated no significant effects of race, sex, parental income, or age, net of the included predictors ( $p$  values were all greater than 0.98). I control for a number of religiosity indicators, to account for any effects between religiosity and deviant behavior. These include: church attendance, importance of faith in daily life, and whether a respondent self-identifies as evangelical. The control variables used in the analyses are self-explanatory, and information about their coding can be found in the NSYR documentation at <http://youthandreligion.org>.<sup>9</sup>

## *Friendship Networks*

The initial prompt of the NSYR asked respondents: “Now I have some questions about some of the important people in your life....Are there people you consider friends?” If the respondent said they had friends, respondents completed a behavior-based name generator for up to five friends, from which immediate family was excluded. If the respondent said they did not have friends, respondents completed the name generator thinking of “the people you like and spend the most time with.” Once the respondent had nominated friends, the survey worker asked a series of questions about each friend, individually and by name. The network variables I include in my data are the sums of these individual answers. If the variables listed below do not appear in the fixed-effects models, it is because they are only asked in the first wave.

Using these variables, I account for a number of features of a respondents’ ego networks. Network influence variables include numbers of friends who (1) a respondent feels especially close to, (2) a respondent interacts with many times per week, (3) do drugs or drink alcohol, (4) get in trouble for cheating, fighting, skipping school, (5) the respondent considers to be a “bad moral influence” on them, and (6) are the respondents boyfriend/girlfriend.

Network selection variables include numbers of friends who: (1) are a different sex from the respondent, (2) are a different race from the respondent, (3) attend the respondent’s school, and (4) attend the same youth group as the respondent. Other structural variables include: (1) number of individuals living in the respondent’s house, (2) number of boys in the home, (3) number of girls in the home, (4) how many friends a respondent has, and (5)

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<sup>9</sup>The paper can be reproduced in its entirety from publicly-available data; the files and scripts to do so are available upon request. If the paper is published, these resources will be made publicly available (excepting any restricted data).

the number of friends the respondent has whose parents know the respondent's parents well enough to call on the phone (parental network closure).

#### CAUSAL INFERENCE

To estimate causal effects, I use a counterfactual model of causal inference. I model the effect of belief and structure as binary “treatments,”  $d$ . For structural treatments,  $d$  is 1 for individuals who eat dinner with a parent more than the mean number of nights per week, and 0 for individuals who eat dinner with a parent *less* than the mean number of nights per week. The same above/below the mean coding is done for each of the three perceived parental attitudes variables (drug use, sexual activity, and cutting class). What we want to know is individual  $i$ 's deviant behavior outcome ( $y$ ) would be if  $i$  was to receive the treatment ( $d$ ), compared with not receiving the treatment. Since we only observe one outcome state for each individual (they were either treated or not), we can only estimate causal effects at the group level based on certain assumptions, represented by the following equations:

$$E(y^0|X, d = 1) = E(y^0|X, d = 0)$$

and

$$E(y^1|X, d = 0) = E(y^1|X, d = 1)$$

The first equation assumes that the amount of deviant behavior for treated individuals ( $E(y), d = 1$ ) would be the same as the observed untreated cases if those treated cases were untreated ( $E(y), d = 0$ ), conditional on  $X$ . The second equation assumes that the amount of deviant behavior for untreated individuals would be the same as the observed treated cases if those untreated cases were treated. Both equations are conditional on the observed covariates, which remove bias ( $X$ ). The specified set of covariates,  $X$ , is assumed to *completely control* for selection into the treatment  $d$ . If we accept this assumption, then we can “balance” the untreated cases based on covariates,  $X$ , and estimate the ATT from purely observational data:

$$E(y(0)|X, d = 0) = E(y(0)|X, d = 1)$$

*Balance* means that both groups have the same joint distribution on the included covariates. Traditionally, balance is achieved through either matching individuals on a predetermined score, or by attempting to match individuals on a nearest-neighbor distance metric. Propensity score approaches match individuals based on a unidimensional ‘score’ (usually

a predicted probability) produced by a logit or other linear regression of the treatment condition on the set of balancing variables. Nearest-neighbor distance matching matches individuals based on cases' closeness in multidimensional space.

Both matching approaches have relative advantages. Propensity-score matching allows for continuous weighting of treated and untreated cases, including as much data as possible. Nearest-neighbor matching allows for a multidimensional matching, comparing individuals who are similar across a range of attributes, rather than a single score. A key downside of nearest-neighbor matching is that it either matches or drops individuals, rather than weighting cases without a sufficient match. I include matching models using both metrics, to account for any differences produced by the estimation method.

#### PREPROCESSING: ENTROPY BALANCING

Entropy balancing can be understood as a generalization of propensity score matching. In traditional propensity-score matching, cases are weighted based on an analyst-provided propensity score, and these weights are then tested for adequate balance. Entropy balancing, in contrast, estimates weights directly from a set of user-provided balance constraints. Entropy balance then finds weights that meet the (potentially complex) balance conditions set by the researcher while also maximizing the each case's contribution to treatment effect estimation (i.e., it avoids assigning many cases insignificant or zero weight). After the data have been balanced, treatment effects are calculated with a single weighted mean difference (in this study, a weighted t-test).

The key advantage of entropy balancing is that it includes all cases in the estimation of causal effects, though some cases may have small weights (weights approaching zero). The disadvantage of entropy balancing is that it relies on regression-style case comparison. Structuralists often critique regression methods for essentializing attributes and assigning them as individual-level characteristics (Wasserman and Faust 1994).

#### MATCHING: MAHALANOBIS MATCHING

Mahalanobis matching, and other spatial distance methods, match individuals who are spatially similar to one another across a range of specified attributes. The similarity of this matching metric to core structuralist concepts like Blau Space (McPherson 1983, 2004) makes it particularly advantageous for testing structural hypotheses. Whereas Entropy Balancing reduces variance to a linear function (a single weight), this solution might be problematic to structural thinkers who reject the use of linear models altogether (Wasserman and Faust 1994:21), instead arguing for the multidimensionality of structural relationships. Mahalanobis distance matching resolves these shortcomings, by simultaneously accounting for

individual position along a number of dimensions. The main disadvantage of Mahalanobis matching is data completeness: distance matching throws out cases that have no match. In sum, the matching methods I use both have disadvantages accounted for by the other method's advantages. To the extent that the findings from the two different matching methods conform, we can be even more confident that the effect is true.

#### FIXED-EFFECTS MODELS

Matching models allow me to robustly test the direction of structural and institutional role effects within a given wave, but cannot not provide insight into change over time. The NSYR is a panel survey, so I use two waves of data to determine the relative effects of each kind of role effect over time. In order to do this, I estimate a mean-difference fixed-effects model (Allison 2009), according to the following formula:

$$y_{it} - \bar{y}_i = (\alpha_t - \bar{\alpha}) + \beta(x_{it} - \bar{x}_i) + (\varepsilon_{it} - \bar{\varepsilon}_i)$$

Where  $\bar{y}_i$  and  $y_{it}$  are individual  $i$ 's mean value on the dependent variable value and value at time  $t$ , respectively;  $\bar{\alpha}$  and  $\alpha_t$  are the global mean and wave-specific mean;  $\bar{x}_i$  and  $x_{it}$  are individual  $i$ 's mean and wave-specific values on a vector of independent predictors; and  $\bar{\varepsilon}_i$  and  $\varepsilon_{it}$  are an individual's mean and wave-specific error terms. The mean-difference model accounts for unobserved heterogeneity among individuals by removing their effects ( $\varepsilon_{it} - \bar{\varepsilon}_i$ ), so model coefficients show the average *within*-person change across all individuals in the sample, controlling for unobserved heterogeneity across individuals. All dependent variables pass the Vaisey-Miles test for endogeneity (Vaisey and Miles 2014).

#### MATCHING RESULTS

##### Mahalanobis Matching Results

Table 1: Results from Mahalanobis Matching Model of Deviant Behaviors

<i>Treatment</i>	Cutting Class		Had Sex		Drug Use	
	Belief	Structure	Belief	Structure	Belief	Structure
Coefficient	-0.351	-0.041	-0.117	-0.024	-0.262	-0.100
SE	0.07	0.03	0.02	0.02	0.05	0.05
t	-5.18	-1.21	-4.79	-1.20	-4.78	-2.19
p-value	2.25e-07	0.23	1.70e-06	0.23	1.73e-06	0.03

Results from the Mahalanobis match in Table 1 show a significant reduction in all deviant behaviors for Belief Treatment cases ( $p < 1.0 \times 10^{-6}$  or less).<sup>10</sup> In other words, net of structural covariates, the estimated causal effect of above-the-mean believed parent reaction to a behavior is -0.351 for drug use, -0.117 for sexual activity, and -0.262 for cutting class. In comparison, structural treatments have no significant effect on drug use and having sex, and have an effect two-and-a-half times smaller than perceived parent attitudes on cutting class ( $-0.262, p < 1.0 \times 10^{-5}$  vs.  $-0.100, p < 0.05$ ).

### Entropy Matching Results

Table 2: Results from Entropy-Balanced Matching Model of Deviant Behaviors

<i>Treatment</i>	Cutting Class		Had Sex		Drug Use	
	Belief	Structure	Belief	Structure	Belief	Structure
Coefficient	-0.092	-0.035	-0.281	-0.032	-0.32	-0.091
t-score	-3.456	-1.347	-5.307	-0.893	-7.342	-2.35
p-value	5.59e-04	0.18	1.24e-07	0.37	3.04e-13	0.02

Results from the Entropy Match in Table 2 demonstrate a near-identical pattern to the Mahalanobis match for both treatment effects. They indicate a significant reduction in all deviant behaviors for Belief Treatment cases ( $p < 1.0 \times 10^{-4}$  or less). Perceived parental attitudes have large, negative effects on deviant behavior frequency. As in the Mahalanobis match, structural treatment has no effect on drug use or sexual activity, but does affect cutting class. However, the effect is more than three times smaller, and is less statistically significant by several orders of magnitude, than perceived parental attitudes (g class ( $-0.320, p < 1.0 \times 10^{-13}$  vs.  $-0.091, p < 0.05$ ).

### PANEL MODEL RESULTS

Table 3 presents results from three mean-difference fixed-effects models of deviant behavior on several independent predictors. Coefficients are x-standardized, meaning they represent a raw change in a given respondent's behavior between Wave 1 and Wave 2 for a standard-deviation change in the independent variable.

Perceived parental attitudes is the only effect that is statistically significant at any level in all models, and all three effects are significant at  $p < 1.0 \times 10^{-6}$  or less. In all three models, the hypothesized effect is observed: increasing upset-ness in perceived parental attitudes is

<sup>10</sup>Tables of descriptive statistics are in the Appendix.

associated with a negative change in the deviant behavior. Change in parental dinners per week is significant at  $p < 0.05$  in the cutting class and sex model, and is not statistically significant in the drug use model. The effect size ratio is smallest in the cutting class regression, where the effect of perceived parental attitudes is 2.08 times the size of parental dinners per week. The effect size ratio of perceived parental attitudes to parental dinners per week is 3.08 in the sex model, and 20.36 in the drug model, though the effect of parental dinners per week is not statistically significant. Aside from parent dinners per week, no other measure of parental structure (closeness, conversation frequency, or punishment frequency) is statistically significant in any model.

Changes in the number of troublesome friends a respondent has is positively associated with cutting class and sexual activity, and changes in the number of drug-using friends a respondent has is positively associated with cutting class and drug use. These measures are also frequently used as structural predictors, and we might be tempted to interpret them as such in the current analyses. However, the main findings of this article suggest that the effect of friendships is likely due more to the *beliefs* about friends and friendship, than to the particular arrangement of concrete relations. In other words, without certain cultural beliefs, the concrete relations, and any influence they may have, would likely not exist.

## DISCUSSION

My results indicate overwhelming support for the Institutional Hypothesis: net of role beliefs, the behavioral influence of concrete social structure is comparatively minute. These results are supported both in cross-sectional matching models, and in cross-wave fixed-effects models. Perceived parental attitudes are the only predictor with consistent, statistically-significant effects on behavior in all models. When measures of parental dinners per week are statistically significant, they exhibit effect sizes 2 to 10 times smaller, and significance values that are orders of magnitude smaller, than the corresponding effects of perceived parental attitudes. These results have important consequences for both theory and method in several subdisciplines, but especially in social network analysis.

Table 3: Results from Fixed-Effects Models of Deviant Behavior (X-Standardized Coefficients)

	Cutting Class				Had Sex				Drug Use			
	Std. $\beta$	SE	<i>p</i>	Signif.	Std. $\beta$	SE	<i>p</i>	Signif.	Std. $\beta$	SE	<i>p</i>	Signif.
Upset Skip	-0.204	0.04	2.70e-06	***	,	,	,	,	,	,	,	,
Upset Sex	,	,	,	,	-0.323	0.04	2.23e-13	***	,	,	,	,
Upset Drug	,	,	,	,	,	,	,	,	-0.202	0.04	9.05e-07	***
Parent Dinners per Week	-0.098	0.05	0.045	*	-0.105	0.04	0.019	*	-0.010	0.05	0.839	
Mom Closeness	-0.065	0.05	0.191		-0.020	0.05	0.653		-0.069	0.05	0.157	
Mom Talk	-0.087	0.05	0.097		-0.068	0.05	0.153		-0.036	0.05	0.484	
Dad Closeness	0.037	0.06	0.539		0.046	0.05	0.401		0.067	0.06	0.256	
Dad Talk	-0.095	0.06	0.092		0.079	0.05	0.125		-0.103	0.06	0.065	
Church Attendance	-0.028	0.06	0.628		0.019	0.05	0.716		-0.101	0.06	0.075	
Faith in Daily Life	0.030	0.06	0.617		0.064	0.05	0.238		-0.014	0.06	0.813	
No. of Friends	-0.004	0.03	0.903		0.055	0.03	0.083		-0.016	0.03	0.653	
Parent Network Closure	0.024	0.05	0.595		0.116	0.04	0.005	**	0.030	0.04	0.505	
Troublesome Friends	0.157	0.04	1.81e-04	***	0.127	0.04	8.59e-04	***	0.040	0.04	0.336	
Drug-Using Friends	0.150	0.05	0.001	**	0.011	0.04	0.787		0.385	0.05	2.53e-16	***
Friends in Same Rel. Grp.	0.012	0.04	0.765		-0.091	0.04	0.014	*	-0.029	0.04	0.465	
Punishment Freq.	0.012	0.04	0.787		-0.008	0.04	0.844		-0.014	0.04	0.756	
Dummy - Wave 2	0.334	0.09	3.53e-04	***	0.733	0.09	1.03e-15	***	-0.037	0.09	0.692	
Adj. R <sup>2</sup>			0.193				0.324				0.156	,
F			21.8				66.4				15.5	,
F Sig.			2.28e-45				8.72e-108				6.22e-33	,
d.f.			492				492				492	,

Notes: \**p* < 0.05, \*\**p* < 0.01, \*\*\**p* < 0.001



### Implications for Theory

Theoretically, my results indicate that socially-influenced behavior is the product of institutionalized role-playing, and not patterns of relations. This finding directly contradicts the prevailing assumption in network analysis, and particularly its explicitly structuralist variant (Burt 1982; White 1992, 2008), which maintains that concrete relations generate beliefs and roles. I have shown this to be false even in the most fundamental type of concrete relationship, kinship (White 1963; Bearman 1997). If the belief component of relationships accounts for the relationships' influence among parents and children, these beliefs likely also support all meaningfully-influential relationships. How else can we account for the relative influence of a respondent's distant friend as compared to the driver of her commuter bus? Though she sees the driver daily, the bus driver will likely exhibit less influence over her behavior than the distant friend. Investigating the relationship between interactional frequency, role beliefs, and behavior is a promising avenue for future research. My results also suggest the need to empirically investigate the common, and more fundamental, assumption that role beliefs depend, *a priori*, the presence of concrete alters to be formed. In other words, we cannot be sure that individuals do not construct role beliefs about alters that do not empirically exist. This is a potential point of investigation for future research, if such "imaginary" entities can be found.

### Implications for Method

Methodologically, my results indicate that existing measurements of "concrete" relations are likely measuring relational *beliefs*, not concrete, observable interactions. This is true for solicitations of concrete relationships (Bearman et al. 2004), and it is likely even more true for solicitations of discussion and online social networks (Centola 2010; Lewis, Gonzalez, and Kaufman 2012). Synonymizing these measures with concrete relationships requires theoretical assumptions that I have shown to be largely untenable. This does not mean that social network analysis is everywhere fraught. Instead, it suggests that all sociologists must pay close attention to their characterization and measurement of social relationships. Observations of concrete, interpersonal interaction have long been the ideal-typical unit of structural data (White et al. 1976). These types of data, or their close approximations, likely provide the purest isolation of truly structural components.

My results also suggest a need to more robustly measure the cultural components of social interactions, no matter how mundane. There is little information on the relational characterizations or role beliefs actors use to motivate and guide their social actions. All evidence points toward these, and other normative beliefs, playing a central role in nearly every facet of social action (Lizardo 2006b; Vaisey 2009, 2010; Vaisey and Lizardo 2010). Future research should redouble its efforts to understand the role of beliefs in social action, including their fundamental role in the creation and maintenance of concrete social ties.

## CONCLUSION

For several decades, sociologists have assumed that social influence is a structural phenomena, caused by patterns in concrete social structure. This paper advances and finds empirical support for a different view: social influence on behavior is almost entirely the result of performed institutionalized roles, which are taken-for-granted beliefs about who an individual is and they should do, even in the most basic concrete interactions: kinship relations. Institutions are easy to forget, because they are so routine and taken-for-granted. However, we must be careful not to ignore institutions just because we are so excellent at performing them.

## APPENDIX

## Descriptive Statistics

Table 4: Descriptive Statistics for W1 Matching Predictors

Variable	Mean	SD	Min	Max
Parent Upset, Drug Use	3.79	0.54	0.00	4.00
Parent Upset, Having Sex	3.30	1.04	0.00	4.00
Parent Upset, Skipping School	3.56	0.72	0.00	4.00
Parent Upset, Drug Use - Mean	0.84	0.37	0.00	1.00
Parent Upset, Sex – Mean	0.60	0.49	0.00	1.00
Parent Upset, Cut Class – Mean	0.68	0.47	0.00	1.00
Parent Dinners per Week	5.19	2.11	0.00	7.00
Dinners w/ Parents – Mean	0.55	0.50	0.00	1.00
Frequency of Punishment for Misbehavior	3.91	1.12	0.00	5.00
Dad Closeness	3.53	1.24	0.00	5.00
Dad Conversational Frequency - R Measure	3.17	1.24	1.00	5.00
Mom Closeness	4.06	0.93	0.00	5.00
Mom Conversational Frequency - R Measure	2.40	1.16	1.00	5.00
'Bad Moral Influence' Friends	0.32	0.74	0.00	5.00
Boyfriends/Girlfriends	0.28	0.50	0.00	5.00
Close Friendships	2.01	1.51	0.00	5.00
Friends Different Race	0.76	1.25	0.00	5.00
Friends Different Sex	1.00	1.05	0.00	5.00
Friends R Sees Often	3.25	1.70	0.00	5.00
Drug-Using Friends	0.66	1.30	0.00	5.00
Troublesome Friends	0.52	0.84	0.00	4.00
No. of Friends	4.71	0.91	0.00	5.00
Friends from Church/Youth Group	1.57	1.72	0.00	5.00
Parental Network Closure	2.48	1.69	0.00	5.00
Friends from School	3.53	1.58	0.00	5.00
Age	15.48	1.41	12.91	18.49
Black	0.12	0.32	0.00	1.00
Female	0.50	0.50	0.00	1.00
Evangelical	0.34	0.47	0.00	1.00
Religious Service Attendance	3.28	2.16	0.00	6.00
Impt. Faith in Daily Life	2.54	1.14	1.00	5.00
HH Boy Count	0.11	0.35	0.00	3.00
HH Girl Count	0.10	0.36	0.00	4.00
HH Size	4.47	1.24	3.00	13.00
Household Income - Parent Measure	6.80	2.81	1.00	11.00
Conversation Frequency - Parent Measure	1.80	0.91	1.00	5.00
Conversation Frequency About Sex - Parent Measure	3.36	0.90	1.00	4.00

Table 5: Descriptive Statistics for Panel Predictors

Variable	W1 Mean	W1 SD	W2 Mean	W2 SD	Std. Change*
Cutting Class	1.27	0.57	1.98	1.11	0.87
Marijuana Use	0.15	0.45	0.48	0.90	1.03
Sex Ever	0.00	0.04	0.59	0.49	1.09
Parent Upset, Drug Use	3.86	0.41	3.71	0.63	1.17
Parent Upset, Having Sex	3.57	0.71	2.69	1.25	0.77
Parent Upset, Skipping School	3.64	0.60	3.39	0.83	0.86
Parent Dinners per Week	5.43	1.95	3.71	2.02	0.62
Dad Closeness	3.65	1.19	3.35	1.20	0.58
Dad Conversational Frequency	3.19	1.20	3.30	1.19	0.58
Mom Closeness	4.16	0.84	3.90	0.92	0.71
Mom Conversational Frequency	2.37	1.12	2.44	1.14	0.62
Frequency of Punishment for Misbehavior	4.06	1.05	3.84	1.07	0.68
Drug-Using Friends	0.39	0.91	1.91	1.78	0.76
No. of Friends	4.82	0.72	4.98	0.18	1.90
Troublesome Friends	0.47	0.76	1.26	1.55	0.75
Friends from Church/Youth Group	1.32	1.73	1.53	1.64	0.63
Parental Network Closure	2.58	1.67	4.43	1.03	0.80
Religious Service Attendance	3.36	2.10	2.79	2.15	0.50
Impt. Faith in Daily Life	2.58	1.07	2.84	1.19	0.55

\* Most respondents have no change on predictors between waves. This column is the average magnitude (absolute value) of standardized change for respondents who *did* change across waves.

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