

**Social deregulation and mortality: An interrupted time-series analysis of homicide, suicide,
and alcohol-related deaths in Russia before and after the dissolution of the Soviet Union**

by

Mitchell B. Chamlin
Division of Criminal Justice
P.O. Box 210389
University of Cincinnati
Cincinnati, Ohio 45221-0389
(513) 556 - 5839
mitchell.chamlin@uc.edu

William Alex Pridemore
Indiana University
Department of Criminal Justice
Sycamore Hall 302
Bloomington, IN 47405
pridemor@fas.harvard.edu

and

John K. Cochran
Department of Criminology
University of South Florida
4202 E. Fowler Ave., SOC 107
Tampa, FL 33620-8100
(813) 974 - 9569
cochran@chuma1.cas.usf.edu

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ABSTRACT: The shifts toward democracy, rule of law, and a free market economy that have occurred in transitional Russia and other former Soviet republics since the dissolution of the Soviet Union in 1991 provides social scientists with a unique opportunity to examine the potentially disintegrative effects of rapid social change and thus to evaluate one of Durkheim's core tenets. We take advantage of this opportunity by performing interrupted time series analyses of annual homicide, alcohol-related, and suicide death rate series for the Russian Federation (1956-2002). The ARIMA models indicate that, controlling for the long-term processes that generate these three time series, the break-up of the Soviet Union led to an appreciable increase in each of the cause of death rates. We interpret these findings as being consistent with the Durkheimian hypothesis that rapid social change disrupts social order, thereby increasing the level of crime and deviance.

This paper is concerned with macro-social integration and rates of deviant behavior. Most cross-national analyses of anti-social behavior, based on Durkheimian theory, focus on the disruptive effects of population growth and structural differentiation on the collective conscience of a society (the developmental or modernization hypothesis). Our research, which is also based on Durkheimian thought, seeks to examine the disintegrative effects of rapid social change on the social cohesion of complex social systems (the social deregulation hypothesis).

DURKHEIM, SOCIETAL EVOLUTION, AND THE DIVISION OF LABOR

In his seminal work *The Rules of Sociological Method*, Durkheim (1938:110) asserts to the reader that the *....determining cause of a social fact should be sought among the social facts preceding it and not among the states of individual consciousness.* Crime, from a Durkheimian perspective, is a social fact; one that is inextricably tied to the manner in which a society adapts to the dual exigencies of growth and change.

According to Durkheim (1933) simple societies are bound together by commonly shared norms and values (mechanical solidarity). In contrast, complex societies achieve unity through the differentiation of the roles and statuses of their members and the mutual interdependence that this division of labor typically engenders (organic solidarity).

Interestingly, each type of macro-social integration is inextricably tied to the size of the populace within the geographic boundaries of the social system (see also, Parsons, 1977; Spencer, 1972). Small populations tend to be homogenous with respect to the basic dimensions of social life (i.e., culturally, ethnically, religiously and economically). It is this sameness in

both the form and content of social relations that produces a ubiquitous value system that not only promotes macro-social integration, but also conformity (Durkheim, 1933:70-110).

However, as social systems experience growth in population size and density they must develop more efficient means of producing and distributing goods and services among their members (Parsons, 1977:38-50). For Durkheim (1933:111-132), the solution to this dilemma is the transformation of society from one that is relatively homogenous and undifferentiated to one that is progressively more heterogeneous and differentiated (i.e., an elaboration of the division of labor).

While the progressive elaboration of the division of labor enhances the capacity of society to handle the pressures of population growth and to adapt to changing environments, it simultaneously has a disruptive influence upon mechanical solidarity. Insofar as social differentiation promotes a rise in individualism at the expense of the collective conscience, it weakens the mechanisms that had, in simple societies, led to macro-social integration. Thus, it would seem that as social systems mature, they could expect to become less cohesive and, thereby, experience higher rates of deviance. This outcome, though possible, is anticipated by Durkheim to be exceptional rather than normative.

Paradoxically, what is hypothesized to produce macro-social integration and conformity in simple societies, similarities across individuals, has no bearing on macro-social integration and conformity in complex societies. According to this view, a highly developed division of labor forces each of us to become mutually dependent upon one another for our basic needs and desires. Thus, not unlike the manner in which the biological differentiation of cells within higher-order organisms becomes essential for survival, social differentiation within populous and

complex social systems fosters macro-social integration and conformity (Durkheim, 1933:130-131).

An unavoidable, though not necessarily pernicious, outcome of the ongoing division of labor is the production of social and economic inequalities. Invariably, social systems must find ways of enticing individuals with the requisite aptitude and/or training to accept positions in the social structure that serve the greater good of society as well as their own particularistic interests (i.e., solve the problem of social stratification).

From a Durkheimian perspective, the solution to the problem of how best to achieve an optimal division of labor is straightforward. If society places a premium on particular roles and duties, then it must provide sufficient pecuniary and social rewards to encourage the best and the brightest to compete for these positions in the social structure (Durkheim, 1933; see also Parsons, 1951; 1977; Spencer, 1972). This means, of course, that some members of society will invariably accrue more wealth, prestige, and respect than others. As Davis and Moore (1945:243) observe, [S]ocial inequality is thus an unconsciously evolved device by which societies insure that the most important positions are conscientiously filled by the most qualified persons. Put alternatively, social and economic inequalities, insofar as they emerge from competition and merit, contribute to the division of labor and, thereby, to macro-social integration.

To summarize, the transformation of small and undifferentiated social aggregates into large and complex social systems does not necessarily engender macro-social disintegration. Societies that can generate and sustain a normal division of labor, one that is based upon merit, achievement, and norms of reciprocity, can generate new bases for macro-social integration and

conformity (Blau, 1964; Durkheim, 1933; Gouldner, 1960). To be sure, not all social aggregates can readily make the transition from mechanical to organic forms of solidarity. As we will discuss in the next section, the failure to develop an equitable means of allocating social roles and responsibilities can have profound, deleterious effects on the social order.

THE DIVISION OF LABOR, SOCIAL DEREGULATION, AND CRIME

If the elaboration of the division of labor is essential for the maintenance of macro-social integration in modern societies, then how can it also engender crime? For Durkheim (1933; 1951), the resolution of this paradox rests with the differential effects of normal and abnormal forms of the division of labor on macro-social institutions.

In book three of *The Division of Labor in Society*, Durkheim (1933:353-409) enumerates three pathological forms of the division of labor. These include: (1) the anomic division of labor-where the structural and cultural systems are out of equilibrium (370), (2) the forced division of labor; where the tasks assigned to individuals do not match their natural talents (375), and (3) inefficiency; where the division of labor fails to provide enough material for individual activity (389, 395). It is the first abnormal form that is the focus of this investigation.

During periods of normalcy, the division of labor progresses at a rate that allows the culture to adapt to changes in the social structure. Two interrelated mechanisms appear to be at work. First, a slow and deliberate process of social differentiation provides sufficient time for new norms and values to replace those that no longer function to temper the passions of societal members. Second, a slow and deliberate process of social differentiation enmeshes societal

members in mutual bonds of obligation, trust, and dependence that militates against selfish individualism (Durkheim, 1933:200-229).

During periods of rapid social change, however, there is not enough time for the social system to adjust to the new macro-structural arrangements. Commenting on the transition from agrarian to industrial economies (the rapid social change that captures his attention in *The Division of Labor in Society*), Durkheim (1933:370) laments that [t]hese new conditions of industrial life naturally demand a new organization, but as these changes have been accomplished with extreme rapidity, the interests in conflict have not yet had time to be equilibrated. Norms and values that clearly define social roles and expectations within agricultural communities quickly become obsolete. As a result, they lose much of their power to hold in check the rising aspirations and expectations of societal members facing fundamental changes in the social and economic order. Until new norms and values can emerge to replace the old a state of anomie emerges, extricating individuals from the external constraints of society. Thus, they become free to pursue their singular wants and desires, including acts of crime and deviance (Durkheim, 1933:353-373; 1951:246-257).

To summarize, rapid social change generates high rates of crime and deviance by reducing the capacity of the society to regulate the escalating aspirations and expectations of its citizenry. This state of anomie (or normlessness) continues to foster crime and deviance until the cultural system adapts to the new social order, thereby reestablishing social equilibrium (for a similar interpretation see Liska, 1987:30-31).

The metamorphosis of an agricultural into an industrial society, though of considerable interest to Durkheim, is less of a concern in the 21st century. This is not to suggest, however, that

social deregulation theory cannot be evaluated with modern data. On the contrary, as we discuss below, we believe that the December Revolution that led to the demise of the Union of Soviet Socialist Republics produced the sort of rapid social change that would allow us to empirically evaluate social deregulation theory.

SOCIAL CHANGE AND SOCIAL DEREGULATION: THE CASE OF RUSSIA

In the last decade and a half Russia has experienced enormous political, economic, and social changes that have permeated and deeply affected every societal institution and all dimensions of social life. The transition away from a totalitarian political system and a command economy toward capitalism and a representative democracy has serious implications for the foundational principles of Russian society. The group-oriented and collective norms and values that had guided social expectations in Russia long before the Communist Revolution (Kharkhordin, 1999) came under fire virtually overnight with an inundation of Western ideals and values that stressed individual freedoms and goals. Independent of the organizational challenges that confront any new state (e.g., the creation and/or reformation of political, financial, military, and legal institutions), Russia faced additional burdens that were intrinsically tied to the manner in which the old Soviet bureaucracy exercised control over the economy. From its inception in 1922, the Soviet Union continuously centralized authority in the hands of economic planners in Moscow (Fajth, 1999; Liu, 1993). Following the collapse of the Soviet Union in the early 1990s, Russia began a shock therapy of market reforms and privatization. The legal, political, regulatory, and social institutions necessary for a properly functioning market

economy, however, were and continue to be largely absent or underdeveloped (Goldman, 1996; Hanson, 1998; Intriligator, 1994; Porket, 1995).

The resulting economic collapse, together with the concomitant political chaos and anomic social conditions, had wide-ranging effects far more devastating and destabilizing than those experienced by the U. S. during the Great Depression. The Russian GDP decreased nearly 40%, industry output halved, and salaries dropped 45-65% (Gokhberg, Kovaleva, Mindeli, and Nekipelova, 2000). Even though conditions had stabilized by 2000, the official unemployment rate at that time was well over 10% and more than a quarter of the population was living in poverty (Goskomstat, 2001). The transition also had severe consequences for fertility and mortality, which are often indicators of abnormal conditions. Decreased birth rates and a mortality crisis, for example, have led to a shrinking population. Life expectancy for both males and females declined rapidly in the late 1980s and early 1990s (Heleniak, 1995), and Russian male life expectancy is still only about 60 years. In terms of mortality, middle-aged Russian males proved to be the most vulnerable to the stress of rapid socioeconomic change and uncertain future (Leon and Shkolnikov, 2002). Skolnikov and Meslé (1996) argue that democratization and marketization led to a failure of the former state paternalism (e.g., social safety networks and medical care, housing, and food guarantees) that led to the debilitating effects.

As disruptive as the political and economic transformation was to social order, its effect on the cultural and normative climate may have been even more profound. The end of the Soviet Union undermined a social contract that had been in place for almost seventy years. Since the 1920s, the central government had provided a substantial array of social services to its population, including full employment, price controls for essential goods and services, universal

health care, universal educational opportunities, and a broad safety net to guarantee a minimum level of financial security (e.g., old-age and military pensions, paid maternity leave). Soviet citizens could feel safe in the knowledge that the state would be there to meet their basic needs, regardless of any misfortunes they might experience. For a variety of reasons, however, including the economic difficulties and the incompatibility of totalitarian controls and communist economic programs with democratic freedoms and free markets, the Russian government was unable to continue its beneficence following the dissolution of the Soviet Union (Hass, 1999; Liu, 1993). Russian citizens were left unsheltered in the face of the transition and the new market (Polanyi, 2001), and along with the troubles mentioned thus far came dramatic increases in and sustained high rates of homicide (Pridemore, 2003a) and suicide (Pridemore and Spivak, 2003) in the country, both of which are now among the highest in the world.

In sum, the collapse of the Soviet Union appears to have resulted in a disequilibrium between the structural and cultural dimensions of social life (i.e., produced an anomie division of labor) as former governmental and social systems that stressed the importance of the group were forced into the background by new principles that highlight individual freedoms and opportunities. Thus, the dissolution of the Soviet Union provides us a unique opportunity to evaluate Durkheim's social deregulation hypothesis with contemporary data (Passas, 2000:28).

THE PRESENT INVESTIGATION

The relationship between anomie and crime, whether it arises from the process of modernization (the developmental hypothesis) or rapid social change (the deregulation

hypothesis), is inherently dynamic. Thus in order to evaluate Durkheimian theory time-series data are most appropriate when available (for a similar view see LaFree and Drass, 2002). Unfortunately, valid crime and mortality data from Russia were previously unavailable due to Soviet secrecy. However, the increased transparency of the Russian government during its transition to a democratic state has allowed researchers to gain access to such data for the first time in decades. This allows us to take advantage of the ongoing natural experiment in Russia to assess the Durkheimian hypothesis that rapid social change engenders increases in rates of crime and deviance.

DATA

We used three sets of time-series data as our outcome variables representing crime and deviance in Russia: homicide, suicide, and alcohol-related deaths. These data were prepared for us by Russian colleagues based upon projects undertaken to reconstruct Russian cause of death data as described below (Meslé, Shkolnikov, and Vallin, 1996; Meslé, Vallin, Hertrich, Andreev, and Shkolnikov, 2003). All data are for Russia proper (i.e., the Russian Soviet Federated Socialist Republic pre-1992 and the Russian Federation 1992 to present), not the Soviet Union.

These vital statistics data were inaccessible until very recently. For most of the Soviet era, mortality data were provided only to government statisticians for creating classified government reports (Shkolnikov and Meslé, 1996). From 1965 to 1987 homicides and suicides were among a group of ideologically embarrassing causes of death that were extracted from the original statistical tables and put into a secret table, called 5B (Andreev, Scherbov, and

Willekens, 1995). There was no pressure to falsify the initial cause of death decision and thus the underlying data still contained valid estimates of homicide and suicide deaths. This count remained classified, however, and the deaths in 5B were reported in the other and unknown causes category. This secrecy ended in the late 1980s and today homicide and suicide data are released annually in various publications available from the Russian State Committee for Statistics (Goskomstat) and Russian Ministry of Health (2001) annual publications. Further, a group of researchers has been provided access to the previously unpublished data and has been able to remove the homicide and suicide (and other) deaths from the 5B table and correctly reclassify them into appropriate categories (Meslé, Shkolnikov, Hertrich, and Vallin, 1996). Until 1999, the Russian vital statistics registration system (*Zapis Aktov Grazhdanskogo Sostoyaniya*, or ZAGS) used the Soviet coding scheme to classify cause of death. Items 173 (suicide) and 174 (homicide) in this classification had the same case definitions of the World Health Organization's (WHO) International Classification of Diseases (ICD) codes E950-E959 and E960-E978, respectively (Andreev, Scherbov, and Willekens, 1995; Kingkade and Arriaga, 1997).

At nearly 15 liters of pure ethanol alcohol per person per annum, Russian consumption is among the highest in the world (Nemtsov, 2000). Both alcohol and stress have been linked to the 1990s Russian mortality crisis (Leon and Shkolnikov, 1998; Vlassov, 1999), and Kuposov, Ruchkin, Eisemann, and Sidorov (2002) have shown that young Russian male problem drinkers often use alcohol as a form of stress control. We thus used alcohol-related deaths as another outcome measure. There are four categories of death due directly to consumption: chronic

alcoholism, alcohol psychosis (including encephalopathy and dementia), alcoholic cirrhosis, and alcohol poisonings. For this study, we combined these deaths into a single category.

The large increases in rates of homicide, suicide, and alcohol-related death immediately following the collapse of the Soviet Union represent actual patterns and are not artefacts of changing measurement systems. First, Soviet and Russian data on mortality in general (Anderson and Silver, 1997), and on violent death specifically (Wasserman and Väimik, 1998), have been subjected to various validation procedures with reassuring results. Second, the dramatic increases in these deaths follow similar patterns in other causes of death that are entirely unrelated to those we study here (Leon, Chenet, Shkolnikov, Zakharov, Shapiro, Rakhmanova, Vassin, and McKee, 1997). Third, Russia did not change systems until the end of the 1990s. In 1993 the country initiated a transition to the use of WHO classifications and only in 1999 did it begin reporting deaths using ICD codes, 10th Revision.

Pridemore (2003b) provides a description and comparison of the two homicide reporting systems, making it clear that estimates from the vital statistics system provide a truer representation of the number of homicides in the country than the police reporting system. For example, in 2000 the police reported a homicide rate of 21.9 per 100,000 persons compared to 29.8 from the vital statistics data (and this even though the former also contains a small number of attempted homicides). This was a difference of well over 10,000 homicides. Small differences are to be expected as a result of case definitions, but a difference of magnitude represents a serious issue on the part of the Russian police. Finally, we note that in the 1990s there was a disproportionate increase in the number of deaths recorded as violent, cause unknown, which was item 175 in the Soviet codes and corresponds to E980-E989 in the ICD-9

codes. Many of these deaths are undoubtedly homicides and suicides. Since the outcome of this situation is to underestimate homicide and suicide deaths in the country *following the collapse of the Soviet Union* (i.e., *after the intervention* in our analysis), the effect of this undercount is to make our estimates more conservative.

METHOD: INTERRUPTED TIME SERIES ANALYSIS

Our study uses autoregressive integrated moving average (ARIMA) techniques to assess the impact of the demise of the Soviet Union on the death rate (per 100,000) for homicide, suicide, and alcohol abuse within the Russian Federation. The data are annual, spanning the years 1956 to 2002.

Admittedly, the length of the time series is less than optimal. It should be recognized, however, that all too often analysts are faced with the dilemma of analyzing relatively short time series or using less appropriate, cross-sectional data to study dynamic social processes (see, for example, Briggs, Sundt, and Castellano, 2003). Statistically, the application of ARIMA procedures to a small number of observations tends to increase the size of the standard errors for the transfer function coefficients. Consequently, the shorter the time series, the lower the power of the test statistics (in our case the lower the probability of our rejecting the null hypothesis of no association between the collapse of the Soviet Union and each of the death rates). In short, given the limited statistical power of the present investigation, our findings should be interpreted as a conservative test of social deregulation theory (McCleary and Hay, 1980; McDowall, Lizotte, and Wiersema, 1991).

Three basic steps are involved in developing a model to assess the causal impact of an intervention on a time series by use of ARIMA procedures. First, the dependent series (in this case, each cause of death series) is transformed into a new set of observations that are distributed independently and normally with a mean of zero and a constant variance (i.e., a white noise process). In the language of ARIMA modeling, this procedure is known as prewhitening. Second, an appropriate transfer function is selected to estimate the impact of the intervention (in our case, the dissolution of the Soviet Union) on the prewhitened dependent series. Lastly, the final model is subjected to a number of diagnostic checks. If it is found to be inadequate, a new model is estimated. This procedure continues until a statistically adequate model is constructed.

Ideally, the selection of an appropriate transfer function should be rooted in theory. Although social deregulation theory allows us to predict the *direction* of the impact of the collapse of the Soviet Union on the cause-specific death rates (i.e., the sign of the coefficient should be positive), it speaks little to the possible functional form of this relationship. Fortunately, an appropriate transfer function can be derived empirically.

One may choose from a variety of functional forms to estimate the effect of an intervention on a series of interest. In practice, the selection may be restricted to one of three common patterns, each determined by an alternative functional form (McCleary and Hay, 1980:168-171). These are (1) an abrupt, permanent change in the level of the series estimated by a zero order transfer function ($\frac{\omega}{1-B}I_t$); permanent is defined here as the length of the series under investigation, (2) a gradual permanent shift in the level of the series estimated by a first-order transfer function [$\frac{\omega}{(1-B)}I_t$], and (3) an abrupt but temporary shift in the level of the series

estimated by applying a first-order transfer function to a differenced intervention series; that is, a pulse function $[(\sigma/(1-B)) * (1-B)I_t]$.

By successively estimating each of these transfer functions and subjecting them to a number of diagnostic tests, one can determine the most accurate model. To be sure, it is possible to fit higher-order transfer functions to the data in a mechanical fashion, but typically the results of such dredging expeditions are uninterpretable. Moreover, previous research consistently reveals that most social science interventions can be represented effectively by the lower-order processes delineated above (Loftin, Heumann, and McDowall, 1983; McCleary and Hay, 1980).

RESULTS

Figures 1-3 present the scatter plots for each of the three cause of death time series as well as a vertical marker to distinguish between the pre- and post-intervention periods. Inspection of these graphs suggests that the dissolution of the Soviet Union had an appreciable impact on the homicide, alcohol-related, and suicide death rates, respectively. However, the magnitudes and functional forms of these relationships are not readily discernable from these visual displays.

(Figures 1 -3 about here)

To begin, consider the graphs of the homicide and suicide series. There is little doubt that Russian homicide and suicide rates are noticeably higher after the breakup of the Soviet Union

than before its demise. What one cannot determine from these pictorial displays is whether or not the increases in these two causes of death are part of a pattern that began in the mid-1980s or a response to the social deregulation accompanying the Russian transition during the 1990s.

The graph for alcohol-related deaths is also open to conflicting interpretations. This series also evidences a post-intervention increase in magnitude. However, there is a sharp, positive spike in this series following the demise of the Soviet Union which is followed by a smaller downward spike. This would seem to indicate that the effects of the intervention might be short-lived (if they exist at all).

In sum, while the changes over time in the three time series plots are consistent with a Durkheimian interpretation, one cannot reject the possibility that the pattern of post-intervention increases in the death rates may be part of an ongoing process that began prior to the fall of the Soviet Union. Hence, we turn to the ARIMA models, which explicitly take into account, by means of the prewhitening procedure, any ongoing systemic processes that could confound the influence of the intervention on each of the dependent series (McCleary and Hay, 1980).

(Table 1 about here)

Table 1 presents the final univariate ARIMA models for each of the dependent series. The table contains information concerning the form, as well as the statistical adequacy, of these models. The systematic variation (autocorrelation) in each of the death rates series can be accounted for by the same, a relatively simple, ARIMA model: the application of first-order, non-seasonal differencing to remove drift and the specification of a first-order moving average

parameter. The Q statistic, which is distributed as chi-square, tests whether the model residuals differ as a whole from a white noise process. All the final models meet this diagnostic criterion (i.e., none of the autocorrelation functions are significant at the .05 level).

(Table 2 about here)

Table 2 contains the final transfer function models for the influence of the break-up of the Soviet Union on each of the death rate time series. The results are clear. Controlling (via prewhitening) for the long-term stochastic processes that are generating the dependent series, the dissolution of the Soviet Union is associated with significant increases in the rates of death for homicide, alcohol-abuse, and suicide.

The change in the level of both the homicide and the alcohol-related death series is well accounted for by a zero-order (step) function. Specifically, the Russian Federation experienced an immediate and permanent annual increase of approximately one homicide ($\beta_0 = .812$, $p < .05$) and two alcohol-related deaths ($\beta_0 = 1.730$, $p < .05$) per 100,000 persons, respectively.¹

In contrast to the final models for homicide and alcohol-related deaths, the influence of the intervention series on the death rate for suicide series appears to fit a pulse function. That is to say, there is a sharp increase in the suicide rate in the year immediately following the collapse of the Soviet Union (5.3 suicides per 100,000). However, within five years the series approaches its pre-intervention level (i.e., the post-intervention increase in suicides falls to .027 suicides per 100,000 persons [$(\beta_0 = 5.3) * (\beta_1 = .488)^5$]).

In sum, the implications of the interrupted time series analyses are rather straightforward. Subsequent to the dissolution of the Soviet Union, the Russian Federation experienced a statistically significant increase in three forms of deviance that could not be accounted for by their prior levels. We interpret these results as supportive of the Durkheimian social deregulation thesis that rapid social change produces a state of anomie and in turn an increase in rates of deviant behavior.

DISCUSSION

Auguste Comte, in the five volumes of *The Course of Positive Philosophy*, attempts to formally establish the science of society (social physics). In doing so, he also identifies the primary subject matter of sociology from which all subsequent sociological inquiries can be derived; the dual questions of social order (social statics) and social change (social dynamics). What was evident to Comte, and has been continuously reaffirmed since, is the complex interplay of these two fundamental social processes. Too much or too little of either can have detrimental consequences for society.

This interplay of order and change is also the driving force behind Durkheim's (1933; 1938; 1951) creative insights concerning the disruptive, anomic effects of rapid social change. That rapid social change is socially disruptive is an inherently important sociological postulate. That the disruption produced by rapid social change includes dramatic increases in the level of deviance is an equally important criminological postulate that, in our view, has not received the amount of attention it deserves. In this study, we have taken advantage of newly available data

and a unique natural experiment in order to subject his social deregulation hypothesis to an empirical test. Specifically, we employ ARIMA modeling techniques to examine the influence of the dissolution of the Soviet Union on rates of criminal homicide, alcohol-related deaths, and suicide.

Consistent with social deregulation theory, we report that the Russian Federation experienced significant permanent increases in the level of homicides and alcohol-related deaths and a more dramatic, though short-lived, increase in the suicide rate in the years following the break-up of the Soviet Union. The reasons behind the differences in the functional forms of these relationships is beyond our capacity to determine with these data. Nonetheless, regardless of the functional form of the relationship between the intervention series and the various death rates, there can be no doubt that the break-up is associated with a rise in the level of deviant behavior within the Russian Federation.

Arguably, it is more difficult to demonstrate the existence of causal relationships with ARIMA interrupted time series designs than it is with traditional multiple regression techniques (McDowall et al., 1991; Pierce, 1977). After all, the prewhitening procedure removes most of the within series variation prior to the estimation of the transfer function parameters. Hence, it seems fair to conclude that our findings cannot be discounted easily as mere statistical artifacts. Nonetheless, there are threats to the validity of studies that focus on a single jurisdiction.

First, the basic threat to the validity of quasi-experimental designs, such as interrupted time series analysis, is history. Although, we can proffer no reasonable rival hypotheses, it is possible that other events occurring at the same time as the intervention are responsible for the reported effects (Campbell and Stanley, 1963). To reduce the possibility of historical threats, we

subject a control series to the intervention that we applied to the Russian Federation data. Specifically, we prewhitened, and applied each of the three functional forms of the transfer function, to the annual rate of reported homicides per 100,000 persons for the United States (1956-2002). We decided to use U.S. homicide data as our control series because we were unable to acquire annual time series for other countries for this time period. The United States is a worthwhile control, though, because like Russia it is a large industrialized nation with very high homicide rates relative to other industrialized nations and because homicide rates in Russia and the U.S. were relatively comparable in level and general trends for the 35 years prior to the collapse of the Soviet Union (Pridemore, 2003a). In contrast to our findings for the Russian Federation, the United States experienced a significant and permanent decline in homicides after 1991 (i.e., the best fitting model is a zero-order transfer function; where $\rho = -.269$, $t = -2.219$). Thus, we conclude that it is exceedingly unlikely that the increase in the death rates in post-intervention Russia reflects some pervasive (cross-national) historical process.

Second, insofar as an investigation is limited to a single jurisdiction, one cannot be overly confident about external validity. Unfortunately, pre-and post-intervention data for the other former Soviet republics are not available. Consequently, we will continue (and encourage others to join us) to attempt to locate the requisite longitudinal data to evaluate social deregulation theory within other jurisdictions and/or other social contexts.

Durkheim (1933) argued that as societies progress they develop alternative means of social control compatible with new values and structural relations. The type of social control characteristic of mechanical solidarity is replaced slowly by organic solidarity. Although individualism develops at the expense of the collective, gradual social evolution and adaptation

provides individuals with the bonds of mutual dependence and thus a new type of social control. During times of rapid social change, however, goals become deregulated and there is no time for a new solidarity to develop, leaving individuals free to follow selfish pursuits. Although the Russian transformation from a totalitarian system and a command economy to a free market democracy will take years to accomplish, the collapse of the former was nearly instantaneous. While a crippled Russian state struggled to deal with repeated crises, social and market forces were deregulated at the expense of Russian citizens.

The Russian transition to a market economy is not a change from a mechanical to an organic society, but it is a fundamental shift from protection of the group to protection of the individual. During the Soviet era, there was an underlying and ubiquitous value system that stressed group ideals, not to mention the top down enforcement of homogeneity in actions and ideas (at least as outwardly expressed). Further, a strong collective conscience, communitarian ideals, and a social system that privileged the collective instead of the individual have long been characteristics of Russian culture and society (Kharkhordin, 1999). These values are largely incompatible with the free market and the individual ethic, so many past goals and symbols of group pride that generated collective sentiments have had to be discarded. The group ethic of the former cultural traditions and the Communist state are being replaced by the goals of individual freedoms and economic opportunities, which were repressed and held in disregard during the Soviet era. Russians are therefore being forced to play by new political, social, economic, and legal rules that are very different from what they had been taught throughout much of their lives. Moreover, the behavior of not only individuals but of governments requires control. Democracies and free markets require institutions that regulate civil society, economic

competition, and rule of law. Such institutions are largely foreign to the Russian state and society and will take time to mature (Intriligator, 1994; Ledeneva, 2000).

During times of rapid social change from one type of social species to another, individuals are freer to follow individual desires, and so we should expect higher rates of deviance until the social system adapts new mechanisms of control and reaches a new equilibrium. This is what we have seen in Russia. A state facing repeated crises was able to do little to respond when Russian citizens were left unprotected following the collapse of the welfare state, the ensuing political chaos, and the accompanying anomic conditions. Drug use rose sharply (Paoli, 2002), a mortality crisis followed (Bobadilla, Costello, and Mitchell, 1997), and we have shown in this study that there were significant increases in rates of homicide, suicide, and deaths directly related to alcohol consumption. To be sure, levels of violence (directed against the self and against others) and of alcohol consumption were already high in Russia before the dissolution of the Soviet Union. Following this collapse, however, rates of homicide and suicide and alcohol consumption have risen to among the highest in the world. Thus we conclude that the results from the interrupted time series analyses undertaken here provide considerable support for Durkheim's social deregulation hypothesis.

NOTES

1. Given that our alternative hypothesis is directional (i.e., we predict that the intervention will produce an increase in each of the death rate series), we use a one-tailed test of statistical significance.

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Table 1. Final Univariate Models for Homicide, Alcohol-Related, and Suicide Death Rates

Series	Model	Q Statistic
Homicide	(0,1,1)*	Q = 9.1 df = 11 p <.63
Alcohol	(0,1,1)	Q = 15.9 df = 11 p <.16
Suicide	(0,1,1)	Q = 7.2 df = 11 p <.79

Note:

* The general form of the non-seasonal ARIMA model is: (p,d,q): where p = the order of the autoregressive parameter, d = the order of differencing, and q = the order of the moving average parameter

Q = Box-Jenkins test statistic for the null hypothesis that the model residuals are distributed as white noise.

Table 2. Final Intervention Models by Cause of Death

<u>Series</u>	<u>Final Model</u>	<u>Parameter Estimates</u>
Homicide	$Y_t = \rho_0 I_t$ $Q = 11.87 \text{ df} = 12$	$\rho_0 = 0.812 \quad t = 1.68$ $p < .38$
Alcohol	$Y_t = \rho_0 I_t$ $Q = 18.08 \text{ df} = 12$	$\rho_0 = 1.730 \quad t = 1.85$ $p < .12$
Suicide	$Y_t = \frac{\rho_0}{1 - \rho_1 B} (1-B) I_t$ $Q = 5.027 \text{ df} = 11$	$\rho_0 = 5.343 \quad t = 2.74$ $\rho_1 = 0.488 \quad t = 1.95$ $p < .93$

Notes: ρ_0 = Zero-order input parameter of a transfer function
 ρ_1 = First-order output parameter of a transfer function
 Q = Test statistic for the null hypothesis that the model residuals are distributed as white noise
 B = Backward shift operator where $B(Y_t) = Y_{t-1}$
 I_t = Intervention series