

Explaining Macro-Level Rape with Routine Activities Theory: A Multitheoretical Approach using Backlash Hypothesis, Social Disorganization Theory, and Evolutionary Psychology

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Abstract: Previous macro-level studies of rape have only examined the relationship between gender inequality or socioeconomic status and possible exposure to rapists. The current study overcomes the limitations of previous research by using Social Disorganization Theory, Evolutionary Psychology, and Backlash Hypothesis to simultaneously measure the three key components of RAT. Our analysis predicts victim/offender disaggregated rape counts in U.S. counties using the U.S. Census data and the National Incident Based Reporting System (NIBRS). Our findings reveal the following: (1) Evolutionary Psychology and Backlash Hypothesis variables were not significant as individual predictors for most of the tested models, (2) Social Disorganization variables were positive and significant in most models, and (3) the Evolutionary Psychology-RAT framework was a poor predictor of all types of rape. Our findings reveal the strength of the Backlash Hypothesis as a predictor of rape, as well as the importance of measuring the components of RAT fully and simultaneously.

Keywords: Rape, Social Disorganization Theory, Evolutionary Psychology, Routine Activities Theory, Backlash Hypothesis

Received : 15 March 2021

Revised : 18 April 2022

Accepted : 28 April 2021

Published : 15 July 2022

TO CITE THIS ARTICLE:

Maria Thuy T. Trinh, Raymond E. Barranco & Casey T. Harris (2022). Explaining Macro-Level Rape with Routine Activities Theory: A Multitheoretical Approach using Backlash Hypothesis, Social Disorganization Theory, and Evolutionary Psychology. *Journal of Crime and Criminal Behavior*, 2: 1, pp. 45-66. <https://doi.org/10.47509/JCCB.2022.v02i01.03>

1. Introduction

Within both media coverage and popular discourse, sexual misconduct and violence has emerged among the most consequential topics of the past few years with some postulating that this marks “the biggest national conversation on the issue since the Anita Hill-Clarence Thomas battle in 1991” (CNN 2018). Indeed, specific instances of sexual violence (e.g., Brock Turner, Harvey Weinstein) have become central discussion pieces across the United

States. Unfortunately, and despite the high profile of such cases, sexual violence remains a persistent issue and among the most under-reported types of offending in the United States: only 32 percent of sexual assaults were reported to the police in for the 2009-2010 period (National Crime Victimization Survey, 2010).

High-profile incidents have certainly triggered a renewed empirical focus among criminologists, particularly over the last decade or more (e.g., Abbey and McAuslan, 2004; Armstrong, Hamilton, & Sweeney 2006; Fisher & Sloan, 2003; Franklin, Bouffard, & Pratt, 2012; Haynes-Smith & Levett, 2010; Hines et al., 2012; Krebs et al., 2009; Rothman & Silverman, 2007; Sable et al., 2006). Much of this research examines micro-level factors impacting whether and how individual characteristics such as a victim's or offender's race (Coulter et al., 2017; Sorenson & Siegel, 1992), age (Felson & Cundiff, 2012), or gender (Felson & Pare 2005) are associated with sexual violence. Still other research explores how incident characteristics impact rape offending or victimization (Moller et al., 2012).

While such individual-level focus on the predictors of rape constitutes an important body of knowledge, the contexts of macro-level correlates of sexual violence matter, as well. As such, the current study advances knowledge on the aggregate patterns of sexual assault in four ways. First, this area of research remains under-developed relative to the larger body of individual-level studies on sexual violence. That is, there is an overall scarcity of empirical studies at the macro-level (for exceptions, see Austin & Kim, 2000; Maume, 1989; Mustaine, 1997). Second, findings within the extant macro-level research remains mixed, suggesting the need for more research to parse out how patterns of sexual violence are impacted by the characteristics of the communities in which they occur. Third, many of these studies focus on the relationship between socioeconomic status and gender inequality across communities as mechanisms of exposure to rapists (e.g., Maume, 1989; Xie, Heimer, & Lauritsen, 2012) or examine gender-specific support networks as they impact the likelihood of sexual violence (Schwartz et al., 2001), pointing to the need for greater attention to victim-offender disaggregated analyses.

Finally, fourth, prior research has yet to fully untangle all of the theoretical dimensions and intricacies of operationalizing those dimensions that are germane to understanding sexual violence across places. We expand on this line of inquiry by using several theoretical traditions, including social disorganization theory, evolutionary psychology, and the backlash hypothesis, alongside components of routine activities theory to examine the relative incidence of rape across United States counties using data from the United States Census and the National Incident Based Reporting System (NIBRS). In doing so, our key research question is: *what are the macro-structural and theoretically informed correlates of community rates of sexual violence?* In subsequent sections, we review prior research examining rape at the macro-level and describe the theories upon which our analysis rests. Second, we elaborate on our contribution relative to prior literature before, third, describing the data and methodology of the current study. Finally, we conclude by discussing our findings and their implications for future research.

2. Previous Research on Rape

Sexual violence, especially rape victimization, has received a significant amount of attention recently in the criminological literature. Most of this inquiry centers on the individual-level (Siddique, 2016; Franklin et al., 2012). In contrast, and relevant to the current study, fewer empirical studies have explored community-level predictors of sexual violence. As such, our review focuses on the handful of existing macro-level studies of rape (see Turchik, Hebenstreit, & Judson, 2016 for a detailed review of existing micro-level research).

Broadly, these aggregate-level studies explore the role of power and equality, victim-offender relationships, or patterns of daily life (i.e., “routine activities”) in predicting rape and other forms of sexual violence. To date, the findings from these studies have been somewhat contradictory. For example, several studies have found support for the “liberal feminist theory,” which argues that rape rates decline as women gain greater equality with men (e.g. Lee, Hilinski, & Cleavenger, 2009; Martin, Vieraitis, & Britto 2006). In contrast, other research has found support for a “backlash hypothesis” that proposes sexual violence to be most prevalent in places where women have more equality with men, primarily because men use rape as a means to maintain power/control over women (e.g. Austin & Kim, 2000; Bailey, 1999; Heise & Kotsadam, 2015; Peterson & Bailey, 1992; Whaley, 2001).

As examples of these perspectives, Austin and Kim (2000) conduct a cross-national examination of gender equality and official rape rates and find a positive association, which they suggest could be explained by women’s increased activity outside of the household rather than an attempt by men to reassert their dominance. Similarly, Xie and colleagues (2012) find that increased female labor force participation is positively associated with known non-intimate and stranger rape, but negatively associated with intimate partner rape. For the former, they argue that increased activity outside of the household increases exposure to potential offenders, while the latter can be attributed to women’s decreased dependence on their abusers.

Still other macro-level research utilizes routine activities theory (RAT) to explain macro-level rape both independently of – and in association with – equality/power explanations. For example, Maume (1989), in his examination of rape rates in 318 standard metropolitan statistical areas (SMSAs), creates a “general opportunity index” that combines measures of motivated offenders and suitable targets and reveals a positive relationship between this index and rape rates. Likewise, Xie and colleagues (2012) hypothesize that women increase their exposure to motivated offenders when they work outside of the household, finding some support for this expectation. Finally, Stein (2014) employs international victimization data to conduct a multilevel examination of sexual victimization with a focus on the potential for interaction with motivated offenders by controlling for the sex ratio and proportion of females employed. Unlike the other studies reviewed here, Stein’s (2014) analysis reveals no significance for the sex ratio and only marginal support for the link between female employment and rape victimization (positive association).

Unfortunately, only a handful of prior studies examine the role of routine activities in aggregate patterns of sexual violence at all. Perhaps more importantly, many of the aforementioned studies examine one or two of the essential components of RAT, but almost never simultaneously or in separate models. As such, we elucidate the key arguments of RAT below and explain how other theoretical frameworks assist in capturing the components of RAT relative to the shortcomings of previous macro-level research.

3. Routine Activities and Sexual Violence

Cohen and Felson's (1979) thesis laying out the boundaries of routine activities theory remains groundbreaking in its explanation as to how criminal acts involve the convergence in time and space of motivated offenders and suitable targets in the absence of capable guardians. As they state, criminal activity occurs in places in which the area's social structure "produce this convergence, hence allowing illegal activities to feed upon the legal activities of everyday life" (Cohen & Felson, 1979, p. 588). Individuals increase their likelihood of victimization through their everyday or routine activities, particularly when those actions involve leaving their homes. Within this perspective, motivated offenders are taken as a given and are likely to commit crimes if they have the opportunity (Cohen & Felson, 1979; Schwartz et al., 2001), though much hinges on the absence of a capable guardians (e.g., an authorized agent such as a police officer, family member, friend, or neighbors willing to intervene to prevent crime). In the case of sexual violence, for example, some prior studies suggest males on college campuses operate as motivated offenders and college-aged females represent vulnerable targets amidst their daily routines, particularly when outside of the guardianship of friends and their own family (Schwartz et al., 2001).

Ironically, several micro-level studies of rape provide support for the primary tenets of routine activities theory (e.g. Cass, 2007; Hines et al., 2012; Mustaine & Tewksbury, 2002; Schwartz et al., 2001; Tewksbury & Mustaine, 2001). For instance, Mustaine and Tewksbury (2002, p. 89) find that college females are at a greater risk for sexual assault when they were more exposed to potential offenders, particularly in the context of "rape-supportive male peer groups," as well as a result of "being a member of a greater number of clubs, going out at night for leisure, and using drugs a greater portion of time in public" that increase the proximity and exposure of potential offenders (Mustaine & Tewksbury, 2002, p. 118). Similarly, Hines and colleagues (2012) find that male sexual victimization is associated with time that was spent partying and socializing in ways that increase the exposure of these motivated offenders with vulnerable targets outside of guardianship.

Given RAT's fundamental argument that there must be a convergence of offenders, victims, and no guardians in order for crime to occur, it is surprising that previous studies of aggregate patterns of rape have failed to account for all three theoretical constructs. Maume (1989, p. 514-515), for example, argues that the RAT "perspective assumes that in every area there are people who commit acts; thus, areal variation in crime is a function of the

opportunity for crimes to occur.” Maume is not alone in making this argument. Stein (2014) controls for the sex ratio, indirectly capturing the presence of motivated offenders, while Xie and colleagues (2012) do not even attempt to control for motivated offenders. Relevant for our purposes, the assumption in prior studies is that there are offenders everywhere. We argue that researchers need to explain why certain areas have more motivated offenders than others and more fully consider how the suitable targets (here, potential female victims) come into contact with those offenders in time and space.

Consider two hypothetical communities: one has 1,000 men (of which only 500 are motivated to commit rape), 1,000 women in the workforce and no capable guardians. A second community has 1,000 men (of which all 1,000 are motivated to commit rape), 1,000 women in the workforce, and no capable guardians. In this example, the sex ratio and the opportunity (suitable targets – capable guardians) to commit rape are the same in both counties. According to the assumption outlined above, the counties should have similar rates of sexual violence, though any reasonable person could see that the rape rate in the second would be noticeably higher than the first. It is for this reason that we argue any study that examines levels of rape across places using the RAT framework needs to account for differences in the motivated offender population. As we describe below, this can be done using insights from evolutionary psychology, the “backlash hypothesis,” and even social disorganization theory.

Similarly, there remains the need to further consider which populations constitute suitable targets. For instance, Maume (1989) operationalizes these by controlling for the percentage of women 16 and older that are separated or divorced. Single or married women are excluded from consideration. Xie and colleagues (2012) and Stein (2014) focus on women in the labor force as proxies for the proliferation of suitable targets under the assumption that if women work outside the home, they are more likely to interact with motivated male offenders. Yet, women not in the workforce are often out running errands, visiting with family and friends, and/or engaging in leisure activities, similarly presenting themselves as suitable targets. Such considerations matter even more in light of the distinction between intimate partner and/or known non-intimate rape. Indeed, Xie and colleagues (2012) find that intimate partner rape increases when women’s labor force participation is higher relative to men. In short, macro-level studies of sexual violence remain somewhat underdeveloped in regard to how specific target population characteristics impact rates of rape or sexual assault.

Finally, capable guardianship within the RAT framework also has yet to be empirically untangled. Both Xie and colleagues (2012) and Stein (2014) exclude measures of guardianship directly. Instead, they assume that women in the workforce will increase their likelihood of being in situations with no capable guardians. Yet, the question remains: how does this explain a lack of guardianship for intimate partner and/or known nonintimate rape? Maume (1989), on the other hand, attempts to directly measure guardianship using the percentage of housing units that are renter-occupied because residents of “high renter”

areas should be more accustomed to seeing strangers and, therefore, less vigilant in protecting their neighbors. Critically, this may be important in regard to sexual violence perpetrated by strangers, though identifying strangers and warning neighbors may not correlate as much with intimate and/or known nonintimate rape. As we discuss below, important insights from both social disorganization theory and evolutionary psychology suggest additional linkages that help extend prior research.

3.1. Social Disorganization Theory: Theorizing Guardianship

Social disorganization theory argues that crime occurs in communities because of the lack of effective informal social controls and common values among its residents (Kubrin, 2009). Deriving from socioeconomic deprivation (Shaw & McKay, 1942), residential instability (Sampson & Groves, 1989), and a lack of ties among community residents (Sampson & Raudenbush, 1999), disorganization inhibits a community's ability to develop and enforce shared common values. If residents are not invested in their local community and are unwilling to interact and work with their neighbors, informal social controls, such as parental and institutional supervision (Kubrin, 2009), will be ineffective (Morenoff, Sampson, & Raudenbush, 2001). This lack of informal social control prevents the community from reaching common goals – like fighting crime (Kasarda & Janowitz, 1974).

Since its reemergence in the late 1980s, the social disorganization framework has been consistently linked with crime, particularly homicide (e.g., Sampson & Raudenbush, 1999; Kubrin, 2003; Morenoff et al., 2001). However, it has rarely been used to explain macro-level rates of rape and other forms of sexual violence. Yet, the general applicability of social disorganization to all types of macro-level crime rates has been demonstrated time and again. As Toby (1957, p. 13) describes it, disorganization in a community brings about distracted and “apathetic citizens” such that “the larger the concentration of distracted persons in a community, the less capable the community becomes for united resistance to anything – including crime.” Thus, disorganized communities will have a harder time preventing crime, including rape, in all of its forms. For example, if citizens are distracted or apathetic, they will be less likely to identify strangers and possibly warn other residents. They would also be less likely to condemn, get involved, or otherwise prevent sexual violence occurring between individuals that know each other (e.g., intimate partner, family, or acquaintance rape). Indeed, Warner (2003) argues that social disorganization brings about cultural attenuation – the weakening of the strength of conventional values, such as prohibitions against sexual violence – that can result in a localized “rape culture”, where values and beliefs provide an environment conducive to rape (Buchwald et al., 1993; Herman, 1984). In short, disorganized communities lack the ability to enact informal social controls to regulate behavior – such as sexual assault.

Crucially for our purposes, the disorganization perspective provides value for macro-level applications of the routine activities framework to patterns of rape across places.

Previous macro-level studies of rape using the routine activities framework have either chosen not to measure guardianship (e.g. Stein, 2014 and Xie et al., 2012) or have done so with somewhat crude measures (Maume, 1989). Centrally, any measure of capable guardianship needs to work well with both stranger and acquaintance rape. That is, measuring the inability to recognize strangers (e.g. Maume, 1989) and increased interaction with individuals while going to and from work (e.g. Stein, 2014 and Xie et al., 2012) may not adequately capture potential guardianship for all types of rape. Instead, building upon social disorganization theory, guardianship can be viewed as a community's willingness or ability to prevent rape. This includes not only physical guardianship like watching what is happening in the community or physically preventing criminal acts from taking place, but also normative guardianship (e.g., making it clear to residents that rape is unacceptable, not accepting victim-blaming explanations for rape, teaching males culturally acceptable ways to behave sexually, etc.). In other words, the community's ability to regulate behavior and enforce norms can act as an ever-present guardian – even when no one is physically present.

3.2. Additional Considerations for Motivated Offenders and Suitable Targets

At the same time, both evolutionary psychology and the “backlash hypothesis” provide greater specificity for capturing both motivated offenders and suitable targets in ways that dovetail with the routine activities perspective. We do not attempt to adjudicate between these theories, but rather treat them as sensitizing frameworks that provide theoretical overlap with the key dimensions of motivation for offending and suitability of targets relative to sexual violence. For the first, evolutionary psychological (EP) emphasizes “the sex-specific male human nature and female human nature” that involves psychological mechanisms that “evolution by natural and sexual selection has equipped humans to possess in order to solve an adaptive problem” (Kanazawa, 2009, p. 90). Such mechanisms operate unconsciously and manifest themselves when an individual is faced with an adaptive problem.

Relative to the current study, males with higher status attainment and more resources can monopolize reproductive access to females while other males are left out. In other words, a lack of access to sexual partners is exclusively a male problem that motivates them to acquire resources and status to remain competitive in attracting potential mates (Kanazawa, 2009). Since not all males have equal access to resources and status, the evolutionary drive to mate can motivate males to obtain mates through illegitimate means (i.e., rape) (see Miller, 2014). According to Thornhill and Thornhill (1983), predatory rapists are mostly males of lower status and class who have low probabilities to gain legitimate access to women. Likewise, Apostolou (2013) found historical and anthropological evidence that rape is an outcome that allows men to evade female and parental choice when experiencing disadvantage in the reproductive competition.

Critically, such themes parallel RAT's emphasis on motivated offenders in a given community via competition for sexual partners. According to EP, fewer females and more

males means there will be increased competition for mates. In turn, increased competition creates motivated offenders for sexual violence. For example, if location A has 1,000 females and 500 males and location B has 500 females and 1,000 males, evolutionary psychology would predict greater competition in location B, resulting in more male on female rape to ensure their genes are passed on. This perspective can also explain which groups of women would be viewed as “suitable targets.” Since evolutionary psychology argues that the primary drive behind rape is the desire to obtain sexual partners and reproduce, women of child bearing age are the primary targets of male perpetrated rape. Thus, including measures of the sex ratio and the percent of reproductive age females (between the ages of 15-44) (Yeh et al., 2014) can advance RAT applications to macro-level studies of sexual violence.

Regarding the backlash hypothesis (and related liberal feminist theory), male rape occurs as a reaction (i.e., “backlash”) to circumstances where women’s desire for independence increases and men express their anger and frustration toward women (Russell, 1975; Whaley, 2001). In essence, greater female independence from men or such things as “feminist anti-rape campaigns” cause an increase in threatened male egos in a community (Whaley, 2001, p. 532; Williams & Holmes, 1981). Due to the increased liberation of women, men desire to maintain hegemonic masculinity through threat or force (Messerschmidt, 1993; Whaley, 2001).

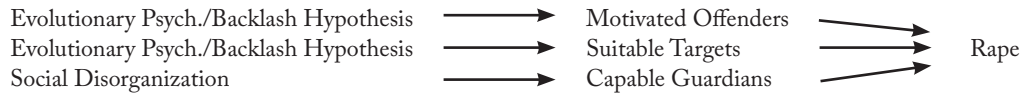
Indeed, some prior research finds that gender equality is positively associated with rape across communities, with those scholars concluding that “rape is the form of male backlash” (Martin et al., 2006, p. 321). For example, Peterson and Bailey (1992) find that higher rates of female participation in male-dominated occupations such as executives, managers, and administrators, is associated with higher rape rates in their sample of U.S. metropolitan cities. Likewise, Austin and Kim (2000, p. 216) find a positive relationship between gender equality and rape across forty-one countries, arguing that when males perceive women making progress in a country that “there may be an increase in rape that is intended to teach ‘uppity’ women a lesson.” Finally, Xie and colleagues (2012) find increased female labor force participation is positively associated with known nonintimate and stranger rape.

That is not to say findings are universally consistent. Other scholars find gender equality decreases the occurrence of rape. For example, Lee et al. (2009, p. 192) observe no significant relationship and state that “competition that leads to the frustration that leads to violence against women could be group-specific instead of a general social condition.” Others suggest that backlash may be short-lived and limited to a few men (Bailey, 1999; Martin et al., 2006; Whaley, 2001). Still others argue that rape is a feature of patriarchy that fosters gender inequality whereas equality produces a decline in rape rates over time (Bryden & Madore, 2016).

Relative to our own study, the key insight is the manner in which the “backlash hypothesis” contributes to our understanding of motivated offenders and suitable targets across locales. For instance, the hypothesis would propose that as women achieve greater equality relative to men, rape might increase. Operationalizing this might entail capturing

female-male differences in education or income (i.e. the gender gap in education and/or income)¹. Thus, we might expect places with greater gender equality to have a larger number of motivated male offenders.

3.4. *Integrated Routine Activities Theory Model of Macro-Level Rape*



4. Current Study

Based on our review of prior research, our goal is to specify and operationalize the three components of RAT simultaneously using themes from social disorganization theory, evolutionary psychology, and the backlash hypothesis. Specifically, we ask the following questions: (1) *Are the components of RAT significant predictors of rape individually and in combination?* And (2) *Do evolutionary psychology or backlash hypothesis specifications of suitable targets better predict rape at the macro-level?* As noted above, all previous macro-level rape studies have attempted to measure motivated offenders, suitable targets, and capable guardians independent of each other, but these three dimensions must come together simultaneously in order for crime to occur. One aim is to disentangle these facets of the RAT model. Additionally, there remains ambiguity regarding the suitability of specific female populations as targets in terms of whether the relative presence of all females matters more or less than those of reproductive ages. Thus, a second aim is to adjudicate this specific issue.

5. Methods

5.1. *Sample*

Our sample consists of 1,498 U.S. counties for which rape counts are provided in the 2008–2010 NIBRS extract data. These years were chosen to coincide with the 2010 Decennial Census, as well as American Community Survey data (5-year estimates). The National Incident-Based Reporting System (NIBRS) is a dataset collected by the Federal Bureau of Investigation's Uniform Crime Reporting Program (UCR) and involves a cooperative, nationwide statistical effort of over 18,000 county, city, college and university, state, tribal, and federal law enforcement agencies voluntarily reporting data on reported or known offenses. In NIBRS, law enforcement agencies report data on offenses and arrests within 23 categories comprising 49 specific crimes.

1. Though there are several ways to measure gender (in)equality, these remain the most commonly used in previous research given their status as markers of socioeconomic status.

For the current study, we use NIBRS because it provides important details on the occurrence of rape – specifically the relationship between the victim and the offender. Although NIBRS is the most appropriate dataset for this analysis, it is not without limitations (for detailed reviews, see Addington 2010; Akiyama and Nolan 1999). In addition to the limitations that affect all official crime statistics, including the underreporting of crimes, the primary limitation of NIBRS is that its coverage is less comprehensive than the UCR. While the UCR covers nearly 90 percent of the U.S. population, NIBRS covers slightly less than one-third. Therefore, our study is not a comprehensive examination of rape throughout the U.S. It is, however, an improvement over previous macro-level studies of rape which have examined only a handful of metropolitan areas (e.g. Bailey 1999; Peterson & Bailey, 1992; Xie et. al., 2012).

5.2. *Dependent Variables*

The dependent variables include the number of all types of rape (*total rape*) in U.S. counties, as well as various types of rape disaggregated by victim-offender relationship: *stranger rape*, *intimate rape*, and *combined known rape* (nonintimate acquaintance and family rape combined)². As noted above, data on rape counts were obtained from the NIBRS dataset, which defines forcible rape as the “carnal knowledge of a person, forcibly and/or against that person’s will or not forcibly or against the person’s will in instances where the victim is incapable of giving consent because of his/her temporary or permanent mental or physical incapacity” (FBI, 2012:5).

Given the rarity of certain types of rape (particularly stranger rape), we analyze rape counts from a three-year period (2008, 2009, 2010) in order to dampen year-to-year fluctuations. This rarity also necessitates the use of Negative Binomial Regression because it allows for overdispersion in the data (see Osgood 2000; Osgood & Chambers, 2000 for a detailed discussion of this issue). As a check for multicollinearity, we also ran our models using Ordinary Least Squares models in order to examine Variance Inflation Factors (VIFs). We found no VIFs above 2.0 in any of our models.

5.3. *Independent Variables*

Our key independent variables were obtained from the 2010 Decennial Census and the American Community Survey (2009-2013) and are informed by the three key requirements laid out by RAT: motivated offenders, suitable targets, and lack of capable guardians. We created our first set of independent variables using Evolutionary Psychology as a guiding framework. Based on our review of the literature above, we include *male:female ratio* as a measure of the presence of motivated offenders in a given county since Evolutionary Psychology posits that males resort to desperate measures (rape) when competition for

2. Since Xie et al. (2012) is the only macro-level study to disaggregate by victim/offender relationship, we follow their relationship typology.

sexual partners is high. Next, we include *percent of females 15–44* since female fertility drops dramatically after age 44 (Yeh et al., 2014) and Evolutionary Psychology states the motivation behind rape is the desire to pass on genes. Lastly, we include an index measure of *social disorganization* since RAT requires a lack of capable guardians in order for crime to occur. We created the social disorganization index by summing the Z scores of the following measures: percent of the population aged 25 and older without a high school diploma, percent of the population unemployed, the percent of the population living in poverty, and the percent of the population that moved in the past year. These three measures were then combined into a single index (*RAT Psychology Index*) in order to simultaneously measure the three requirements of RAT. This was done by summing the Z scores of each of the three measures described above.

We created our second set of independent variables using Backlash as a guiding framework. Based on our review of the literature above, we include the difference in female to male income (female income – male income: *income difference*) since Backlash suggests that when women gain greater equality relative to men, men will use rape as a way to maintain social power over women. Next, we include the percent of the total population that is female (*percent female*) since Backlash suggests that male dominance extends over all women – not a particular group of women. Therefore, more women, of any age, means more suitable targets. Lastly, we once again include the social disorganization index described above as a measure of the lack of capable guardians. These three measures were then combined into a single index (*RAT Backlash Index*) in order to simultaneously measure the three requirements of RAT. This was done by summing the Z scores of each of the three measures described above.

5.4. Control Variables

Our control variables were also obtained from the 2010 Decennial Census and the American Community Survey (2009–2013). As general demographic measures, we include the total county population (*total population*) and the percent of the population that is non-white (*percent non-white*). The *Gini coefficient* measures overall income inequality, while *Metro* is a dummy variable indicating whether a given county is metropolitan or nonmetropolitan (metropolitan =1)³. Lastly, as measures of the potential for interpersonal violence to occur, we include the proportion of housing units in clusters of five or more (*housing density*) and the proportion of all houses that are vacant (*vacant houses*).

6. Results

The descriptive findings are presented in Table 1. The results shows that the population in our sample of counties was nearly split evenly between males and females (male:female ratio = .99, % female = .50) and less likely to be non-white than the general U.S. population

3 Based on the rural-urban continuum codes of the U.S. Department of Agriculture (2013). Values 1–3 are coded as metropolitan, while values 4–9 are coded as nonmetropolitan.

(13% in our sample vs. 25% in general population). Slightly more than one-third (36%) of our counties were considered metropolitan, which is very similar to the actual makeup of U.S. counties (41% of all counties are metropolitan).

Although we use rape counts in our analysis, we present rape rates for descriptive purposes in Table 1. Our findings are consistent with previous research and statistics on rape – stranger rape is the least likely to occur, while rape committed by acquaintances and family members is the most common.

Table 1: Descriptive Statistics of County-level Variables for U.S. Counties, 2010

	<i>Mean</i>	<i>S.D.</i>
Male : Female Ratio	.99	.10
% Female 15-44	.18	.03
% Female	.50	.02
Gini Coefficient	.43	.04
Housing Density	.07	.07
% Non-White	.13	.14
Vacant Houses	.16	.10
Metro	.36	.48
Total Population	81,755	225,200
Income Difference	-12,326	4145
Disorganization#		
No HS	.16	.07
Unemployed	.07	.03
Poverty	.15	.06
Moved	.07	.03
Total Rape [^]	21.73	20.27
Stranger Rape	1.13	2.09
Intimate Rape	2.71	3.60
Combined Known Rape	12.29	12.92
N=	1498	

Disorganization measures (no HS, unemployed, poverty, and moved) are listed separately for descriptive purposes, but in the multivariate analysis they are combined into a single index. See methods section for more detail.

[^] Total Rape, Stranger Rape, Intimate Rape, and Combined Known Rape are expressed as rates in the descriptive table, but are entered as counts in the negative binomial regressions.

Table 2 presents the results of negative binominal regression models predicting types of rape in U.S. counties. Given the large number of models in our analysis (36 models total), Table 2 only shows the results for the theoretically relevant independent variables. However, all 36 models were run with control variables included as well. The results for the control variables are presented separately in Table 3. The columns in Table 2 are

disaggregated by victim/offender relationship and are labeled as Models 1, 2, 3, and 4. The rows in Table 2 show the key independent variable that was included in the model (along with all previously described control variables). These are labeled A through I. So, the 36 models should be read as follows: Model 1A predicted Total Rape while including control variables and Male:Female Ratio, Model 1B predicted Total Rape while including control variables and % Female 15-44, Model 2A predicted Stranger rape while including control variables and Male:Female Ratio, and so on. Therefore, each independent variable was controlled for in separate models. The only exception to this is Models 1I, 2I, 3I, and 4I where the RAT Psychology Index and RAT Backlash Index were included in the same model to compare their predictive strength.

Our first set of models (Model 1A – Model 4D) focus on testing Evolutionary Psychology as an explanation of rape. The results show that Male:Female Ratio (measuring the presence of motivated offenders) fails to significantly impact any of our four types of rape. Likewise, % Female 15-44 (measuring suitable targets) is nonsignificant in three out of four models – only reaching significance for Total Rape. Disorganization (measuring lack of guardians), however, fares much better. It significantly increases three out of the four types of rape – only Stranger Rape is not impacted. However, RAT requires these three variables to be present at the same time – this means their individual significance is far less important than their combined impact. Models 1D – 4D test the combined effect of these variables. The results provide no support for an Evolutionary Psychology explanation of rape. RAT Psychology Index fails to reach significance in all four models.

Table 2: Negative Binomial Regression Estimates Predicting Types of Rape in U.S. Counties, 2010

	<i>Total Rape Model 1</i>	<i>Stranger Rape Model 2</i>	<i>Intimate Rape Model 3</i>	<i>Combined Known Rape Model 4</i>
Evolutionary Psychology				
Male : Female Ratio (A)	-0.5 (-4.9)	-0.8 (-7.0)	-0.0 (-0.2)	-0.2 (-2.3)
% Female 15-44 (B)	2.7* (8.2)	3.6 (10.7)	2.1 (6.2)	0.4 (1.1)
Disorganization (C)	0.1** (11.3)	0.1 (10.0)	0.1* (9.3)	0.1* (9.5)
RAT Psychology Index (D)	0.1 (5.0)	0.1 (5.1)	0.1 (6.8)	0.1 (3.2)
Backlash Hypothesis				
Income Difference^ (E)	16.3* (7.0)	20.0 (7.5)	3.7 (1.6)	20.0* (7.5)
% Female (F)	2.6* (5.5)	3.1 (6.5)	0.3 (0.7)	1.4 (2.8)

	<i>Total Rape Model 1</i>	<i>Stranger Rape Model 2</i>	<i>Intimate Rape Model 3</i>	<i>Combined Known Rape Model 4</i>
Disorganization (G)	0.1** (11.3)	0.1 (10.0)	0.1* (9.3)	0.1* (9.5)
Backlash Index (H)	0.1*** (13.9)	0.1* (14.2)	0.0 (6.2)	0.1** (11.4)
Index Comparison				
RAT Psychology Index (I)	0.0 (1.3)	0.0 (0.8)	0.0 (5.4)	0.0 (0.4)
RAT Backlash Index (I)	0.1*** (13.6)	0.1* (13.9)	0.0 (4.3)	0.1** (11.3)
N =	1498	1498	1498	1498

Note: Total Population is used as an exposure variable. % change in rape for a one standard deviation increase in variable is shown in parentheses. Each model was run using all of the control variables described in the Methods section. See Table 3 for a summary of the effects of the control variables.

^ Variable multiplied by one million to avoid exponential notation.

*** p \leq .001 **p \leq .01 *p \leq .05

Overall, we find very little support for Evolutionary Psychology. The two key predictors (Male:Female Ratio and % Female 15-44) were significant in only one out of eight models. Even when combining their effect with Disorganization, the results were not significant.

Our second set of models in Table 2 (Model 1E – Model 4H) focus on testing the Backlash Hypothesis as an explanation of rape. The results show that income difference between males and females (measuring motivated offenders) is significant in explaining Total Rape and Combined Known Rape. In other words, as females' income becomes more similar to males', Total Rape and Combined Known Rape increase. Next, the percent of the population that is female (measuring suitable targets) is significant only on Total Rape. This measurement of suitable targets fared no better than the Evolutionary Psychology measure. Both only impacted Total Rape, but none of the disaggregated types. Models 1G-4G are identical to Models 1C-4C. Since Disorganization is used to explain the lack of capable guardians for both the Evolutionary Psychology and Backlash frameworks, the models are the same. We include them again in the Backlash section simply to provide a complete picture of the framework. Like our findings for Evolutionary Psychology, the Power/Equality variables did not fare well on their own. The two main variables for equality (Income Difference and % Female) were significant in only three out of the eight models.

However, we have yet to test the combined effect of all three variables in the Backlash Hypothesis framework – which we do in Models 1H- 4H. Unlike our results for Evolutionary Psychology, we find strong support for the Backlash Hypothesis explanation. Specifically, the RAT Backlash Index is significant for three out of four types of rape (only

Intimate Rape was not significant). The effect of the Backlash Index varied by rape type. For instance, when predicting Total Rape, the Index had the second largest effect in the model (a one standard deviation increase in the Backlash Index was associated with a 13.9% increase in Total Rape). For Stranger Rape, the effect of the Backlash Index paled in comparison to Housing Density (see Table 3). Lastly, for Combined Known Rape, the effect was proportionally higher than it was for Stranger Rape, but it was still lower than several control variables (see Table 3).

Our third set of models in Table 2 (Model 1I – 4I) include both indices in the same model. As expected, the results show that even when controlling for the RAT Psychology Index, the Backlash Index remains a strong, significant predictor of rape (with the exception, once again, of Intimate Rape). The standardized effects of the Backlash Index barely dipped in each of the models. For example, when predicting Total Rape, the effect of the Backlash Index dropped from 13.9 in Model 1H to 13.6 in Model 1I. Therefore, even after simultaneously controlling for Evolutionary Psychology, we still find strong support for the Backlash explanation of rape. Although the Backlash Index did not have the strongest effect in any of the models in which we included it, it did significantly impact rape in six out of eight models. We view this as strong support for the Backlash explanation.

Table 3 presents the standardized coefficients of the control variables used in Models 1A–4I. Overall, housing density had the most consistent effect out of all of our variables – it was significant in 36 out of 36 models. Housing density had an especially strong effect on Stranger Rape, where a one standard deviation increase in housing density corresponds with a roughly 40% increase in Stranger Rape. The effect is less than half as strong for the three other types of rape. We found fairly consistent results for Vacant Houses (significant in all models except for Stranger Rape) and the Gini Index (significant in all models except for Intimate Rape), which had a negative effect for all types of rape counts except for stranger rape.

Finally, two variables had unique effects for certain types of rape. For instance, % Non-White had a significant effect on Intimate Rape, but not on other types. Also, a county being coded as metropolitan was significant only for Stranger Rape. We discuss these findings, as well as our previous findings, in greater detail in the following section.

7. Discussion and Conclusion

Previous macro-level studies of rape have inadequately applied a Routine Activities Theory framework by not simultaneously measuring motivated offenders, suitable targets, and the absence of capable guardians. The current study overcomes this shortcoming by using several theoretical frameworks: Social Disorganization Theory, Evolutionary Psychology, and the Backlash Hypothesis. Overall, our results show (a) the importance of measuring all components of RAT simultaneously and (b) the Backlash Hypothesis provides a better explanation for rape than Evolutionary Psychology. We discuss the implications of our findings.

Table 3: Summary of Standardized Coefficients for Control Variable for Models 1A – 4I

	1A	1B	1C	1D	1E	1F	1G	1H	1I
Gini	-7.4*	-7.0*	-9.8**	-7.1*	-8.5**	-7.6*	-9.8**	-11.9**	-11.9***
Housing Density	18.8***	14.8***	20.8***	18.1***	19.0***	18.7***	20.8***	19.9***	19.6***
% Non-White	7.7**	6.3*	3.2	5.7	5.8	7.6*	3.2	3.5	3.2
Vacant Houses	10.3***	11.8***	8.8**	9.6***	8.7**	10.5***	8.8**	9.6**	9.7***
Metro	-0.1	-0.7	0.9	0.2	1.2	-0.1	0.9	1.3	1.2
	2A	2B	2C	2D	2E	2F	2G	2H	2I
Gini	4.8	5.1	2.3	5.0	2.9	4.7	2.3	-0.7	-0.7
Housing Density	41.0***	34.6***	43.0***	39.7***	41.0***	41.1***	43.0***	42.6***	42.3***
% Non-White	21.0***	19.5***	17.5***	19.6***	19.8***	20.9***	17.5***	17.1***	17.0***
Vacant Houses	6.3	8.5	5.3	5.9	4.8	6.3	5.3	5.5	5.5
Metro	14.9**	14.9**	17.1***	16.2**	17.3***	14.9**	17.1***	17.4***	17.5***
	3A	3B	3C	3D	3E	3F	3G	3H	3I
Gini	-15.6***	-16.0***	-18.2***	-16.3***	-16.0***	-15.7***	-18.2***	-17.9***	-17.9***
Housing Density	18.0***	14.8**	19.3***	16.7***	18.0***	18.0***	19.3***	18.3***	17.1***
% Non-White	3.2	2.6	0.2	1.3	2.9	3.2	0.2	1.7	0.6
Vacant Houses	11.9**	13.9***	11.4**	12.3***	11.7**	12.0**	11.4**	11.8**	12.2**
Metro	0.1	-0.3	1.2	0.5	0.4	0.1	1.2	0.9	1.0
	4A	4B	4C	4D	4E	4F	4G	4H	4I
Gini	-9.5**	-9.2**	-12.0***	-9.5**	-11.1***	-9.6**	-12.0***	-13.5***	-13.5***
Housing Density	16.5***	16.0***	18.0***	16.0***	16.6***	16.5***	18.0***	17.1***	17.0***
% Non-White	3.0	2.6	-0.4	1.8	1.1	2.9	-0.4	-0.1	-0.2
Vacant Houses	13.3***	13.2***	12.0***	12.9***	11.9***	13.4***	12.0***	12.8***	12.8***
Metro	-2.2	-2.2	-1.5	-2.1	-2.2	-2.2	-1.5	-1.2	-1.2

***p<.001 **p<.01 *p<.05

***p<.001 **p<.01 *p<.05

First, our results show that measuring components of RAT independently of each other weakens the explanatory power of RAT. In the fifteen models controlling for motivated offenders, suitable targets, and lack of capable guardians, respectively, a significant relationship was found in only seven of them – and most of that can be attributed to the social disorganization measure. And yet, this is how previous macro-level research has approached RAT. We argue that future research should rely less on making assumptions about motivated offenders (i.e. that they are present, in equal proportions, everywhere) and capable guardians (i.e. that simply entering the workforce removes potential guardians) and instead provide measures of each, as well as an explanation as to how each measure explains variation across units.

Second, our results show that researchers should not only provide individual measures for each component of RAT, but these measures should be combined in order to simultaneously control the components of RAT. In this study, we did this by summing the Z scores for each of our measures into an index for Evolutionary Psychology and the Backlash Hypothesis, respectively. We found that the index performs better than the independent measures. For example, when testing the Backlash Hypothesis, the motivated offenders measure had a standardized coefficient of 7.0, the suitable targets measures was 5.5, and the capable guardian measure was 11.3. However, when combining these variables into a single measure, the standardized coefficient was 13.9 (see Model 1E-1H in Table 2). One might argue that the strength of the index was simply due to the effect of the Disorganization (i.e. capable guardian) measure. However, that same variable was included in the Evolutionary Psychology index and it failed to reach significance in all four models. Therefore, we argue that our results show the importance of creating a RAT index, rather than testing each component independently.

Third, our results show that the Backlash Hypothesis is a much better explanation for variation in macro-level rape than Evolutionary Psychology. The RAT Psychology Index failed to significantly affect any of our rape measures, while the RAT Backlash Index significantly affected three out of four measures. Even when we controlled for both measures in the same model, the RAT Backlash Index maintained significance and nearly maintained its standardized effect size. These findings are important for two reasons. First, to our knowledge, Evolutionary Psychology has never been used to predict macro-level rape in any criminological research. Our findings show that while an EP approach may make sense intuitively, it does not work as a statistically significant predictor of rape at the macro-level. Second, as outlined above, there has been empirical support for two contradictory explanations of rape – the Backlash Hypothesis and Liberal Feminist Theory. Our results add to the existing literature that supports the Backlash explanation.

Fourth, our results show the importance of disaggregating rape by victim/offender relationship. Just as Xie and colleagues (2012) found, predictors of rape are not invariant across relationship types. Had we simply examined overall rape as most previous research has done, we would have found support for most of our key independent variables.

However, there was much variation in the effects of our independent and control variables across relationship types. The key difference we found concerned intimate partner rape – unlike the other forms of rape, it was not significantly affected by the RAT Backlash Index. This finding mirrors that of Xie and colleagues (2012) who also found that equality had a different effect on intimate partner rape. We offer the following potential explanation for this differential effect: perhaps men oppose greater equality for “women in general” due to a perceived lack of job opportunities (competition from women, as well as affirmative action practices) and a perceived loss of overall power/status in society. However, perhaps this opposition is lessened when a man’s intimate partner is the beneficiary of greater equality. We measured greater equality in terms of better income outcomes for women – which, in theory, could potentially benefit the male partner in a relationship. In other words, perhaps men will oppose women in general from gaining greater equality, but not necessary their intimate partner since they (the male) stand to gain directly or indirectly from their partner’s greater economic standing. This means that men would be less willing to target their partner, but still willing to target non-intimate partners. Our explanation is merely speculation on our part and we encourage other researchers to further examine this issue in their future research.

Fifth, our results show the usefulness of using Social Disorganization Theory in examining macro-level rape. Since it was tested as one of four possible theories of rape by Baron and Straus (1987), Social Disorganization Theory has been virtually ignored in the macro-rape literature. However, its usefulness can be seen both in the significance of the disorganization variable when measured independently of the other components of RAT and in how well it helps explain the lack of capable guardians required by RAT. We believe all future studies of macro-level rape using a RAT framework should use Social Disorganization Theory to measure variations in guardianship across units.

Finally, we recognize there are several limitations of this study. First, since we felt it vitally important to disaggregate our analysis by victim/offender relationship, we were forced to use a data source (NIBRS) that has not yet been adopted in all parts of the country. Although our analysis covers far more places than previous macro-level rape research that has focused only on large metropolitan areas, our sample of counties still only covers roughly one-third of the U.S. As adoption of NIBRS continues to grow, we encourage future research to reexamine the present study with an even larger sample of counties. Also, we recognize that there are alternatives to the measures we used for motivated offenders, suitable targets, and lack of capable guardians. Nonetheless, we believe our theoretical justification for these variables is sufficient for their inclusion in the present study and encourage other researchers to replicate our study using alternative measures.

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