Crime Load and Mental Health Decline:
Longitudinal Evidence from the Mexican Family Life Survey

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Abstract

The literature on the impact of crime on victims' mental health is mostly rooted on clinical studies, cross-sectional samples and region-specific case studies, providing only descriptive evidence on the crime-health correlation, with little generalizability to the general population. There is also scarcity of evidence for developing countries. We contribute to fill this gap using nationally representative, longitudinal data from the Mexican Family Life Survey to examine the effect of victimization on the mental health status of the population. Building upon a double-difference methodology—comparing victim's health before and after the occurrence of crime with changes in health of non-victims—we find that crime poses a significant burden on several dimensions of health. After being victimized, individuals are more likely than non-victims to start suffering an anxiety disorder. Symptoms that were absent before victimization, such as frequent nervousness, fear, pessimism, obsessiveness, headaches, chest pain, tend to appear after it. Additionally, subjects that did not use to drink or smoke are more likely to engage in these habits if they are victimized. Impacts vary across genders—females seem to endure a harder impact on mental health, being significantly more likely than males to start exhibiting anxiety symptomathology following crime.

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The current state of knowledge on crime and health offers evidence that victimization is associated with substantial deterioration of physical and mental health (Robinson & Keithley 2000, Resnick & Kilpatrick 1994, Frieze *et al.* 1987). In many cases, the evidence is based on clinical and case studies, drawing conclusions out of a few individuals that have sought help at a medical facility and/or have volunteered for the study. Kilpatrick et al. (1981) use a sample of 20 rape victims who reported to the Charleston County Emergency Room. Compared to a sample of matched non-victims, victims exhibit higher anxiety after one year. Frank and Stewart (1984) work with 90 victims of sexual assault referred by the Allegheny County Center for Victims of Violent Crime and Pittsburgh Action Against Rape. They find evidence of depressive symptomathology 4 weeks after the assault, and although victims' health improves after 3 months, there does not seem to be improvements in the following 9 months. Using data from two rape crisis centers, Waigandt *et al.* (1990) show that victims of sexual assault tend to be in worse physical health than a sample of non-victims matched by age. Although rape has by and large been the focus of the majority of the case studies, there is also evidence on other types of crime as well. For example, Harrison & Kinner (1998) examine armed robbery, and based on 57 English-speaking victims that volunteered for the study, find that subjects exhibit high levels of mental distress.

Apart from the limitation of small sample size[1], these studies have two other shortcomings that seriously limit their generalizability. First, they focus on certain types of crime that affect very specific demographic groups, such as women, in the case of rapes. Second, clinical studies are based on samples that suffer from a selection problem—victims who seek

[1] See Koss *et al.* (1990) and Porcerelli *et al.* (2003) for examples of clinical studies with large samples. Still, however, they suffer from sample selection limitations.

help at an institution are probably more desperate and in more need than victims that do not, and expectedly they would have worse health status. Therefore, conclusions based on these selected victims would exaggerate and overestimate the real effect of crime in the general population. Additionally, victims that attend a medical institution have the economic resources to afford the cost of treatment that other victims cannot. We would not know then the consequences of crime at the lower end of the income distribution, a sector of the population whose health status is in general worse and more vulnerable than that of the richer sector of the population.

There have been attempts to overcome these limitations by implementing and using data from community surveys. Kilpatrick *et al.* (1985) and Boudreaux *et al.* (1998) use a survey from females of Charleston County, South Carolina, Burnam et al. (1988) base their study on a survey representative of two communities of Los Angeles, California, Boney-McCoy & Finkelhor (1995) use a national survey of youth in the U.S. collected using telephone-based interviews, and Norris & Kaniasty (1994) use a representative sample of the state of Kentucky. The evidence in these cases is consistent with that of clinical and case studies—victimization is associated with the prevalence of psychological pathologies such as depression, anxiety, and post-traumatic stress disorder, and higher alcohol consumption and substance abuse. Nevertheless, this evidence is typically drawn on the basis of cross-sectional surveys, which makes it difficult to interpret the results as the impacts of crime. The observed crime-health association may be, at least in part, the consequence of spurious correlation. It may also be the case that there were pathological symptoms in the victim that pre-dated the crime incident and actually predisposed the person to victimization. For example, it is possible that people with smoking and drinking habits

carry a lifestyle that makes them more likely to be victims of crime. Perhaps people that are less depressed about their lives are more alert when they go around and are less likely to be assaulted. Examples of this sort force the interpretation of cross-sectional evidence as just crime-health correlations.

In order to be able to isolate the effect of crime on health it is crucial to disentangle the temporal sequence of crime occurrence and health decline. This can be accomplished by examining longitudinal evidence. Norris & Kaniasty (1994), in their Kentucky study with a sample of 500 individuals, are able to re-contact around 80% of the respondents via phone interviews every 3 months for a period of fifteen months. Controlling for symptoms at baseline, they find no significant effects of crime on mental health. Boney-McCoy & Finkelhor (1996) use a survey on children 10-16 years old, interviewed by phone twice in fifteen months. A little more than 70% of the children completed the survey both times. The longitudinal evidence in this case points to the existence of an effect of crime on depression and post-traumatic stress disorder related symptoms. Still, however, this evidence applies only to the selected age group, and may not be generalized to the general population.

Thus, the existing evidence on the impact of victimization on the health status of the general population is inconclusive. Either because of issues of sample selection, spurious correlation or lack of generalizability—studies focused on specific crimes (rape), particular communities or narrow age groups—there is no evidence available on how criminal victimization affects the mental and physical health of the population.

In our study we contribute to fill this gap using a survey of unique characteristics, bringing a number of advantages over previous studies.

First, our study uses a large scale, longitudinal sample representative of the Mexican national population. Second, we focus on crime in general rather than on a specific form of victimization that affects only certain part of the population, such as women rape studies. Third, we take advantage of the richness and structure of the survey to examine multiple dimensions of health, including physical and mental. Fourth, it is also worth noting that, unlike previous research, our study focuses on a developing country. This is especially relevant since not only is crime more prevalent in the developing world, but also the availability and quality of health services to treat victims is less adequate.

In particular, the Mexican context provides a setting where crime has become a major concern in the society. In the ten years between 1985 and 1995 crime saw a dramatic rise of 300%. Meanwhile, between 1999 and 2004, just about half the households had at least one member who had been victim of a crime[2]. The Citizen Institute for the Study of Insecurity (ICESI), a reputable university institution of Mexico, in a 2002 nationally representative survey informs that 92% of reported offenses are robberies, half of them involving violence. In spite of this situation, only 1 out of 3 victims reported the event to the police, mainly due to lack of confidence on the authorities. The median (direct) economic loss of a victim amounts to 1,700 pesos (approximately 170 us$), equivalent to 40 days of work at the minimum wage[3]. As a result, 1 every 2 citizens feels insecure, and 1 every 4 citizens has changed habits in response to it. As the insecurity situation continued worsening, the Mexican civil

[2] Citizen Institute for the Study of Insecurity (ICESI, by its Spanish acronym), International Survey on Crime and Victimization (ENICRIV), 2004.
[3] In 2002, the minimum wage was 42.15 pesos a day in Zone A (Baja California, Federal District, State of Mexico, and large cities); 40.10 pesos a day in Zone B (Sonora, Nuevo Leon, Tamaulipas, Veracruz, and Jalisco); and 38.30 pesos a day in Zone C (all other states) (Tax Administration Service, 2002).

society responded with a massive demonstration, filling the streets with hundreds of thousands of people that congregated not only in Mexico City but also in several places around the country[4]. This quick look illustrates the extent of the *crime crisis* in Mexico.

We organize the paper as follows. The next section describes the data used in the study, section 2 characterizes crime and health in the study sample, section 3 depicts the econometric strategy used in the empirical estimation, and section 4 includes the estimation results before we conclude.

1 Data

We use data from the Mexican Family Life Survey (MxFLS). This is a nationally representative, longitudinal multi-purpose household survey. It collects not only profuse socio-economic and demographic household information—such as composition, sources of income, asset holdings, consumption—but also copious and detailed individual information—including schooling, employment history, migration history, time allocation, tastes and habits. It is an ongoing survey, with the first wave fielded in 2002, the second one in 2005, and the third wave to be fielded in 2008. The survey covered around 8,550 households and 35,000 individuals at baseline (Rubalcava & Teruel, 2006).

Particularly advantageous for the purposes of our study is the fact that MxFLS contains extremely vast information on individual health, with modules on both self-reports and physical measures, administered to every household member of 15 or more years old. In our study, we divide

[4] The New York Times (June 28, 2004).

the analysis of health status in five dimensions: risky habits (smoking, drinking), mental health, morbidities, physical health, and general health status.

Regarding habits, MxFLS comprises a series of questions about past and present smoking habits, including age and year of initiation, average quantities, average expenditure, and interruptions, if any. Additionally, it includes two separate questions for drinking habits—one for habits at social events and one for habits with food at home—collecting even detailed information on types of beverages consumed. The mental health section of the survey was carefully modeled using CESDS (Centre for Epidemiological Studies Depression Scale) type questions. More precisely, the module consists of 22 reactives about the emotional well being of the respondent, ranging from feelings of sadness and anguish to loneliness. Each reactive inquires about the feelings and emotions experienced in the past 4 weeks, and individuals choose among 4 options to answer about the intensity with which they have experienced each emotion: no, sometimes, a lot, all the time. Based on these reactives it is possible to build an index, validated for Mexico (Calderon Narvaez, 1997), to capture the prevalence of different levels of depression and anxiety, from moderate to acute. The section on morbid symptoms of MxFLS, the third dimension we consider, is also exceptionally complete. The survey includes a detailed battery of yes-no questions to capture symptoms in a list of 20 morbidities, such as the flu, cough (distinguishing dry cough, cough with flem, cough with blood), stomach pain, irritated eyes, left-sided chest pain (pneumonia), and stress, to mention a few. Each question is in reference to the past 4 weeks.

In addition, the richness of the survey allows the analysis of physical health measures. In MxFLS, a trained health worker conducts physical

assessments in the home of the respondents. Each respondent is measured in height and weight, based on which we can construct body mass index (BMI), and in particular, we can study individuals who are overweight (BMI>25), a risk factor for heart disease, diabetes and mortality. Trained workers also assess Hemoglobin (Hb), using blood from a finger stick analyzed by a Hemocue photometer brought to the respondent's home. Typically, low Hb indicates low iron in the blood, although it may also indicate elevated levels of inflammation, the presence of worms or malaria. Low iron is associated with fatigue, elevated susceptibility to disease and reduced work capacity. The survey also collects measures of resting blood pressure, assessed after recording height and weight and prior to the finger stick. We define blood pressure as "normal" (i.e., not high) if systolic<120 mm Hg and diastolic<80 mm Hg. High blood pressure is associated with poor physical health, stress and heart disease.

Finally, we also examine two self-reported measures of general health status. Adult respondents of MxFLS are asked to rate their health on a five-point scale. Answers to this question however might be difficult to interpret and compare across individuals since it is not clear what reference group is being used by respondents to rate their health. Therefore, the survey includes an additional question where individuals are asked to assess their health relative to a person of their same sex and age.

On the other hand, in lieu of the increasing wave of insecurity experienced in the country, MxFLS architects purposely included extensive victimization module especially designed to study the crime epidemic that had been generating so much concern in the Mexican society. Respondents were asked detailed information about

victimizations suffered over the life-course, including date of the event (month, year, age), type of crime (robbery, sexual assault, kidnap), the place where it occurred (going to work/school, at work/school, at home, in transit), moment of the day when it occurred (morning, evening, night, daybreak), type of weapon used by the aggressor, monetary value of objects lost, whether the incident was reported, how severe it was considered (in a scale of 1-4 from very severe to nothing), whether there were injuries suffered by the victim and/or other people, type of injury (shot, stabbed, bone injury, other), and even if anybody died in the event. Furthermore, to complement this profuse information, there is a series of questions about perceptions of crime, regarding fear of being assaulted (in a 4-point scale from not scared to very), feelings of safety compared to 5 years ago (3-point scale, more, equal or less) expectations for being victimized in the next year (a 4-point scale from not likely to very), and expectations about violence in the future (3-point scale, increase, not change, decrease). In addition to all this, respondents are also inquired about habits and habit changes for safety reasons and in response to the wave of crime. Using a 4-point scale from not frequently to very, individuals rate their habits in going out at night and wearing valuable objects in the street. Respondents are then asked about changes in these habits—whether they go out at night, carry valuable objects more, same, less than 5 years ago. Additionally, individuals report whether they have changed routes followed, or transportation methods used.

A further highlight of MxFLS is its high re-contact rates. The advantages of its longitudinal format would be of little use if attrition were very high. Incidentally, a special effort was made to follow and re-contact individuals that move, not only within Mexico but also to the U.S. As a result, around 90% of baseline individuals had been re-interviewed in

MxFLS2, which positions the survey in the highest quality lot amongst those for developing countries.

2 Sample Characteristics

Our sample consists of all individual respondents between 15 to 50 years old that could be contacted in both rounds of the survey. Exploratory analysis done in preliminary stages showed that crime incidence is relatively low in the older population. Therefore we focus on that part of the population most hit by crime, and where its detrimental health effects, if any, are more likely to be uncovered. In this section we first delve into the incidence of crime in our study sample; then we present descriptive statistics of the health dimensions analyzed in our study.

Crime Incidence and Characterization in the Sample

We focus on all street crime events happening in the period between MxFLS rounds—approximately 3 years. According to ICESI (2002), street crime amounts to 80% of total crime. In Table 1 we summarize how crime affects individuals in our sample[5]. Notice crime hits urban centers much more—the incidence (% of individuals victimized at least once) in urban areas is more than 4 percent, and is more than twice the incidence in rural areas. This is a relatively high incidence, considered the extension of the period examined. Moreover, 2 out of every 3 crimes was considered severe or very severe, or resulted in gunshot or knife injuries to the victim.

[5] The proportions presented should not be taken as population estimates because we have not weighted observations to account for rural areas' oversampling.

In order to understand the economic burden imposed to the victims, we examine the value of material losses relative to per capita monthly household expenditure. The loss only takes into account the value of objects lost when victimized, leaving aside indirect costs arising from health recovery, forgone earnings, etc. Nevertheless, on average, material losses amount to almost twice the value of per capita monthly household outlay. In other words, victims lose roughly the product of 2 months of work.

In can also be seen that crime is spread out across all demographic groups—in none of the gender, age, education, expenditure and regional groups the incidence of crime is close to zero. However, crime does not hit all demographic groups the same way. Males suffer more than females, and people 15-29 years old are more affected than people 30-50 years old. Incidence is different as well across education and expenditure categories. In both cases, the impact is increasing: the higher education and per capita household expenditure are, the higher the incidence. In addition, and as it is to expect, the load of crime is stronger in the central region of the country, where Mexico City is located. Nevertheless, it is observed that crime is not only a Mexico City phenomenon, as other regions of the country, in particular the south- and center-west, are strongly hit by crime as well.

The severity of crime can also be observed on the impact that it has on the feelings of fear and insecurity of individuals. In the face of being victimized, individuals' perceptions, expectations and habits will expectedly reflect the burden. We examine how these dimensions differ between victims and non-victims in Table 1, Panel B. As can be noticed, there are sharp contrasts in how an individual perceives his or her environment depending on whether he or she has been victimized. More

than half the victims feel afraid to go out and feel less secure than a few years ago, while only a fifth of the non-victims share these feelings. A substantial proportion of the victims expects more violence and thinks likely to be assaulted in the next year—around 80 and 60 percent, respectively. Non-victims proportions are far from these magnitudes—only around half expects more violence while a fifth expects an assault. Habits are also dramatically different across groups. Around 45% of victims go out less than a few years ago, and 55% wears fewer valuable objects than they used to 5 years ago. Additionally, in response to this scenario, a third of the victims have changed routes or transportation as a safety precaution, which is three times as much as non-victims.

Health

The scenario described in the previous paragraphs compelled us to investigate whether victimization has consequences beyond the loss of belongings and valuable objects. In particular, the stark differences observed in perceptions, feelings and expectations suggest that crime might have important effects on individuals' psychological health, and may translate into consequences on risky habits (smoking, drinking), morbid symptoms and overall health status in general.

Before we turn to examine the health effects of crime, we present in Table 2 a description of health status of individuals in our sample, at baseline and the second round of MxFLS. It is to note that we examined more health dimensions than the ones in Table 2—including all the mental health reactives, morbid symptoms and physical health measures. In the interest of exposition, we present only those for which we found crime had a significant effect. In our analysis, alcohol and tobacco habits are measured dichotomically, for whether the individual consumes them or not. In mental health variables, we dichotomized responses assigning 1

to the top two categories (symptom present very frequently and all the time), while the anxiety prevalence index, built with the 22 reactives as previously described, equals 1 if there is symptomathology indicative that the individual might suffer from an anxiety disorder. Morbid symptoms are reported dichotomically, and additionally we build an indicator for whether the individual presents any morbid symptom. Finally, for both general health self-assessments, responses are dichotomized with good health identified as the top two categories of the five-point scale.

3 Estimation Model

Our goal is to identify the effect of crime on health. We need to compare the health status of those who have suffered a crime event to the health of those who have not. It is reasonable however for the health *level* of a person to affect the likelihood of suffering crime. Intuitively, people that drink and smoke have poorer health and might have habits that make them more likely to be victimized. People with poor mental health might be less alert on the street and make a more fragile target of crime. This is why cross-sectional analyses are biased and are not able to isolate the effect of crime on health. We address this limitation exploiting the longitudinal structure of MxFLS and focusing on individual health *changes* over time—more specifically, between the two rounds of the survey. We then compare changes in health of victims and non-victims, considering as victims those who suffered crime in-between baseline and the first panel of the survey. Because we can observe health prior to the occurrence of crime, we can be confident that baseline health level is not affected by posterior crime, and thus resolve the shortcoming that affects cross-sectional studies.

Our empirical analysis is based on the following regression model:

$$\Delta H_{i,1-2} = \alpha + x_{i,1}'\beta + \gamma \cdot crm_{i,1-2} + \delta_{c,1} + \varepsilon_{i,1-2} \qquad (1)$$

where $\Delta H_{i,1-2}$ is the change in health between rounds 1 and 2 for the i^{th} individual; $crm_{i,1-2}$ is an indicator that equals one if individual i was victimized between rounds 1 and 2; and $\varepsilon_{i,1-2}$ is the error term. Given the differences in crime incidence across demographic groups observed in Table 1, the model includes a series of socio-economic and demographic baseline characteristics. The vector $x_{i,1}$ contains the person's age, gender, height, schooling and per capita household expenditure (in logs) at baseline. Age and schooling are included in categorical variables following the classification in Table 1, and expenditure is included in splines with knots at each quartile. In light of the regional differences, we include $\delta_{c,1}$ to account for location fixed effects at the community level. We estimate the parameter of interest γ using least squares on equation (1).

4 Results

In Table 3, Column (1) we present the first set of estimation results. First we explore whether crime had any impact on habits proven to be damaging for health. We find that being victimized makes people engage in smoking and drinking, with significant marginal effects of 7 and 11% respectively. These behaviors may be consequences of the state of anguish and trauma generated by the endured crime. In fact, using our anxiety prevalence index we observe that individuals that did not have symptoms of anxiety at baseline are 7% more likely to suffer an anxiety disorder after they have been victimized. This mental state is reflected more strongly in some mental health dimensions than in others. In

particular, individuals that were not feeling nervous, frightened, pessimistic, obsessive, unable to concentrate or lonely at baseline are between 8 and 12 percentage points more likely to have such feelings following victimization.

It would not be surprising if the patterns found so far were accompanied by morbid symptoms. We explore that and find that crime has substantial effects on some morbidities. Among individuals who were not suffering from headaches or chest pain at baseline, the probability of suffering any of those symptoms increases after being victimized by 10 and 4 percent, respectively. On the whole, the stress and upset brought by the crime event makes victims 15% more likely to experience morbidities, although they were not suffering from any morbidity before the crime.

There are two other results to be mentioned from column (1), and they refer to general health status. First, in accordance to the previously described problems that general health questions have, we show that the general health question can be very misleading. According to it, crime has had no impact on victim's change in health status. The second result is a puzzling one. Relative to a person of same age and gender, victims report a health improvement over non-victims. A hypothetical explanation may be that when victims are asked to compare themselves with similar persons, they (unconsciously or not) use as reference group persons that have also suffered crimes, but have suffered worse consequences after it. That might lead to an 'optimistic report' that on average makes victims show up with better health improvements. In any case, this is indeed a result that deserves further exploration.

Robustness

Although by looking at health changes we are able to overcome spurious correlation issues between crime and health levels, there could be legitimate concerns about whether our results are confounded by correlation between crime and changes in health. It might be possible that our difference-in-difference estimates were at least partly driven by differential health trends correlated with the probability of being victim of a crime. For example, persons that become more anxious over time may adopt conducts that place them at more risk of suffering a crime. Also people that increase their drinking habits as time goes by may undertake risky behaviors that affect their likelihood of victimization. This time-variant unobserved heterogeneity would confound the inference and the causal interpretation of the results. Exploiting the information available on timing of the event, we construct a test to examine this hypothesis. If increasing anxiety affects the likelihood of crime, then people with worse mental health trend are more likely to suffer crime earlier in time, all else equal. In extent, they should exhibit different health changes compared to people that suffer crime later in time.

We test this by implementing a triple difference approach, comparing health changes of victims that suffered crime in the period close to baseline, victims assaulted closer to the second round of the survey, and non-victims. If the change in health of those who suffer crime early in the period is no different from those who suffer later, then we can be optimistic that our results are not simply the consequence of spurious correlations.

Using the information on date of event reported in MxFLS, we build two dichotomic variables, one for whether the event happened in 2002-2003, and the other for whether the crime happened after that date, roughly

splitting the period between survey rounds in halves[6]. Then we fully interact equation (1) using one these indicators at a time and re-estimate the model using the same specification as before. We present the results in Columns (2)-(4) of Table 3. First, we note that no matter when the crime occurred, still it inflicted significant damage to the individual's health evolution. This suggests that the detrimental effects of crime do not vanish quickly and tend to persist at least in the medium term examined here. Furthermore, and more importantly, we find no significant differences in the effects of crimes occurring before and after 2003 across any health dimension (Table 3, Column 4). This provides some support that our results of the burden of crime on health are not entirely driven by correlation between crime and health trends.

Gender Differences

Finally, given the differential incidence of crime across genders observed in the data, we proceed to examine whether the load of crime exhibits non-linearities in gender. Results show some interesting patterns (Table 4). Women suffer uniformly more in all the mental health dimensions. The magnitudes are substantially larger in some cases, such as feeling nervous and having feelings of loneliness. It appears that females are psychologically more affected by the stress and trauma of victimization. Regarding habits, the impacts are similar in terms of alcohol intake, but males engage in smoking as much as 4 times more than females as a result of the traumatic event. All these disorders seem to reflect in the morbid symptoms of the victims, whatever their gender. However, men victims endure a higher increase in chest pain than women victims, who actually do not show any chest pain change over time. Finally, the discussed issue about general health status holds here as well. The

[6] A small group was victimized both before and after 2003. We create a separate category for them and control for it in the analysis.

question on general health proves misleading once more, while according to relative health reports the relative health of victims has improved more than that of non-victims. Interestingly also is that the magnitude is exactly the same for both genders.

We also explored non-linearities in age, stratifying on different age groups, but found no significant differences across groups.

Conclusion

Our preliminary findings suggest that victimization imposes a significant burden on the health of the population. After suffering crime, victims are more likely to start suffering from an anxiety disorder than non-victims. This is specially reflected in feelings of nervousness, pessimism, fear, loneliness, and lack of concentration. Individuals that were not experiencing these discomforts are more likely to have following a crime episode. This pattern goes in hand with the onset of smoking and drinking habits, and with the appearance of morbid symptoms that were not present preceding victimization. On the other hand, there does not seem to be impacts on physical health measures such as body mass index, hemoglobin levels and blood pressure.

Furthermore, the detrimental effects of crime events happening in the first half of the 3-year period we examine are no different from the effects of events happening on the second half. Notably, this speaks to the persistence of crime's health costs. In addition, crime hits differentially across genders, with women suffering higher costs in terms of mental health.

In sum, exploiting the advantages of the Mexican Family Life Survey, we contribute with evidence where the literature had been inconclusive. The longitudinal structure, large scale, national representativeness and profuse content of the survey set this study apart from previous ones. We find evidence suggestive that the crime wave that is keeping the Mexican society in worry and apprehension has consequences that reach beyond the monetary value of the immediate economic losses, compromising the health of the population.

References

Boney-McCoy, S., and D. Finkelhor (1995), "Psychosocial Sequelae of Violent Victimization in a National Youth Sample", Journal of Consulting and Clinical Psychology, Vol. 63, No. 5. 726-736.

---- (1996), "Is youth victimization related to trauma symptoms and depression after controlling for prior symptoms and family relationships? A longitudinal, prospective study", Journal of Consulting and Clinical Psychology, vol.64 No.6, 1406-1416.

Boudreaux, E., D. Kilpatrick, H. Resnick, C. Best, and B. Saunders (1998), "Criminal Victimization, Posttraumatic Stress Disorder, and Comorbid Psychopathology Among a Community Sample of Women", Journal of Traumatic Stress, Vol. 11, No. 4, 665-678.

Burnam, M., J. Stein, J. Golding, J. Siegel, S. Sorenson, A. Forsythe, and C. Telles (1988), "Sexual Assault and Mental Disorders in a Community Population", Journal of Consulting and Clinical Psychology, 56, 843-850.

Calderon Narvaez, G. (1997), "Un Cuestionario Para Simplificar el Diagnostico del Sindrome Depresivo", Revista de Neuro-Psiquiatria, 60:127-135.

Frank, E., and P. Stewart (1984), "Depressive Symptoms in Rape Victims: A Revisit", Journal of Affective Disorders, 7, 77-85.

Frieze, I., M. Greenberg, and S. Hymer (1987), "Describing the Crime Victim: Psychological Reactions to Victimization", Professional Psychology: Research and Practice, vol.18, No.4, 299-315.

Harrison, C. and S. Kinner (1998), "Correlates of Psychological Distress Following Armed Robbery", Journal of Traumatic Stress, Vol. 11, No. 4, 787-798.

Citizen Institute for the Study of Insecurity (ICESI) (2002), "Primera Encuesta Nacional sobre Inseguridad Publica en las Entidades Federativas: Resultados Finales", Mexico, http://www.icesi.org.mx.

---- (2004), International Survey on Crime and Victimization (ENICRIV), Mexico, http://www.icesi.org.mx.

Kilpatrick, D., P. Resick, and L. Veronen (1981), "Effects of a Rape Experience: A Longitudinal Study", Journal of Social Issues, 37, 105-122.

Koss, M., W. Woodruff, and P. Koss (1990), "Relation of criminal victimization to health perceptions among women medical patients", Journal of Consulting and Clinical Psychology, Vol. 58 No.2, 147-152.

Norris, F., and K. Kaniasty (1994), "Psychological Distress Following Criminal Victimization in the General Population: Cross-sectional, Longitudinal, and Prospective Analyses", Journal of Consulting and Clinical Psychology, 62(1), 111-123.

Porcerelli, J., R. Cogan, P. West, E. Rose, D. Lambrecht, K. Wilson, R. Severson, and D. Karana (2003), "Violent Victimization of Women and

Men: Physical and Psychiatric Symptoms", The Journal of the American Board of Family Practice, 16:32-39.

Resnick, H. and D. Kilpatrick (1994), "Crime-Related PTSD: Emphasis On Adult General Population Samples", The National Center for Post-Traumatic Stress Disorder, PTSD Research Quarterly, vol.5, No.3, 1-8.

Robinson, F., and J. Keithley (2000), "The Impacts of Crime on Health and Health Services: A Literature Review", Health, Risk & Society, vol.2, No.3, 253-266.

Rubalcava, L., and G. Teruel (2006), "User's Guide for the Mexican Family Life Survey: The First Wave", available at http://www.mxfls.cide.edu.

Tax Administration Service (SAT) (2002), http://www.sat.gob.mx/sitio_internet/asistencia_contribuyente/informacion_frecuente/salarios_minimos/.

The New York Times, "Hundreds of Thousands in Mexico March Against Crime", G. Thompson and A. Betancourt, The New York Times Company, Jun 28, 2004.

Waigandt, A., D. Wallace, L. Phelps, and D. Miller (1990), "The Impact of Sexual Assault on Physical Health Status", Journal of Traumatic Stress, Vol. 3, No. 1, 93-102.

TABLE 1: Crime Incidence, Expectations & Habits (MxFLS)

PANEL A	***%***		%
Crime incidence	3.2	**Education (cont.)**	
	(0.2)**	6 years	2.2
Urban	4.2		(0.3)**
	(0.3)**	7-9 years	3.6
Rural	1.9		(0.3)**
	(0.2)**	10 or more years	5.4
%crimes that are violent	66.7		(0.5)**
	(2.7)**	**Per Cap. Household Expenditure**	
Economic Burden on victims	220	Quartile 1	1.6
(% of p.c. monthly hh. expend.)	(30.3)**		(0.3)**
#Observations = 9,496		Quartile 2	2.6
			(0.3)**
Incidence by Demographic Group		Quartile 3	4
Gender			(0.4)**
Men	3.9	Quartile 4	4.8
	(0.3)**		(0.5)**
Women	2.7	**Geographic Regions**	
	(0.2)**	Center	6.4
Age			(0.6)**
15-29 years old	3.6	Center-West	2.9
	(0.3)**		(0.4)**
30-49 years old	2.9	Northwest	2
	(0.2)**		(0.3)**
Education		Northeast	1.2
less than 6 years	1.4		(0.3)**
	(0.3)**	Southwest	3.2
(continues next column)			(0.4)**

PANEL B	***Victim***	***Not Victim***
	%	%
Fear to go out at night or day	52.9	20
	(2.9)**	(0.5)**
Feel less safe than 5 years ago	52	22.9
	(3.0)**	(0.5)**
Expects to be victim next year	61.4	22.5
	(2.7)**	(0.5)**
Expects violence to increase	79.4	54.8
	(2.3)**	(0.6)**
Goes out infrequently	70.6	74.7
	(2.7)**	(0.5)**
Goes out less freq. than 5 years ago	45.4	35.9
	(2.8)**	(0.6)**
Uses few or no valuable objects	89.9	82.6
	(1.7)**	(0.5)**
Use less valuable obj. than 5 yrs ago	56.9	40.7
	(2.8)**	(0.6)**
Changed route/transport. for safety	32.4	9.5
	(2.9)**	(0.3)**
#Observations = 9,496		

Robust household clustered standard errors in (), *:p<.05, **p:.01

Panel A: Incidence measured over the period between MxFLS1 & MxFLS2 (approx. 3 years), individuals with baseline ages 15-50 contacted in both survey rounds. Categories constructed using on baseline

Panel B: Reports given on MxFLS2 by individuals with baseline ages 15-50 contacted in both survey rounds. Victim: respondents suffering crime in the period between survey rounds.

TABLE 2:
Health Risky Habits and Health Status (MxFLS)

Prevalence (percentage points)

	MxFLS1	MxFLS2
Habits		
drinks alcohol	33.6	29.4
	(0.5)**	(0.5)**
smokes	11.3	8.2
	(0.3)**	(0.3)**
Mental Health		
anxiety prevalence	16.4	12.1
	(0.4)**	(0.4)**
nervous	38.9	26.9
	(0.5)**	(0.5)**
pessimistic	26.8	18.8
	(0.5)**	(0.4)**
frightened	29.0	18.2
	(0.5)**	(0.4)**
lonely	25.2	18.8
	(0.5)**	(0.4)**
unable to concentrate	26.0	19.1
	(0.5)**	(0.4)**
Morbidities		
morbid symptoms	66.6	48.1
	(0.5)**	(0.6)**
freq headaches	34.4	25.1
	(0.5)**	(0.5)**
left-sided chest pain	7.6	5.2
	(0.3)**	(0.2)**
General health status		
in good health	53.6	51.3
	(0.6)**	(0.6)**
in good health relative to same sex/age	33.0	27.4
	(0.5)**	(0.5)**
Observations	9496	

Robust household clustered standard errors in (), *:p<.05, **p:.01
Individuals with baseline ages 15-50 contacted in both survey rounds.

TABLE 3: Effect of Crime on Change in Health

Marginal effect of being a crime victim (MxFLS2 - MxFLS1)

	Com. Fixed Effects (1)	Crime <= 2003 (2)	Crime >2003 (3)	*Diff (2)-(3)* (4)
Change in Habits				
Drinks alcohol	0.11	0.14	0.08	*0.06*
	(0.03)*	(0.06)*	(0.04)	*(0.07)*
Smokes	0.07	0.08	0.08	*0.00*
	(0.02)*	(0.03)*	(0.03)*	*(0.04)*
Change Mental Health				
Anxiety Prevalence	0.07	0.13	0.03	*0.10*
	(0.03)*	(0.05)*	(0.03)	*(0.06)*
obsessive, repetitive	0.09	0.04	0.10	*-0.06*
	(0.03)**	(0.06)	(0.04)*	*(0.07)*
nervous	0.12	0.14	0.13	*0.01*
	(0.04)**	(0.06)*	(0.05)**	*(0.08)*
pessimistic	0.08	0.13	0.06	*0.07*
	(0.03)**	(0.06)*	(0.04)	*(0.07)*
frightened	0.10	0.13	0.07	*0.06*
	(0.04)**	(0.06)*	(0.05)	*(0.07)*
lonely	0.11	0.20	0.08	*0.12*
	(0.03)**	(0.06)**	(0.04)	*(0.07)*
unable to concentrate	0.10	0.12	0.10	*0.02*
	(0.04)**	(0.06)	(0.04)*	*(0.08)*
Change in Morbidities				
Any morbidity	0.15	0.19	0.10	*0.10*
	(0.04)*	(0.07)**	(0.04)*	*(0.08)*
Suffers from headaches	0.10	0.16	0.07	*0.09*
	(0.04)*	(0.06)*	(0.05)	*(0.08)*
Left sided chest pain	0.04	0.08	0.01	*0.07*
	(0.02)*	(0.04)*	(0.03)	*(0.05)*
Change Gral.Health Status				
In good health	0.02	-0.02	0.05	*-0.07*
	(0.04)	(0.06)	(0.05)	*(0.07)*
In good health relative to same age/gender	0.16	0.18	0.17	*0.00*
	(0.04)*	(0.07)*	(0.05)*	*(0.09)*
Observations	9,496			

Least squares estimates on panel individuals ages 15-50 at baseline. Dependent variables: changes between MxFLS1 & MxFLS2 in indicators for whether symptom is present or gral. health is good. Not reported controls for baseline characteristics: gender, height, age (categories 15-29 & 30-50 years old), schooling (categories in years of education: less than 6, 6, 7-9, 10 or more), log of per capita household expenditure (in splines with knots at quartiles). Robust standard errors with household level clustering in (). * p<.05, ** p<.01. Column (1)= effect of being victimized between MxFLS1 & MxFLS2. Column (2)= Model (1) fully interacted with an indicator for crimes that happened in or before 2003. Column (3)= Model (1) fully interacted with an indicator for crimes that happened after 2003. Both these columns control for individuals victimized both before and after 2003. Column (4)= differential coefficients & std. errors from fully interacted model.

TABLE 4: Effect of Crime on Change in Health, by Gender

Marginal effect of being a crime victim (MxFLS2 - MxFLS1)

	Males (1)	Females (2)	*Diff (3)*
Change in Habits			
Drinks alcohol	0.11	0.13	*-0.02*
	(0.05)*	(0.04)**	*(0.06)*
Smokes	0.12	0.03	*0.09*
	(0.04)**	(0.02)	*(0.04)**
Change Mental Health			
Anxiety Prevalence	0.02	0.14	*-0.12*
	(0.03)	(0.04)**	*(0.05)**
obsessive, repetitive	0.06	0.12	*-0.06*
	(0.05)	(0.05)*	*(0.07)*
nervous	0.00	0.23	*-0.23*
	(0.05)	(0.05)**	*(0.07)***
pessimistic	0.07	0.11	*-0.04*
	(0.05)	(0.05)*	*(0.07)*
frightened	0.07	0.15	*-0.08*
	(0.04)	(0.05)**	*(0.06)*
lonely	0.04	0.18	*-0.14*
	(0.04)	(0.05)**	*(0.06)**
feels unable to concentrate	0.07	0.13	*-0.06*
	(0.05)	(0.05)*	*(0.07)*
Change in Morbidities			
Any morbidity	0.17	0.16	*0.01*
	(0.05)**	(0.05)**	*(0.07)*
Suffers from headaches	0.09	0.14	*-0.05*
	(0.05)	(0.05)**	*(0.07)*
Left sided chest pain	0.09	0.00	*0.09*
	(0.03)**	(0.03)	*(0.04)**
Change Gral.Health Status			
In good health	0.06	-0.02	*0.08*
	(0.05)	(0.06)	*(0.08)*
In good health relative person same age/gender	0.17	0.17	*0.00*
	(0.05)**	(0.06)**	*(0.08)*
Observations	9,496		

Least squares estimates on panel individuals ages 15-50 at baseline. Dependent variables: changes between MxFLS1 & MxFLS2 in indicators for whether symptom is present or gral. health is good. Not reported controls for baseline characteristics: gender, height, age (categories 15-29 & 30-50 years old), schooling (categories in years of education: less than 6, 6, 7-9, 10 or more), log of per capita household expenditure (in splines with knots at quartiles). Robust standard errors with household level clustering in (). * p<.05, ** p<.01. Columns (1),(2)= effect of being victimized between MxFLS1 & MxFLS2 for males (females), computed based on original model fully interacted with an indicator for males (females). Column (3)= differential coefficients & std. errors from fully interacted model.