CRIMINAL JUSTICE INVOLVEMENT AND SELF-REPORTED HEALTH AND DEPRESSION: 
THE ROLE OF ECONOMIC DISADVANTAGE, ANTISOCIAL LIFESTYLE, AND STRESS

William M. Clemens

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Committee:

Monica A. Longmore, Advisor
Peggy G. Giordano
Wendy D. Manning
Stephen Demuth
The complex relationship between economic disadvantage, antisocial behavior, stress, and health makes assessing the role of the criminal justice system on health more complicated than previous descriptions in criminological literature. Previous literature has asserted that incarceration has long-term repercussions for mental and physical health. Yet, researchers have not explored directly the criminal justice system involvement and health connection while adequately controlling for childhood poverty and a history of antisocial behavior. Furthermore, researchers have theorized that stress is a mechanism facilitating these relationships. However, few studies have attempted to empirically test the role of general stress. Using the Toledo Adolescent Relationship Study (TARS), I tested whether being arrested or incarcerated has a long-term negative influence on the health of individuals who engage in health adverse behavior and come from economically disadvantaged backgrounds. Additionally, I examined stress as a potential mechanism through which economic disadvantage and criminal justice system involvement affects health outcomes. Results supported my hypothesis that antisocial behavior and a history of economic disadvantage explains the relationship between the criminal justice system and self-reported health outcomes in young adulthood. However, my results did not support my hypothesis that the relationship between depressive symptoms and incarceration history was spurious. My results supported the role of stress as a mediating factor between incarceration and depression. Results from the present study demonstrated how the effect of incarceration is subject to several confounding factors. Most prominently, economic contexts and
antisocial lifestyles. Future research should not neglect these pre-incarceration factors when assessing the effects of incarceration on health and well-being.
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INTRODUCTION

In the U.S., a substantial proportion of incarcerated individuals suffer from chronic physical ailments (Wilper et al., 2009). This heightened rate of poor health tends to continue among released prisoners as well. Explanations for the statistically poorer health among former prisoners compared with non-incarcerated individuals emphasize contacts with the criminal justice system and have not emphasized the potentially detrimental effect of antisocial lifestyles on health outcomes. Further, some scholars (Schnittker & John, 2007; Massoglia, 2008) have argued that the incarceration experience accounts for released prisoners’ declining health in later life. Confounding these effects are numerous background factors, which facilitate individuals’ selection into incarceration. In addition to criminal activity, activities that put individuals at highest risk for incarceration are substance abuse and mental health problems (Lamb, Weinberger, & DeCuir, 2014). Each activity is health adverse, and increases the risk of incarceration. Thus, the possibility of spuriousness challenges the argument for a causal relationship between criminal justice system involvement and poor health.

Another important confounding factor to consider is family economic background, and, in particular being economically disadvantaged as an adolescent (Massoglia & Pridemore, 2015). Economically disadvantaged individuals often are at increased risk of criminal involvement and in turn, incarceration. Additionally, economically disadvantaged individuals face greater challenges to their physical and mental well-being (Link & Phelan, 1995). In essence, economic disadvantage directly affects health (Hsieh & Pugh, 1993; Kelly, 2000; Poulton et al., 2002), and indirectly affects health through health-compromising behaviors like substance abuse and crime that select individuals into the criminal justice system (Barak, Leighton, & Cotton, 2014). Thus, it is imperative to assess economic background when examining effects of the criminal justice system on health.
Scholars have shown that incarceration and other criminal justice system contact is associated with poor health (Massoglia & Pridemore, 2015). Yet researchers have not explored directly the criminal justice system involvement and health connection while adequately controlling for childhood poverty and lifetime involvement in antisocial activities. A second limitation of prior work is that although researchers have theorized stress as a critical link, few studies assessed the mediating impact of feelings of stress. My study contributes beyond prior work by including indices of economic disadvantage, involvement in antisocial activities, and stress in assessing the association between variation in arrest and incarceration on self-reported physical health and depression.
LITERATURE REVIEW

Theoretical Background: The Stress Model and Accumulated Disadvantages

Scholars who proposed a link between criminal justice system involvement and health often suggested stress as a mechanism. Most prominent in the literature on arrest and health is the stress process theory proposed by Pearlin and colleagues (Pearlin & Skaff, 1996; Pearlin Menaghan, Lieberman, & Mullan, 1981). Pearlin and colleagues have argued that stress accumulates over the life course, leading to lowered cognitive processing abilities, which then increase individuals’ vulnerability to the consequences of high levels of life stress. Further, Pearlin and colleagues postulated that stressors act on an individual throughout the life course and accumulate into various conditions. These conditions are conducive to the creation or aggravation of physical ailments. Stress proliferates through strain of many kinds. Of particular importance to my theoretical application of the stress process theory is that stress in the lives of the economically disadvantaged proliferates via economic strain. The stress process is applicable to any kind of stress or strain but economic is perhaps the widest reaching. Economically disadvantaged individuals have less access to social resources and face greater vulnerability to the negative effects of stress. Each of these stressors can, according to the stress process theory, crossover to other domains of life. Thus, individuals under great strain economically, will also experience greater amounts of social and emotional stressors.

Second, I drew on cumulative disadvantage notions, which emphasize that antisocial behavior stems from individuals’ social environments. Individuals who grow up economically disadvantaged carry that burden throughout the life course, and the consequences of disadvantaged background may increase as individuals grow older. There are numerous potential trajectories, but as some scholars (e.g., Ferraro & Kelley-Moore, 2002) have suggested, many effects are irreversible regardless of other life outcomes. Health is arguably one of these irreversible effects of accumulated disadvantage throughout the life course.
In the present study, I combine insights from these two theoretical perspectives by conceptualizing accumulating disadvantages throughout the life course as accumulating stressors, which lead to increased self-reported depressive symptoms and poorer health. This is consistent with the stress processes proposed by Pearlin and Skaff (1996) that unexpected life events, which cause distress or strain, directly and indirectly increase depressive symptoms. Additionally, cumulative disadvantage increases the number of stressful life events that an individual endures (Ferraro & Kelley-Moore, 2002). Stress may become such a common occurrence that individuals who have lived under prolonged disadvantage may not perceive it. Yet, even subconscious stress still affects the body and mind to the point that is discernable to outside entities (DeLongis, Folkman, & Lazarus, 1988). Accompanying accumulated disadvantages is an increased number of life stressors and decreased mental and physical health.

**Criminal Justice System Involvement and Health Outcomes**

**Health of U.S. prisoners.** The literature on incarceration and health has burgeoned for several decades with most contemporary scholars agreeing that incarceration has a negative effect on physical health. Yet, early on, Walker (1983) posited that health would likely improve in prison since many incarcerated individuals could not afford, or simply neglected, to take care of their health when not incarcerated. Thus, while incarcerated, individuals received a modicum of essential healthcare and hygiene practices including STI/HIV testing. Lindquist and Lindquist (1999), however, later presented findings showing that those who experienced incarceration had worse health compared with those who had not experienced incarceration. Further, the negative effect on health increased substantially with incarceration duration. Several scholars have corroborated Lindquist and Lindquist’s findings by showing continuing negative effects of incarceration on the health of aging adults. Loeb and Steffensmeier (2006), for example, interviewing male inmates (n=51) over the age of 50 who had spent, on average, 7.6 years of their current sentence incarcerated, found that inmates were aware of unhealthy prison conditions.
Some inmates thought that prison had improved their health knowledge, yet others felt abandoned medically and that they had not learned any healthy lifestyle practices while in prison. Although age generally is related negatively with self-reported health, and poorer health is expected as individuals age, only 23% (n = 13) of the inmates reported that their health had improved since incarceration (Loeb, Steffensmeier, & Myco, 2007). Thus, in contrast to Walker’s (1983) early conclusions, these qualitative findings have provided evidence of little or no improvement in self-reported health among prisoners. However, Loeb and colleagues were unable to examine whether individuals continued to report deteriorated health after release, only that many did not expect to continue positive health practices.

**Longer-term effects of incarceration on health.** In more recent and comprehensive examinations of prolonged effects of incarceration on health, Schnittker and John (2007) found that previous time in prison was a robust predictor of chronic physical health problems. Using the National Longitudinal Study of Youth (NLSY79) to test their hypothesis that incarceration negatively affected health, even after including age, drug use, marital status, income, education, and intelligence, mediators only explained about half of the main effect of incarceration on health outcomes. Schnittker and John (2007) proposed that incarceration might be a bridge between stress research and health research. They suggested that the internalized stigma of incarceration increased stress, which negatively influenced individuals’ mental and physical health. Schnittker and John's notion of stigma as a detriment to health was somewhat supported by their analysis, but they noted that the complexity of the relationship overwhelmed their limited look at these processes. As such, their research had some critical limitations. First, there was considerable omitted variable bias in the study. For example, these researchers did not examine individuals’ history of criminal behavior, and examined only cocaine use as an indicator of substance use. Schnittker and John also excluded indicators of economic disadvantage other than family income and years of education. Most importantly, the authors omitted prior self-
reported health and any indicators of mental health. Second, Schnittker and John only measured incarceration at the time of interview thereby potentially excluding a substantial amount of short stays in prison or jail.

In a pair of articles also using the NLSY79, Massoglia (2008a; 2008b) remedied some limitations of the Schnittker and John (2007) study by accounting for a number of omitted variables. Massoglia (2008a) included three sets of variables: (1) background variables including prior health problems that limited individuals’ ability to work, intact family (two parent household), parents’ education (highest level for either mother or father), control orientation, whether family of origin ever receive welfare, drug use other than marijuana, and self-reported crime (frequency of 5 delinquent acts); (2) lifestyle variables including health insurance, exercise, weight, smoking, binge drinking, and cocaine use (ever used); and (3) life course variables including urban residence, poverty status, marital status, educational level, and labor force participation. He found that inclusion of antisocial and background variables accounted for about 40% of the variation in health; however, the effect of incarceration remained significant.

In a follow-up study, to further account for potential confounding factors, Massoglia (2008b) used propensity score matching (n= 273 matched pairs from the NLSY79) to investigate incarceration and health. According to Massoglia (2008b), the stress of prison life leads to deteriorating health post-release. He showed that incarceration influenced only chronic health conditions related to stress (e.g., hypertension, anxiety disorders, chronic lung disease), while conditions unrelated to life distress (e.g., arthritis, cancer, diabetes) showed little effect of exposure to incarceration. It is, however, debatable whether incarceration is more stressful than lifelong poverty, fear of street violence and other types of victimization experienced on a daily basis, which are considerably more probable for individuals who engage in behavior predictive of criminal justice involvement.
Despite the significant expansion on the work of Schnittker and John (2007), flaws in the data hinder Massoglia’s analyses. First, his measure of drug use was limited to whether individuals have ever used cocaine. Using a dichotomous measure is too limiting because there is a great deal of variation between ever trying cocaine experimentally and using cocaine regularly (Shedler & Block, 1990). Secondly, the measure of prior health was problematic. Massoglia (2008a, 2008b), and Schnittker and John (2007), utilized a detailed assessment of self-reported health at age 40 based on health specific modules collected separately from the NLSY79 main survey. Although this detailed measure of health was a positive feature of these data, Massoglia (2008a, 2008b) measured prior health by simply asking whether a medical condition had prevented the respondent from working. Schnittker and John (2007) described this measure of prior health as “capturing a severe and relatively uncommon limitation (119),” yet it is unclear whether this measure appropriately accounts for a range of prior health conditions or is too restricted to severe conditions. Third, Massoglia (2008b) argued that mere exposure (i.e., one day) to incarceration was enough to trigger negative health outcomes. His measure of incarceration, however, likely only captured individuals incarcerated for more than a few months. Fourth, the NLSY79 may suffer from cohort effects in that the respondents were born in an era prior to mass incarceration. Because the landscape of criminal justice differs dramatically since the dawn of mass incarceration (Alexander, 2010), the literature will benefit from research based on a contemporary cohort.

Lastly, Massoglia’s (2008a, 2008b) findings suggested that incarceration has a substantial negative influence on offender health post-release. The negative effects of prison are debatable on their own, but possible causal order ambiguity also emerged in each study. By only examining incarceration, Massoglia did not examine a number of procedural steps in the criminal justice system (e.g., being arrested but not incarcerated). It is possible that the mechanisms leading to health deterioration occurred early on in the process of criminal justice contact.
Perhaps the stress of mere contact with police or the ensuing arrest procedures are just as influential as the prison environment. Further, depressive symptoms associated with arrest are especially relevant because such symptoms are associated with physical health outcomes.

**The criminal justice system prior to incarceration.** Police contact, no matter how trivial, has been hypothesized to have long-term negative effects on overall health (Júnior & Muniz, 2006). For example, arrest, even without incarceration, may negatively affect health in multiple respects. First, labeling individuals as delinquent may lead to a downward spiral for youths (Teplin, Abram, McClelland, Dulcan, & Mericle, 2002; Bernburg, Krohn, & Rivera, 2006). Having an arrest record may significantly hinder a juvenile’s ability to gain employment (Kirk & Sampson, 2013; Reynolds, Temple, Robertson, & Mann, 2001). Moreover, unemployment significantly predicted lack of health insurance for adults (Jin, Shah, & Svoboda, 1995). Lacking health insurance is a key component of the "inverse care law" (Watt, 2002), which refers to how the individuals most in need of healthcare are blocked from accessing it. Thus the effects of labeling trigger the inverse care law and individuals who have criminal records may be unable to access adequate healthcare. A second way that arrest, may be detrimental to health is via strained family bonds. Loss of social support puts individuals at greater risk of declining health and mortality (Uchino, 2009). After experiencing arrest or accumulating a criminal record, individuals may experience strained family relationships.

In addition to physical health, researchers have found that encounters with the criminal justice system are related to increased depressive symptoms in adults. Schnittker, Massoglia, and Uggen (2012) examining the National Comorbidity Survey Replication (n=5,692) found greater depressive symptoms among individuals who had experienced incarceration, but whether the greater depressive symptoms were also experienced prior to incarceration is not clear. Expanding on this, Ziegler (2014), using the National Longitudinal Study of Adolescent to Adult Health (Add Health) found that juveniles’ law enforcement encounters increased the odds of
experiencing depressive symptoms during adulthood but the effect was explained largely by other risk factors such as, demographic characteristics (gender, race, family socioeconomic status, and family structure). Further, Ziegler found that although incarceration affected mental health, once economic controls were included, juvenile arrest did not significantly predict young adults’ depressive symptoms. Yet, Ziegler’s analysis focused only on depression, did not account for overall health outcomes, and involved criminal justice contact in addition to arrest and incarceration, she also focused on juveniles. Further, although conceptualized as a primary mechanism, stress was not included in Ziegler’s analyses. In this study, I assessed overall self-reported health and depression, included stress as a mediator, and considered the effects of arrest and incarceration beyond age 18.

Amidst the evidence for a negative relationship between prison and physical and mental health, some scholars have reminded us that there are also pre-existing propensities, which may cause selection into both the criminal justice system and poor health. Conklin, Lincoln, and Tuthill (2000) provided one such counter-argument in favor of selection effects by emphasizing that prisons are filled overwhelmingly with individuals who have pre-existing mental and physical health problems resulting from debilitating conditions that both contributed to and stemmed from criminal lifestyles including substance abuse. Even prior to the onset of criminal and antisocial behavior, selection effects were in motion wherein individuals of lower socioeconomic status (SES) faced greater challenges to their health.

**Poverty and Poor Health**

Poverty and other associated social conditions relate to poor health in numerous ways (Link & Phelan, 1995; Kawachi & Kennedy, 1999; German & Latkin, 2012). In an early review of the literature, Link and Phelan (1995) described how specific social conditions related to disease. They hypothesized that although poverty is a fundamental cause of disease, detrimental health practices (e.g., smoking, lack of exercise, diet) associated with social conditions truly
‘spin the wheels’ of health deterioration. The medical community, according to Link and Phelan, is equipped to treat individuals’ health risks, but the much broader scope of social conditions that breed the individual risk factors are important considerations. Important for the present study, researchers (e.g., Loeb & Steffensmeier, 2006; Massoglia, 2008a; Schnittker et al., 2012; Schnittker & John, 2007; Schnittker & Massoglia, 2015) have shown that prison negatively affects overall health, but these studies’ examination of broader social conditions that increase the odds of both being incarcerated and having poorer health do not reflect current social conditions.

The association between economic disadvantage and health over the life course.

Clearly, living in poverty makes it difficult to maintain healthy habits, but social conditions reflecting poverty also have longer-lasting effects on health. Repetti, Taylor, and Seeman (2002) linked childhood social conditions to poor health in adulthood. They identified family conflict and aggression, as well as the broader economic background of the family of origin, as predictors of greater risk for poor physical and mental health. Importantly, these scholars found substance abuse to be more prevalent among individuals raised in “risky” families. These researchers point to family conflict as the general mechanism facilitating poor outcomes later in life, but the effect depends on individuals’ coping skills and stress processing abilities.

The unrelenting damages to health manifest in numerous ways throughout the life course. Ultimately, the conditions accompanying poverty leave individuals at increased risk of early mortality. Wilson, Shuey, and Elder (2007), using the Panel Study of Income Dynamics (n=1,695), showed how lower socioeconomic status throughout the life course led to earlier mortality. This disparity increased as cohorts aged demonstrating the negative effect of prolonged exposure to disadvantaged circumstances. Disadvantage in adulthood is also predictive of higher rates of depressive symptoms in adults (Ross, 2000). Thus the effects of disadvantage are present throughout the entire lifespan.
Lifestyle Correlates of Poor Health

Linking economic disadvantage and health, researchers must also consider how certain lifestyle factors may act as a selection mechanism into incarceration and poorer health. Individuals who engaged in antisocial behavior often have some of the highest rates of incarceration as well as the poorest physical and mental health outcomes (Shepherd & Farrington, 2003). One strong predictor of poor health is heavy drug and alcohol use (Degenhardt & Hall, 2012). Less explored, however, are direct relationships between other antisocial behavior, particularly criminal activity, and negative health outcomes.

Antisocial behavior. Studies have only recently examined whether engaging in criminal behavior directly led to lowered physical and poorer mental health outcomes for young adults. This is puzzling considering that criminal activity may have direct health related repercussions. For example, fighting and assaults likely cause physical injury, while drug use may diminish cognitive capacity and is predictive of cardiovascular problems (Lange & Hillis, 2001). Shepherd, Farrington, and Potts (2004) examined a variety of antisocial behaviors and concluded that participation in these behaviors negatively affects health in adulthood, including earlier mortality. Specifically, the authors assessed a group of health outcomes known as DATES syndromes: drug abuse, injury sustained in assaults and accidental trauma, and elective surgery. DATES syndromes were direct consequences of antisocial lifestyles from adolescence until around age 32. Shepherd and colleagues proposed that although antisocial individuals are in good health in adolescence and young adulthood, their lifestyles’ negative effects on health catch up and are visibly present by age 32. Some specific behaviors during adolescence and young adulthood (e.g., drunk driving, sexual promiscuity, heavy smoking, fighting) were correlated with illnesses and hospital admissions. The sample used by Shepherd et al., however, was small (n = 411) and featured a British cohort of men born in 1953, which is likely not representative of the U.S, nor the U.S. policy of mass incarceration.
**The direct effect of crime on health.** One commonly analyzed form of antisocial behavior is crime. Yet scholars grant minimal attention to direct health outcomes of prolonged criminal activity. One exception, Piquero, Dagle, Gibson, Piquero, and Tibbetts (2007), examining data from the National Collaborative Perinatal Project (n = 1,758) tested whether those who had a long history of criminal activity faced health consequences. Piquero et al. using the developmental taxonomy of offender type developed by Moffit (1993) categorized individuals as high offending (i.e., life-course persistent). Piquero et al. (2007) concluded that life-course persistent offenders compared to adolescence-limited offenders were at greater risk for health problems later in life. Life-course persistent offenders were also more likely to continue to engage in other antisocial behaviors including casual sex, drug use and alcohol consumption. Thus, continual involvement in antisocial behaviors likely increases the risk of health deterioration.

The amplification effect demonstrated in Piquero et al.’s study raises questions about the health trajectory of life-course persistent criminals. Plausibly, these individuals face greater consequences of their behavior due to their increased exposure. In further support of this idea, Odgers et al. (2007) suggested that life-course criminal persisters are most at risk for adverse health outcomes. Examining types of conduct problems, including aggressiveness, crime, and substance use, they found health differences at age 32 among a sample of New Zealand men (n = 526). They concluded that earlier onset of behavior problems led to poorer health in adulthood. One limitation, however, is that Odgers et al. (2007) did not propose or describe the underlying causal mechanisms of this health disparity. It is not difficult to identify the link between individual level differences on health, but the potential role of macro-level processes leading to negative health conditions is also of interest.

**Drug use and health.** There is a multitude of studies which clearly link drug use to poor health. At the micro level, Aarons et al. (1999) provide evidence of long-term health effects from
drug and alcohol use as an adolescent. Deykin, Levy, and Wells (1987) similarly linked such substance use to depression. Marijuana and cocaine, specifically, were linked to adverse health outcomes by Volkow, Baler, Compton, and Weiss (2016). Some sociologists have examined drug use and health with larger units of analysis like the neighborhood level (Narevic et al. 2006). They linked variation in unmet health needs to drug use and abuse history, and posited that this variation may be associated with neighborhood disorganization. This study provided some evidence that drug use negatively affects health among substance users at the macro level. The effects of drug use on health are also seen on a grander scale in a study by Degenhardt and Hall (2012). Degenhardt and Hall took a global perspective of the correlation between drug use and health and found higher rates of disease in nations that had higher rates of drug use. The link between substance and abuse appears clearly across different units of analysis with most scholars agreeing that recreational drug use is negatively related to health.

**Race, Gender, and Poor Health**

Scholars have proposed ways that certain background and current characteristics affect health and depressive symptoms. Scholars have found racial, gender, and union status differences in health, depression, with respect to the effects of childhood economic disadvantage and criminal justice system representation. Regarding the focus of this study, race is perhaps the most imperative of these background factors. I included these known correlates of both incarceration and health in my analyses.

**Race.** First, the effects of disadvantage and other predictors of poor health may differ by race (Hannon, 2003). In an early examination of health outcomes, Williams and Collins (1995) demonstrated that along with disparities in socioeconomic status, there are racial disparities in self-reported health reflecting the reality that racial inequalities persist and cannot be ignored when studying health outcomes of disadvantage. Examining racial differences in the Americans’ Changing Lives Survey (n=2,751), Jackson, Knight, and Rafferty (2010) observed that unhealthy
behaviors (e.g., smoking, drinking and obesity) moderated the relationship between stress and depression for White adults. Relevant to the present study, Jackson et al. suggested a reciprocal relationship between these unhealthy behaviors and stress. Although individuals of any race experience the effects of unhealthy behaviors, Black individuals showed the strongest positive association with unhealthy behaviors and poor health. Jackson and colleagues posited that individuals under chronic stress engage in these behaviors as coping mechanisms. Their analyses, however, excluded illicit drug use, which is an important correlate of chronic negative health conditions. Further, it is important to examine race because mass incarceration disproportionately affects Black and Hispanic individuals (Alexander, 2010). Likewise, studies show that economic disadvantage has an even stronger effect on Black compared with White individuals (Kahn & Fazio, 2005). Furthermore, prison affects the health of Black individuals more strongly than White individuals (Lee & Wildeman, 2013). Thus, race appears correlated with most key measures in the present study and is a vital statistical control.

As such, the criminal justice system may reflect racial and socioeconomic inequality and may not necessarily be the cause, but rather a correlate of poorer health among young adults. Race may also select individuals into the criminal justice system. At each level of the criminal justice system, Black and Hispanic individuals are represented disproportionately. Black and Hispanic individuals are more likely to be stopped by police (Davis, 1997), subsequently arrested (Harris, Steffensmeier, Ulmer, & Painter-Davis, 2009), and are sentenced to longer jail terms on average (Baumer, 2013). At every step of the process, race may have a role as a selection mechanism into greater depths of criminal justice system involvement.

**Gender.** Regarding gender differences relevant to the present study, women have reported higher depression on average and worse physical health (Macintyre, Hunt, & Sweeting, 1996; Picinelli & Wilkinson, 2000). Moreover, women are significantly less likely than men to be arrested or incarcerated (Steffensmeier & Allan, 1996). Because of these established
relationships with both the primary independent variable and dependent variables, it was important to include control for this potential confound.

Other Correlates of Poor Health

**Prior health.** Elevated BMI as an adolescent is a strong predictor of lifelong struggles with obesity and increases mortality (Engeland, Bjorge, Tyeral, & Sogaard, 2004). BMI is a simple way to account for selection into health deteriorating conditions (e.g., diabetes) which Massoglia (2008) argued were not related to the stress of prison or the criminal justice system. Including BMI as a control provides a more objective control for prior health than the self-reported measure of health at earlier waves. Additionally, adolescent depression is one of the strongest predictor of later life depressive symptoms (Thompson, 2008) and is a necessary control when examining adult depressive symptoms.

**Adult socioeconomic status.** Although socioeconomic status is generally stable over the life course, SES as an adult can differ from childhood. Thus, it is important to account for continued disadvantage as an adult in addition to adolescent disadvantage. In lieu of a more sophisticated control, SES can be represented by reasonable proxies employment and education (Oakes & Rossi, 2003; Dupre, 2008). Individuals of similar socio economic status may have different access to health care via private or public insurance. Being uninsured increases the probability of untreated health conditions worsening over time (Levy & Meltzer, 2004). Additionally, those uninsured are less likely to engage in preventative measures or get tested for sexually transmitted diseases (Shapiro et al., 1999; Zelenev et al., 2013).

The Present Study

The complex relationship between economic disadvantage, antisocial behavior, stress, and health makes assessing the role of the criminal justice system more complicated than previous descriptions in criminological literature. Arrested and incarcerated individuals often are involved in activities, which directly compromise their health (e.g., substance abuse, violence).
Previous literature has asserted that criminal justice system involvement has long-term repercussions for mental and physical health. In this study, however, I examined an alternative scenario in which self-reported physical health, depressive symptoms and criminal justice system involvement all stem from the same root causes: antisocial lifestyles and economic disadvantage. Additionally, I examined the confounding effects of an economically disadvantaged background as indexed by current and childhood socioeconomic status on adult health status. Similarly, I examined whether involvement in antisocial activity as measured by substance use and criminal activity during adulthood accounts for incarceration effects on self-reported physical health and depressive symptoms. I examined stress as a potential mechanism through which economic disadvantage and criminal justice system involvement affects health outcomes. Additionally, I expected no discernable effect of arrest without incarceration on self-reported health or depression.

I relied on Massoglia’s conceptualization emphasizing that stress is the main mechanism linking incarceration to health outcomes. I used ideas from cumulative disadvantage and stress process theories to conceptualize these relationships. Further, I conceptualized the stress process as underlying the association between antisocial and disadvantaged lifestyles and poor health. This is consistent with Massoglia’s view that the prison environment is inherently stressful. However, much like Schnittker (2007), Massoglia (2008a, 2008b) did not empirically measure stress. In this study, I tested whether stress plays a role in the association between incarceration, socioeconomic status, lifestyles and self-reported health outcomes. In addition, the multivariate models included several other independent variables, such as race, gender, and union status, which prior studies have linked to emotional and physical well-being as well as incarceration experiences. Lastly, I controlled for insurance coverage, prior depression, and age.

**Hypotheses.** Based on the previous findings and gaps in the literature, I proposed three hypotheses.
H1a: The relationship between depth of criminal justice involvement (classified as no arrest, arrest but no incarceration, and incarceration experience), and self-reported physical health is confounded by childhood disadvantage and antisocial behavior.

H1b: The relationship between depth of criminal justice involvement and depressive symptoms is confounded by childhood disadvantage and antisocial behavior.

H2: The relationship between depth of criminal justice involvement on self-reported physical health and depressive symptoms, respectively, is mediated by general stress.

H3: There is no effect of arrest without incarceration on self-reported physical health or depression.
METHODS

Data

The Toledo Adolescent Relationship Study (TARS) is a stratified random sample of seventh, ninth and eleventh graders in the year 2000 in Lucas County, Ohio. The baseline sample (1999) consisted of 1,321 individuals between the ages of 12 and 18. At the time of the fifth interview in 2010 respondents were between 22 and 29 years old. 1,021 individuals were retained for the fifth interview in 2010. Respondents participated primarily in their homes with a computer assisted personal interview procedure. Primary caregivers, usually mothers, were also administered a questionnaire at the time of the first interview. The TARS drew their sample from school rosters, but respondents did not have to be in school or regularly attend school to be included. The sample is not nationally representative. It is, however, representative of Lucas County, Ohio. Census data show that the socio-demographic characteristics of Lucas County are similar to national averages in most key characteristics (e.g., income, racial composition, education) (Warner, Giordano, Manning, & Longmore, 2011). The TARS oversampled Black and Hispanic respondents, I controlled for race/ethnicity in the multivariate analyses. I excluded respondents missing on self-reported health (n=6) and respondents missing on one or more items of the depression scale at the fifth interview (n=2). This resulted in a final analytic sample of 1,013. For univariate and bivariate summaries, I estimated missing values using results from a single imputation of the data. For multivariate regression analyses I estimated missing values for the independent and control variables using multiple imputation.

Although not nationally representative, the TARS is ideal for examining the relationship between criminal justice involvement, stress, and self-reported health because of its inclusion of questions assessing the overall perceived stress of respondents at the fifth interview. As highlighted in the theoretical background section, many studies of incarceration and health have posited stress as the primary mechanism facilitating the deterioration of health yet, to my
knowledge, no prior studies have examined empirically the role of stress. Unlike other datasets, TARS has measures of criminal justice involvement and respondents’ general stress at the same time-point, thus allowing for a systematic examination of the role of overall stress. Moreover, prior research has used the NLSY79 (e.g., Massoglia 2008). The TARS sample is a more contemporary cohort than the sample of the NLSY79 who experienced the criminal justice system during a substantially different era in U.S. criminal policy prior to mass incarceration (Alexander, 2010). Scholars who use more contemporary datasets such as the Fragile Families and Child Well Being study and the Add Health have primarily focused on parental incarceration and child outcomes.

**Dependent variables**

**Self-reported health.** I examined two dependent variables. First, self-reported overall health, measured with a single question at the fifth interview, asked: "Overall, how would you rate your health?" Response categories were: (1) poor; (2) Fair; (3) Good; (4) very good; (5) excellent. Scholars have demonstrated self-reported, categorical indicators of general health to correlate highly with the rates of more specific self-reported and objectively measured conditions (Clarke et al., 1994; Wilson, Shuey, & Elder, 2007). However, the distribution of self-reported health necessitates a different approach. The TARS sample reported predominantly good to excellent health. The highly skewed distribution of self-reported health does not permit treatment as a continuous variable. Instead, I dichotomized self-reported health so that 0 = good or better self-reported health and 1 = fair or worse self-reported health. Dichotomizing this variable has some precedence in the literature (Macran, Clarke, Sloggett, & Bethune, 1994). Dichotomized versions of self-reported health have also been tested and yielded similar results to more sophisticated studies that used a categorical measure of health (Manor, Matthews, & Power, 2000).
Depressive symptoms. The second dependent variable, depressive symptoms, was an eight-item version of the Center for Epidemiological Studies Depressive Symptoms (CESD) scale (Radloff, 1977). Respondents were asked how often in the last week they felt each of the following statements was true with response categories ranging from 1 (never) to 8 (every day): (1) “You felt depressed”; (2) “You felt that everything was an effort”; (3) “you felt sad”; (4) “you felt like you couldn’t get going”; (5) “you felt lonely”; (6) “you felt like you couldn’t shake off the blues”; (7) “you had trouble sleeping or staying asleep”; and (8) “you couldn’t keep focused.” I summed responses and divided by the number of items to form a mean scale measure ranging from 1 to 8 (Cronbach’s alpha = .90). To correct for a strong right skew to the distribution of mean general stress, I log transformed the variable. An identical measure was used at Wave 1 (α=. 83) which I include as a control for prior depression in the analyses.

Independent Variables

Criminal justice system involvement. The primary independent variable, depth of criminal justice involvement, incorporated several measures including (a) self-reported number of arrests and incarcerations, (b) interviews conducted in prison or jail, (c) parental and self-reports of time served in juvenile facility or prison. I used these three methods to construct a single ordinal variable that represented depth of criminal justice system involvement. For arrest, at the fifth interview, respondents were asked “Have many times have you been arrested?” Responses ranged from “never” to “5 or more times.” I dichotomized any number of prior arrests into those experiencing arrest and those who said zero prior arrests as never experiencing arrest.

The TARS assessed incarceration history of respondents in multiple ways. First, respondents indicated each arrest they experienced and whether that resulted in any jail time. I coded affirmative responses as previously incarcerated and negative responses as not previously incarcerated. Second, at each wave respondents provided their residency status. If at any time the respondent selected “in prison” as their current residence, they were coded as incarcerated.
Finally, on the parent questionnaire administered at the baseline interview, the primary guardian of TARS respondents were asked how many times their child “was placed in a juvenile detention facility.” Responses ranged from zero to four times. This item provides a substantial number of additional juvenile incarcerations that were not previously captured by the retrospective measure at the fifth interview or residential status questions. Using this trio of questions, I captured a large portion of respondents who have experienced incarceration in their lifetime.

Combining my measure of incarceration with the arrest experience data, I created an ordinal variable where: (1) those who have never been arrested or incarcerated (hereafter never arrested); (2) respondents who have been arrested but never incarcerated (hereafter arrested); the greatest depth of criminal justice involvement (3) is represented in the individuals who have ever experienced incarceration (hereafter incarcerated). This categorization allows the contrast of mutually exclusive categories against each other. To compare these, I constructed three dummy variables (Never arrested, Arrested, Incarcerated) which represented each category of the ordinal criminal justice involvement variable.

**Antisocial behavior.** Drug use is a lifestyle risk factor predicting poor health and depression. To preserve temporal ordering of causal variables, I measured drug abuse at the first interview. The measure of drug use, adapted from the CAGE questionnaire (Ewing, 1984) asked, “How often in the past 2 years have you experienced the following because of your drug use: (1) “not felt so good the next day”; (2) “felt unable to do your best at work or school”; (3) “had problems with a partner you were dating, living with or married”; (4) “hit one of your family members”; (5) “gotten into fights with others”; (6) “had problems with your friends”; (7) and “Gotten into a sexual situation that you later regretted.” Respondents answered the same questions about drug use. Response categories ranged from (1) “never” to (8) “almost daily,” and I created mean scales (α= .87).
I measured self-reported crime (Elliott & Ageton, 1980) at the first interview by how often respondents committed each of the following eight acts: (1) “steal something worth less than $50”; (2) “steal something worth more than $50”; (3) “damage property”; (4) “carry a gun”; (5) “attack someone”; (6) “sell drugs”; (7) “break into a building”; and (8) “be drunk in a public place.” Response categories ranged from (1) “never” to (9) “more than once a day”. Scores were the sum of these eight items (α= .75).

**Childhood economic disadvantage.** Following Krieger, Williams, and Moss (1997), I measured childhood economic disadvantage using four items from the parent questionnaire at the first interview. Because parental education and economic circumstances predict overall disadvantage for children, I summed four dichotomous variables: (1) mother has less than a high school education; (2) family had ever received public assistance at baseline; (3) mother was unemployed; and (4) has there ever been a time when the respondent’s mother did not have enough food in the house to feed the family. The economic disadvantage measure ranged from zero to four (α=. 63).

**Stress.** Because I hypothesized stress as mediating the association between incarceration and the two indicators of health, I included a composite measure of general stress. At the fifth interview respondents indicated how stressed they had been in the last two years due to the following: (1) health of family members; (2) work or employment; (3) living arrangements; (4) school; (5) money; (6) romantic relationship; (7) relationship with parents; (8) relationship with other family members; and (9) relationship with friends. Response categories ranged from (1) “not at all stressed” to (5) “extremely stressed.” The final scale was the mean of these nine items (α=. 83).

**Background variables.** I measured race with a single item at the first interview asking, “What do you consider your racial/ethnic background to be?” For respondents who elected not to select a race, researchers filled in missing data using information from school records. Although
there were 15 response categories, the sample was predominantly White (61%), Black (24%) and Hispanic (10%). All other races, including biracial respondents, totaled about 6%. Respondents responded to a dichotomous question about their gender. There were nearly equal numbers of male and female respondents at the first interview (51.5% female).

**Other covariates.** *Gainful activity* served as a control for socioeconomic status in adulthood. This is a binary measure representing present employment or student status of respondents at the fourth interview (Alvira-Hammond, Longmore, Manning, & Giordano, 2014). Gainful activity is coded as 1 if respondents indicated that they currently attend school or if they indicated current employment of more than 10 hours a week. Affirmative responses to either of these items meant that an individual was gainfully active at the fourth interview.

I measured respondents’ adolescent health by calculating their body mass index (BMI) at the baseline interview. Respondents reported their height in inches and their weight in pounds. Using this information, I calculated the BMI by multiplying their self-reported weight by 703 and dividing that product by their height in inches. I centered this value in multivariate analyses to give the variable an interpretable zero.

**Analytic Plan**

In this study, I tested whether arrest or incarceration has long-term negative influence on the health of individuals who engage in health adverse behavior and come from economically disadvantaged backgrounds. I first tested for differences of means and proportions of each independent variable across three depth of criminal justice system involvement groups (Table 1). I conducted logistic and ordinary least squares regression, respectively, to estimate the effects of criminal justice system involvement on self-reported health (Table 2) and depression symptoms (Table 3). The first columns in tables 2 and 3 presented the bivariate simple linear regression coefficients for each independent variable. Subsequent models are multiple regressions.
Results

I compared the means of the independent variables and controls across categories of the ordinal version of depth of involvement in the criminal justice system (Table 1). As expected, the never arrested have a smaller proportion (10.6%) of individuals self-reporting poor health compared with the arrested group (11.6%), and those never arrested have better self-reported health than the incarcerated group (17.4%). Both the never arrested and the arrested groups were statistically significantly different from the incarcerated individuals, but the health of the never arrested group was not significantly different from the arrested group. However, the results are in the expected direction. The tests of depression mirrored these results. Respondents who have experienced arrest report more depressive symptoms on average than those who have not, but this difference is not statistically significant. However, those who have been incarcerated (µ=.967) had more depressive symptoms on average than those who had been only arrested (µ=.734). The mean depression of the incarcerated group was significantly higher than the mean depression of the never arrested and only arrest groups, but there were no other significant differences between these groups indicating that the arrest only group is more similar to the never arrested group than the incarcerated group on levels of depressive symptoms. This pattern was expected based on my third hypothesis that there is no effect of arrest on mental and physical health without incarceration.

As expected, on average, the never arrested group (µ=.214) reported significantly less delinquency than the two groups who have experience with the criminal justice system. Additionally, on average, the incarcerated individuals reported the highest delinquency (µ=.539). Thus, these bivariate analyses supported my conceptualization of antisocial behavior as selection mechanisms into the criminal justice system and any health effects therein. In addition to having much higher criminal involvement, both the arrested and incarcerated groups had significantly higher drug abuse rates during adolescence. Notably, compared to the never arrested, levels of
childhood economic disadvantage were significantly higher among respondents with involvement with the criminal justice system, suggesting that childhood disadvantage may confound the association between criminal justice involvement and self-reported health. Moreover, the bivariate results illustrated that those who experienced incarceration exhibited higher levels of overall stress ($\mu=2.342$) than those who experienced an arrest ($\mu=2.064$) and those who had no contact with the criminal justice system ($\mu=2.093$). The arrested and never arrested do not differ in terms of mean overall stress at the fifth interview.

In Table 2, regarding zero-order relationships, incarceration, but not arrest increased the probability of poor self-reported health. None of the adolescent antisocial behaviors displayed a bivariate correlation with the probability of self-reporting health in adulthood. General stress substantially increased the probability of reporting poor health. Both childhood and recent economic context relate to poor health. Regarding socio-demographic characteristics, there were no significant racial differences, gender was also not associated significantly with the probability of self-reporting poor health. Adolescent BMI was strongly and positively correlated with the probability of reporting poor health.

The multivariate models in Table 2 are logistic regressions predicting the probability that individuals reported poor health. In model 1, I included only depth of criminal justice involvement and childhood disadvantage. Model 1 demonstrates that the effect of disadvantage is significantly related to the probability of self-reporting poor health but criminal justice system involvement is not. For each level of disadvantage during childhood, the odds of self-reporting poor health increase 27% (OR=1.269). Incarceration appeared to be positively related to self-reported health, but did not attain significance in this model with simple controls for disadvantage, race, gender, and age.

In model 2, these results hold steady as antisocial behaviors are added to the model. This lack of change does not support the idea that antisocial lifestyle is associated with health when
economic context is considered. In model 3, I added childhood BMI to the model and results did not change substantially. BMI was significant and positive, indicating that for each unit increase in childhood BMI, the odds of self-reporting poor health as an emerging adult increased by about 8% (OR=1.082). This 8% figure is sustained throughout the rest of the models until the full model (Model 5). Additionally, in model 3, childhood disadvantage is still a significant predictor of self-reporting poor health (OR=1.236).

Model 4 further supports the notion that accumulating disadvantages are the driving force behind other effects on health. When gainful activity, a marker of adult SES, is added to the model, it proves to be a powerful predictor of self-reporting poor health. Being gainfully active decreases the odds of self-reporting poor health by 52% (OR=.478). Because gainful activity is a more recent measure of disadvantage, it is not surprising that it overpowers the previously significant effect of childhood disadvantage.

Finally, I examine the role of general stress by including it in model 5. As expected, the association between stress and health was significant and positive. Every unit increase in stress increases the probability of self-reporting poor health by 97% (OR=1.965). Notably, however, the odds-ratio for gainful activity (.502) slightly increased, but was not significantly different from model 4 (.478). Although stress is a strong predictor of health, it does not statistically mediate the relationship between disadvantage and health.

For depression (Table 3), similar to the results in Table 2, incarceration was associated positively with depressive symptoms when compared to the never arrested group. The significance of controls in model 1, however, differed from the self-reported health models in two important ways. First, the auto-regressive variable of wave 1 depression was included and was positive (.1). Second, being black significantly raised depressive symptoms (b=.0875). Regarding the primary independent variables, both experiencing incarceration (b=.2217) and
childhood disadvantage ($b = .0366$) were positive and significant, indicating that economic context and criminal justice system involvement are detrimental to mental health.

Model 2 adds indicators of antisocial lifestyle during adolescence. Much like the results for self-reported health, drug use is positively associated with adult depressive symptoms ($b = .1797$) even while controlling for wave 1 depressive symptoms ($b = .1001$). According to hypothesis 1b, I expected the addition of antisocial behaviors to reduce the coefficient for incarceration. However, the addition of this block group did not significantly alter the coefficient for incarceration ($b = .2234$) in model 2.

In model 3, the addition of a centered BMI term did not significantly alter any of the other covariates in the model. Next I add the dichotomous indicator of gainful activity at the fourth interview in model 4. This coefficient is in the expected direction ($b = -.0523$), but surprisingly is not significantly different from 0 ($p > .10$). Most of the other coefficients have absolute values lower than in model 3, but none are significantly different from their counterparts. Gainful activity was the single most robust predictor of poor health in Table 2. However, for depression, childhood disadvantage ($b = .0309$) appears to be a stronger predictor than more recent economic context which is represented by gainful activity. Most importantly to Hypothesis 1b, the coefficient for incarceration is unchanged ($b = .2151$) by the inclusion of gainful activity. Thus, I do not find support for hypothesis 1b.

Finally I add the hypothesized mediating variable of overall stress to the model. As hypothesized, stress was significant and positive ($b = .2772$), indicating that greater life stress increases depressive symptoms. In support of hypothesis 2, the effect of incarceration is significantly lowered when accounting for life stress in the model. This indicates that incarceration effects on mental health may work partially through increasing life stress. Similarly, the coefficient for prior depression was significantly reduced in magnitude.
Finally, to perform a multivariate test of hypothesis 3, I changed the reference group of criminal justice depth of involvement in each model from the never arrested group to the incarcerated group. The effect of arrest was significantly lower than the effect of incarceration on health or depression and did not significantly differ from the effect of no involvement. Results indicating that the only arrested coefficients were not significantly different from the never arrested coefficient demonstrate that any effect on health appears triggered by incarceration, not arrest. Thus, I found support for hypothesis 3 that there is no effect of arrest without incarceration on health or depression.
DISCUSSION

In the present study, I both expanded on, and challenged the extant literature in several important ways. First, I was able to explain away the effects of incarceration on self-reported health. Previous studies have suggested that conditions in prison have a profound negative impact on the health of incarcerated individuals even after release from prison. However, it is plausible that incarceration was not the cause of poor health, but rather an indication of selection into poor health by individuals who engage in numerous health compromising behaviors and who were disadvantaged by their economic standing. Furthermore, the idea that placement under arrest has long-term consequences for individual well-being was not supported. Additionally, previous studies have only theorized the role of stress in these relationships. In the present study I empirically examined the role of general stress in the incarceration and depression relationship, and found evidence to support the stress process theory as a mechanism facilitating an increase in depression for individuals who have experienced incarceration, but not if individuals have only experienced arrest. Although some studies have begun to explore whether the effects of the criminal justice system extend to early procedures like arrest or police contact (e.g., Massoglia & Uggen, 2013), I found little to no evidence that there are deleterious effects of arrest for health or depression prior to incarceration.

Three primary research questions drove the current study. First, does experience in the criminal justice system affect overall self-reported health? I hypothesized that the relationship between criminal justice system involvement and the probability of self-reporting poor health was spurious. Results support this hypothesis. My results suggested that criminal justice system involvement had little to no significant effect on adult self-reported health. Instead, lifestyle correlates, especially childhood economic disadvantage, were most highly correlated with lower self-reported health in adulthood. Respondents with higher levels of drug use at the first interview have significantly worse health. However, for depression, results did not display a
spurious relationship between depression and the criminal justice system. When I included variables in the models that represented selection into higher depression and greater probability of incarceration, the effect of incarceration on depression remained positive and statistically significant. It is also important to note that traditional predictors of poor health such as adolescent BMI are also relevant covariates in this study. As another example, Adolescent depression was one of the strongest and most consistent predictors of adult depressive symptoms.

My second research question asked whether incarceration was causally related to depression after controlling for childhood disadvantage and antisocial behavior respectively. I hypothesized that this relationship was spurious, much like the relationship between incarceration and health. However, my results showed a significant effect of incarceration history on levels of depression, even when accounting for economic disadvantage and antisocial lifestyle. Drug abuse also showed significant relation to depressive symptoms, but the effect of incarceration was still robust. Perhaps the significance of incarceration in the final model may be indicative of reverse causation where individuals are using drugs as a coping strategy for higher levels of depression. However, this relationship is likely a reciprocal one because greater drug use as an adolescent also increased the probability of arrest and incarceration and being in prison can increase the need to cope. A third plausible scenario is that individuals with debilitating conditions and no ability or desire to receive medical treatment self-medicated as youth via drug use.

Finally, I assessed whether levels of stress mediated the relationship between criminal justice system involvements on self-reported health. I hypothesized that stress did indeed act as a mechanism and my results support this notion for depression. The effect of incarceration on depression was significantly decreased when stress was controlled for. This finding of mediation supports scholars (e.g., Schnittker and John, 2007) who posited that the stressfulness and stigma of incarceration experience is likely to overwhelm the limited stress processing abilities of
incarcerated individuals and ultimately leave them more depressed than prior to incarceration.
Furthermore, incarceration may impede the path to important life transitions such as marriage, employment and home ownership. These barriers to success may further increase the levels of stress due to financial strain in formerly incarcerated individuals.

As predicted, economic contexts are an important factor relating to poor health in adulthood. There is a persistent effect of gainful activity at the fourth interview on both self-reported health and depressive symptoms. This is not a surprising finding given that the literature often links health consciousness with education levels (Nutbeam, 2000) and access to health care is associated with employment (Ross & Mirowsky, 1995). Childhood economic context however retained significance only for depression. Likely, this is due to the control for gainful activity at the fourth interview, which is correlated highly with childhood disadvantage. These findings stress the importance of future research on cumulative disadvantage regarding health outcomes and incarceration.

My analyses provided support for the hypothesis that antisocial behavior and a history of economic disadvantage explains the relationship between the criminal justice system and self-reported health outcomes in young adulthood. Upon addition of further control variables, the non-significant incarceration coefficient continued to decrease. This trend suggested that health conditions attributed to prison are more likely culminations of a variety of outside exogenous factors. In the full model, the strong effect of stress supported my hypothesis that stress is a primary mechanism facilitating health deterioration from criminal justice system involvement. For example, drug use was a reliable predictor of higher depression in each model. However, stress suppressed the effect of drug use, indicating that these negative consequences may work through increasing stress.

Analyses also demonstrated that incarceration effects may work through increasing stress. The incarceration coefficient decreased substantially once I accounted for stress levels. Scholars
have previously posited stress as one of the strongest predictor of adult depression. Likewise, scholars including Massoglia (2008), Massoglia and Uggen, (2013), and Schnittker and John (2007) hypothesized that the negative effects of incarceration and arrest on health act through the increased stress of the prison environment. Although researchers presume stress as the mechanism through which incarceration affects well-being (Massoglia, 2008a), prior studies have not tested this relationship. As expected, my results provided evidence that general life stress acts as a mediator in the relationship between incarceration and depression.

My selected measure for stress combined various life domains into a singular measure. However, stress is also a multi-faceted concept. The present study considers self-reported stress in a selection of domains. However, it is not clear how these domains directly relate to incarceration experiences. If a direct measure of stress from criminal justice involvement were available in the data, it would be intriguing to explore how this measure affected the other stress measures examined in this study. Furthermore, the interplay of the included domains of stress may be interrelated in other ways. Although they are correlated well enough to combine into a single measure ($\alpha=.83$), the substantive meaning of this measure was debatable. I conceptualized this measure of stress as manifestations of proliferating stress via the stress process, however others may view this differently. For example, incarceration may influence stress through the straining of relationships and employment or education opportunities. Incarceration may directly strain the relationships with families, thus increasing the levels of reported stress in that domain as well.

The theoretical perspectives (e.g., stress process and cumulative disadvantage) proposed in the present study maintain their relevance to the study of incarceration and health. As demonstrated by my depression analyses, stress explained the effects of incarceration experience on depressive symptoms. Regarding cumulative disadvantage, the effect of childhood economic disadvantage on depression is persistent throughout the models. For health, however, being gainfully active at the prior interview is a much more robust predictor of decreased self-reported
health. This indicates a shorter-term relationship with health, which may be likely tied to the inverse care law detailed by Watt (2002).

Limitations

This study is not without limitations. One flaw in the available measures in the TARS is that the arrest and incarceration measures are retrospective. This is problematic because the dependent variables assess the respondent’s health at the time of the interview. Because of this limitation, inference of causal order based on gradual health changes compared to the time of arrest is impossible. The measure complicated the research question as an individual’s health is naturally going to decrease over time, especially those with the type of lifestyle that leads to arrest. For this reason and others, it will be difficult to pinpoint arrest history as the mechanism leading to decreased health in adulthood. Future research should seek to pinpoint the time of incarceration to determine more accurately whether these events triggered increases in stress.

The measure of physical health is limited in some ways. Studies of incarceration and health have often used more in-depth measures of health conditions than the one selected for this study. However, some scholars have deemed self-reported overall health to be an adequate if not superior way to measure health in survey research. Wilson, Shuey, and Elder (2007) argued for a self-reported measure as the optimal way to capture health disparities in younger adults. They stated that self-reported health was highly correlated with objective measures of more serious conditions. Therefore, the present study uses self-reported health as a reliable measure for a sample the age of the TARS respondents. Most other studies have focused primarily on older adults or adolescent health. However, the present study focused on adults who should be in prime physical health condition. Thus, finding small effects on health may be indicative of much larger future problems as health declines naturally with age. This accelerates the decline via the continual accumulation of disadvantage and inherent stress. Thus, it is likely that health will continue to decline over time.
The present study did not focus on racial disparities in any domain. However, racial disparities abound in many aspects of the present study. Black and Hispanic individuals are more likely to be arrested and incarcerated than White individuals. They also experience stronger effects of economic disadvantage. Furthermore, scholars have found racial disparities in health and depression. Due to the multifaceted relationship of race to the present study, race was only included as a control. Future research should grant race a position of primary focus when replicating the present analyses.

Conclusion

As scholars continue to explore the countless effects of incarceration on well-being, the present study suggests that research should not neglect the preceding conditions that increase the probability that an individual will be imprisoned. Although the studies of Massoglia (2008a, 2008b) provide valuable contributions to the literature, the present study provokes future research to reconsider the place of incarceration in the life course. As any time a causal relationship is proposed, one must pay careful attention to selection effects and contextual differences of individuals in the focal group. Incarceration is no exception. Results from the present study demonstrate how the effect of incarceration is subject to several confounding factors. Re-envisioning incarceration as another accumulated disadvantage and stressor should be subject to debate.

The present study was not an advocate for prison but rather an advocate for the continuation of healthcare programs in prison and support for paroled and released prisoner health education (Kinner, 2014). Although previous research implicates the prison system as a negative influence on the health and well-being of incarcerated individuals, the present study suggests that this might be a spurious correlation. Thus, while the United States continues to incarcerate individuals, prison should be an opportunity to provide them with much-needed
healthcare that is not available outside of prison. Additionally, it is important to care for prisoner substance addictions and prepare them to make health-conscious decisions after release.
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### Table 1. Descriptive Statistics and Cross Group Comparisons for Depth of Criminal Justice Involvement

<table>
<thead>
<tr>
<th>Variable (wave)</th>
<th>Total Sample (n=1,012)</th>
<th>No Involvement (n=643)</th>
<th>Arrested (n=277)</th>
<th>Incarcerated (n=92)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>min</td>
<td>max</td>
<td>m</td>
<td>%</td>
</tr>
<tr>
<td><strong>Dependent variables</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Poor health (5)</td>
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<td>11.5%</td>
<td>10.6%&lt;sup&gt;c&lt;/sup&gt;</td>
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<td>0.696&lt;sup&gt;c&lt;/sup&gt;</td>
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<tr>
<td>General stress (5)</td>
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<td>2.093&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
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</tr>
<tr>
<td>Gainfully active (4)</td>
<td>0</td>
<td>1</td>
<td>0.782</td>
<td>81.3%&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Childhood disadvantage (1)</td>
<td>1</td>
<td>5</td>
<td>1.180</td>
<td>1.000&lt;sup&gt;bc&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Background</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>0</td>
<td>1</td>
<td>21.5%</td>
<td>17.7%&lt;sup&gt;bc&lt;/sup&gt;</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0</td>
<td>1</td>
<td>10.9%</td>
<td>10%&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>1</td>
<td>2.2%</td>
<td>2.3%</td>
</tr>
<tr>
<td>Female (1)</td>
<td>0</td>
<td>1</td>
<td>53.9%</td>
<td>62.5%</td>
</tr>
<tr>
<td>Adolescent BMI (centered) (1)</td>
<td>-15.17</td>
<td>34.96</td>
<td>0.000</td>
<td>5.59</td>
</tr>
</tbody>
</table>

*a* = mean or percentage significantly different from mean or percentage for no involvement category (p<.05)

*b* = mean or percentage significantly different from mean or percentage for arrested category (p<.05)

*c* = mean or percentage significantly different from mean or percentage for incarcerated category (p<.05)
### Table 2. Zero-Order and Multivariate Logistic Regression of Poor Health on Criminal Justice Involvement, Antisocial Behavior, Stress, and Background Controls

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Zero-order</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR SE</td>
<td>OR SE</td>
<td>OR SE</td>
<td>OR SE</td>
<td>OR SE</td>
<td>OR SE</td>
</tr>
<tr>
<td>Intercept (beta)</td>
<td>-3.344 1.422*</td>
<td>-3.396 1.437*</td>
<td>-2.226 1.477</td>
<td>-1.300 1.517</td>
<td>-3.727 1.618*</td>
<td></td>
</tr>
<tr>
<td><strong>Criminal justice involvement</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(0=never arrested)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arrested</td>
<td>1.120 .248</td>
<td>1.074 .236</td>
<td>1.068 .243</td>
<td>1.146 .247</td>
<td>1.120 .248</td>
<td>1.181 .249</td>
</tr>
<tr>
<td>Incarcerated</td>
<td>1.507 .359*</td>
<td>1.602 .326</td>
<td>1.596 .352</td>
<td>1.760 .358</td>
<td>1.507 .359</td>
<td>1.347 .348</td>
</tr>
<tr>
<td>Childhood disadvantage (1)</td>
<td>1.169 .096</td>
<td>1.266 .091**</td>
<td>1.265 .091*</td>
<td>1.230 .093*</td>
<td>1.169 .096</td>
<td>1.188 .097</td>
</tr>
<tr>
<td><strong>Antisocial behavior</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delinquency, logged (1)</td>
<td>1.057 .155</td>
<td>1.182 .154</td>
<td>1.075 .155</td>
<td>1.163 .155</td>
<td>1.058 .237</td>
<td></td>
</tr>
<tr>
<td>Drug use (1)</td>
<td>1.145 .379</td>
<td>1.312 .358</td>
<td>1.189 .389</td>
<td>1.078 .379</td>
<td>1.029 .394</td>
<td></td>
</tr>
<tr>
<td>Adolescent BMI (centered) (1)</td>
<td>1.083 .016***</td>
<td>1.082 .016***</td>
<td>1.082 .016***</td>
<td>1.074 .016***</td>
<td>1.074 .016***</td>
<td></td>
</tr>
<tr>
<td>Gainful activity (4)</td>
<td>.478 .224**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mediator</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General stress (5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Background controls</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Race (0=white) (1)</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Hispanic</td>
<td>.719 .358</td>
<td>.756 .352</td>
<td>.773 .352</td>
<td>.735 .355</td>
<td>.704 .358</td>
<td>.706 .363</td>
</tr>
<tr>
<td>Other</td>
<td>1.511 .589</td>
<td>2.302 .534</td>
<td>2.215 .536</td>
<td>1.625 .575</td>
<td>1.522 .589</td>
<td>1.435 .590</td>
</tr>
<tr>
<td>Female (1)</td>
<td>1.207 .218</td>
<td>1.279 .210</td>
<td>1.266 .212</td>
<td>1.188 .217</td>
<td>1.270 .218</td>
<td>1.247 .221</td>
</tr>
<tr>
<td>Age (5)</td>
<td>.996 .058</td>
<td>1.032 .055</td>
<td>1.051 .057</td>
<td>1.009 .058</td>
<td>.998 .058</td>
<td>1.035 .060</td>
</tr>
<tr>
<td>Wald $\chi^2$</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>16.72***</td>
<td>19.85***</td>
<td>42.38***</td>
<td>51.91***</td>
<td>73.10***</td>
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</tr>
<tr>
<td>Cox-Snell R$^2$</td>
<td>.031 .039</td>
<td>.082 .102</td>
<td>.149</td>
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</tbody>
</table>

***p<.001; **p<.01; *p<05
Table 3. Zero-Order and Multivariate OLS Regression of Depressive Symptoms on Criminal Justice Involvement, Antisocial Behavior, Stress, and Background Controls

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Zero-order</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
<td>SE</td>
<td>b</td>
<td>SE</td>
<td>b</td>
<td>SE</td>
</tr>
<tr>
<td>Intercept</td>
<td>.6816</td>
<td>.201***</td>
<td>.6529</td>
<td>.203**</td>
<td>.7858</td>
<td>.212**</td>
</tr>
<tr>
<td>Criminal Justice involvement (0=no involvement)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Arrested</td>
<td>.0380</td>
<td>.034</td>
<td>.0224</td>
<td>.034</td>
<td>.0199</td>
<td>.034</td>
</tr>
<tr>
<td>Incarcerated</td>
<td>.2713</td>
<td>.052***</td>
<td>.2217</td>
<td>.053***</td>
<td>.2153</td>
<td>.054***</td>
</tr>
<tr>
<td>Childhood disadvantage (1)</td>
<td>.0648</td>
<td>.012***</td>
<td>.0366</td>
<td>.014**</td>
<td>.0369</td>
<td>.014**</td>
</tr>
<tr>
<td>Antisocial Behavior</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Delinquency, logged (1)</td>
<td>.0613</td>
<td>.029*</td>
<td>-.0079</td>
<td>.033</td>
<td>-.0097</td>
<td>.033</td>
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<tr>
<td>Drug use (1)</td>
<td>.1085</td>
<td>.036**</td>
<td>.0508</td>
<td>.040***</td>
<td>.0480</td>
<td>.040**</td>
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<tr>
<td>Adolescent BMI(1)</td>
<td>.0077</td>
<td>.003**</td>
<td>.0030</td>
<td>.003</td>
<td>.0030</td>
<td>.003</td>
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<td>Gainful activity (4)</td>
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<td>.036**</td>
<td>-.0523</td>
<td>.036</td>
<td>-.0315</td>
<td>.032</td>
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<td>Mediator</td>
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<tr>
<td>General stress (5)</td>
<td>.3044</td>
<td>.018***</td>
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<tr>
<td>Background Controls</td>
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<tr>
<td>Depression (1)</td>
<td>.1062</td>
<td>.013***</td>
<td>.1010</td>
<td>.013***</td>
<td>.1001</td>
<td>.013***</td>
</tr>
<tr>
<td>Race (0=white)</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>.1609</td>
<td>.037***</td>
<td>.0876</td>
<td>.039*</td>
<td>.0810</td>
<td>.039*</td>
</tr>
<tr>
<td>Hispanic</td>
<td>.0693</td>
<td>.049</td>
<td>-.0103</td>
<td>.049</td>
<td>-.0073</td>
<td>.049</td>
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<tr>
<td>Other</td>
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<td>.102</td>
<td>.0134</td>
<td>.098</td>
<td>.0053</td>
<td>.098</td>
</tr>
<tr>
<td>Female (1)</td>
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<td>.020</td>
<td>.0189</td>
<td>.030</td>
<td>.0173</td>
<td>.030</td>
</tr>
<tr>
<td>Age (5)</td>
<td>-.0094</td>
<td>.008</td>
<td>-.0109</td>
<td>.008</td>
<td>-.0072</td>
<td>.008</td>
</tr>
</tbody>
</table>
| R² | .109 | .110 | .112 | .115 | .284 | | | | | | | **p<.01; *p<.05