The 2011 FCD-CWI Special Focus Report on Trends in Violent Bullying Victimization in School Contexts for 8th, 10th, and 12th Graders, 1991-2009

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The Foundation for Child Development (FCD)

The Foundation for Child Development (FCD) is a national, private philanthropy dedicated to the principle that all families should have the social and material resources to raise their children to be healthy, educated, and productive members of their communities.

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Kenneth C. Land, Project Coordinator

Kenneth C. Land, Ph.D., is the John Franklin Crowell Professor of Sociology and Demography at Duke University. He has conducted extensive research on contemporary social trends and quality-of life measurement, social problems, demography, criminology, organizations, and mathematical and statistical models and methods for the study of social and demographic processes. He is the co-author or co-editor of five books, more than 100 research articles, and numerous book chapters. Dr. Land has been elected a Fellow of the American Statistical Association, the Sociological Research Association, the American Association for the Advancement of Science, the International Society for Quality-of-Life Studies, and the American Society of Criminology.

The Child and Youth Well-Being Index Special Focus Reports

Each year, the **Foundation for Child Development** and the **Child and Youth Well-Being Index (FCD-CWI) Project at Duke University** issue a comprehensive measure of how children are faring in the United States. Each annual FCD-CWI report also includes a **Special Focus Report** on a particular topic of interest. The 2011 Special Focus Report examines trends in violent bullying victimization in school contexts over the past two decades and the factors associated with such trends. This analysis helps to put into focus the recent round of attention given to bullying and its consequences by the media, policy makers, and school officials.

Special Focus Report: Bullying Victimization in School Contexts:

Repetitive Cycles and Persistent Risk Factors

Child and youth bullying behaviors, especially in school contexts, have received increased attention during the past three years from the media[1], parents and the public, policy makers[2], and school administrators. While this recent spotlight on bullying behaviors is undergirded by real incidents and there has been much research on bullying[3], important questions remain as to whether the recent upsurge in school bullying is historically unique in recent American history and about the relative risk of bully victimization of students with different sociodemographic, contextual, and behavioral characteristics and the variation of these risks over time. Questions also have been raised about anti-bullying efforts nationwide: Do they not only fail to change the status quo but lead to an intensification of school bullying?[4] Without concrete evidence about historical trends in school bullying and the prevalence of bullying behaviors across demographic, social and economic groups, the wisdom behind the war against school bullies will continue to be challenged.

To address these questions, we use a nationally representative dataset to analyze trends and changes in the prevalence of **serious forms of school bullying victimization among middle and high school students** – physically threatening, violent, injurious – over time and in the differential exposure of demographic, social and economic groups to school bullying.

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[1] For instance, from January 2000 through September 2011, there were 196 articles in *The New York Times*, including news about bullies and bullying incidents, commentary, and archival articles. See http://topics.nytimes.com/top/reference/timestopics/subjects/b/bullies/index.html?offset=15&s=newest.

[2] See The Myths About Bullying, Secretary Arne Duncan's Remarks at the Bullying Prevention Summit, August 11, 2010. U.S. Department of Education. http://www.ed.gov/news/speeches/myths-about-bullying-secretary-arne-duncans-remarks-bullying-prevention-summit.

[3] See, e.g., Espelage DL, Swearer SM (2003) "Research on school bullying and victimization: What have we learned and where do we go from here?" *School Psychology Review* 32:365-383; Srabstein, J. (2008) "Deaths Linked to Bullying and Hazing." *International Journal of Adolescent Medicine and Health* 20:235-239; Swearer, S. M; Espelage, D.L; Vaillancourt, T.; Hymel, S. (2010) "What Can Be Done About School Bullying? Linking Research to Educational Practice" *Educational Researcher* 39: 38-47; Ttofi Maria M.; Farrington David P.; Loesel Friedrich; et al. (2011) "The predictive efficiency of school bullying versus later offending: A systematic/meta-analytic review of longitudinal studies." *Criminal Behaviour And Mental Health* 21:80-89.

[4] See Winnie Hu, "Bullying Law Puts New Jersey Schools on Spot." The New York Times, August 30, 2011. http://www.nytimes.com/2011/08/31/nyregion/bullying-law-puts-new-jersey-schools-on-spot.html?pagewanted=all

Data

This report is based on data from the Monitoring the Future (MTF) project, a nationally representative study conducted at the Survey Research Center of the Institute for Social Research at the University of Michigan. The objective of the MTF project is to explore trends and changes in values, behaviors and orientations of American adolescents. The survey of 12th graders was initiated in 1975 and surveys of 8th and 10th graders have been conducted since 1991. Every year, thousands of 8th, 10th, and 12th graders participate in this survey and respond to questions on a series of subjects, such as drug use, religious orientation, school performance, violence, and socio-economic status of their parents. The MTF provides five Key Indicators for the overall FCD-CWI including 12th grade trends in: smoking cigarettes, binge drinking, use of illicit drugs, attendance to religious services, and the evaluation of the importance of religion to the student. The MTF data also include responses to a number of questions about the experience of various specific forms of bullying victimization in school-related contexts that can be used to study changes over time and the influence of sociodemographic and behavioral characteristics on the relative likelihood of being bullied. These questions have been included in the MTF surveys of 12th graders since 1989 and in the surveys of 8th and 10th graders since 1991.

Measures and Analyses of Threatening, Violent, Injurious School Bullying Victimization Behaviors

Questions regarding physically threatening, violent, injurious school bullying victimization appear in the MTF questionnaire as follows:

> "The next questions are about some things which may have happened TO YOU while you were at school (inside or outside or in a school-bus). During the LAST 12 MONTHS, how often …"
> 1. Has an unarmed person threatened you with injury, but not actually injured you?
> 2. Has someone threatened you with a weapon, but not actually injured you?
> 3. Has someone injured you on purpose without using a weapon?
> 4. Has someone injured you with a weapon (like a knife, gun, or club)?

These four questions are hereinafter referred *as threatened without injury*, *threatened with a weapon*, *injury without a weapon* and *injury with a weapon*, respectively. Response categories for all four questions are the same: 1) not at all; 2) once; 3) twice; 4)3-4 times; 5) 5+ times.

Trends Over Time: We first describe overall trends over the past two decades in annual data on frequency distributions of victimization experiences of the four types of bullying behavior as reported by the 8th, 10th, and 12th grade students. In addition to comparisons of prevalence rates of victimization during the 2000-2009 decade with those of the 1990s, we will examine these trends for indications of increases associated with the increasing availability of Internet-based communications and social networking sites and their facilitation of cyber-bullying in the past ten years.

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Risk Factors: We then consider differences in the risk of bullying victimization experiences as a function of a number of risk factors –sociodemographic, contextual, and behavioral characteristics of the students and their environment as they relate to the four types of bullying behavior for the three grade levels. These characteristics include: *gender* (male *vs.* female), *residency* (on a farm or in the country *vs.* in a city), *parental structure* (single-parent and no-parent families *vs.* two-parent families), *father's educational attainment* (secondary education and below *vs.* tertiary education), *race* (African American *vs.* non-African American), and *Grade Point Average—GPA* (B+ and below *vs.* A- and above).

Statistical Methods: The statistical procedures for estimating the trends in the MTF frequency distributions of bullying victimization behaviors are described in detail in Appendix A. Briefly, to focus on temporal trends in the data, data smoothing by application of three-point moving averages were first applied to the observed frequency distributions in each of three adjacent years centered in each focal year. Then the smoothed frequency distributions were analyzed by application of zero-inflated Poisson (ZIP) statistical models. ZIP models are appropriate for modeling data on frequency distributions that have so-called extra density or more observations than expected by conventional Poisson models at the zero frequency, which is the case for the bullying victimization frequency data. All of the figures described below and in Appendix B show two estimated ZIP parameters for smoothed data series of the annual frequency distributions of bullying victimization for each of the four forms of bullying for the past two decades: *(1) the percent of students exposed to bullying behaviors (P), and (2) the intensity of bullying as measured by the average number (λ) of times students exposed to bullying were bullied in the past 12 months.*[5] The left *y*-axis is the scale for the annual intensity of bullying (λ) and the right *y*-axis is the scale for the percent that were exposed to bullying for each year (P).

In the study of trends for different age groups over time, it is useful to consider whether there might be *period* or *cohort effects* associated with the trends. *Period effects* refer to similar effects, such as an increase in the rates, which take place *during the same period of time for different age groups*. One could then look to common historical experiences, such as an economic recession, which could explain similar behaviors or experiences across different age groups. *Cohort effects* would refer to changes in trends that are lagged such that it appears the same age group or cohort is associated with such changes. For example, if the intensity rate of bullying victimization increases for the 8th graders in a particular year, such as 1990, and then two years later increases for the 10th graders, then the change in rates may be due to characteristics of that particular age cohort.

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[5] The estimate of the percent, P, of students in a particular grade exposed to a form of bullying in any particular year may not correspond to the observed proportion of students who report zero bullying incidents of that form due to 1) the data smoothing and 2) the fact that the observed proportion of zero incidents includes both the estimate P of exposure plus the expected proportion of zero events from the Poisson model with the mean number of bullying incidents for those experiencing that form of bullying. Rather, the estimated P parameters approximate the underlying trends in percentages of students in latent classes for whom that form of bullying process is operative in the years studied and thus are more stable.

Overall Trends in Bullying Victimization for 8th, 10th, and 12th Graders

1) Trends in Being Threatened without Injury:

8th Graders: There was *increased exposure of 8th graders to being threatened without injury, as measured by the percent (P) who experienced this form of bullying, from 2002 (34.9%) to 2006 (37.4%)*, after which time the percent declined to 36.6% in 2009 (Figure 1). During this decline, the estimated intensity of bullying (λ) increased. Taken together, this means a smaller percent of 8th graders was being threatened, but the threats were experienced more often during the year by those who were bullied.

Concerning long-term trends, it also should be noted that *the highest estimated percents of 8th graders exposed to being threatened without injury occurred during the 1990s.* In 1991 41.4% of the 8th graders were exposed to this type of bullying and the rate stayed above 40% until 1998. It then declined in the years 2000 to 2002 and increased again in the 2003-2006 period, leading to the increased focus of attention on bullying in recent years.

10th Graders: Figure 2 shows trends in estimated parameters of the threatened without injury bullying frequency distributions for 10th graders. The estimated exposure values (P) move over time in a fashion similar to that of the 8th graders in that *the highest rates occurred in the 1990s and the rates increased again from 2003 (32.0%) to 2006 (34.3%)*, but at levels slightly lower than those for the 8th graders. By contrast, t*he estimated intensity (λ) of bullying for those who were exposed surged upward from 1999-2003, and increased again 2006 to 2009.* Both of these increased periods of intensity occurred while the overall exposure rates were in decline – that is, these were periods of declining exposure to this form of bullying, perhaps due to actions taken by parents or school officials to reduce bullying victimization, but, for those who experienced this form of bullying in these periods, the average number of bullying incidents experienced, increased.

12th Graders: Although the temporal patterns across the years for the 8th and 10th graders being threatened without injury are in the form of a period effect (in the sense defined above) with increases from 2002-2003 to 2006, the pattern for the 12th graders was different in the 2000s. As Figure 3 shows, the *highest estimated rates (P) for 12th graders being threatened without injury happened in the 1990s*. But, throughout the period of study, *the percent of 12th graders exposed to bullying shows a long-term downward trend, that is, a long-term secular decline, from the high of 35.0% in 1989 to a low of 25.8% in 2009*. In contrast, the estimated intensity (λ) of this form of bullying occurrences shows an upsurge from 2001 to 2005 such that average occurrences for those who were bullied rose from 1.14 to 1.31 incidents per year. Again, this upsurge is consistent with a heightened attention to bullying behavior by parents, school personnel, and policy makers in the years 2006 to 2011.

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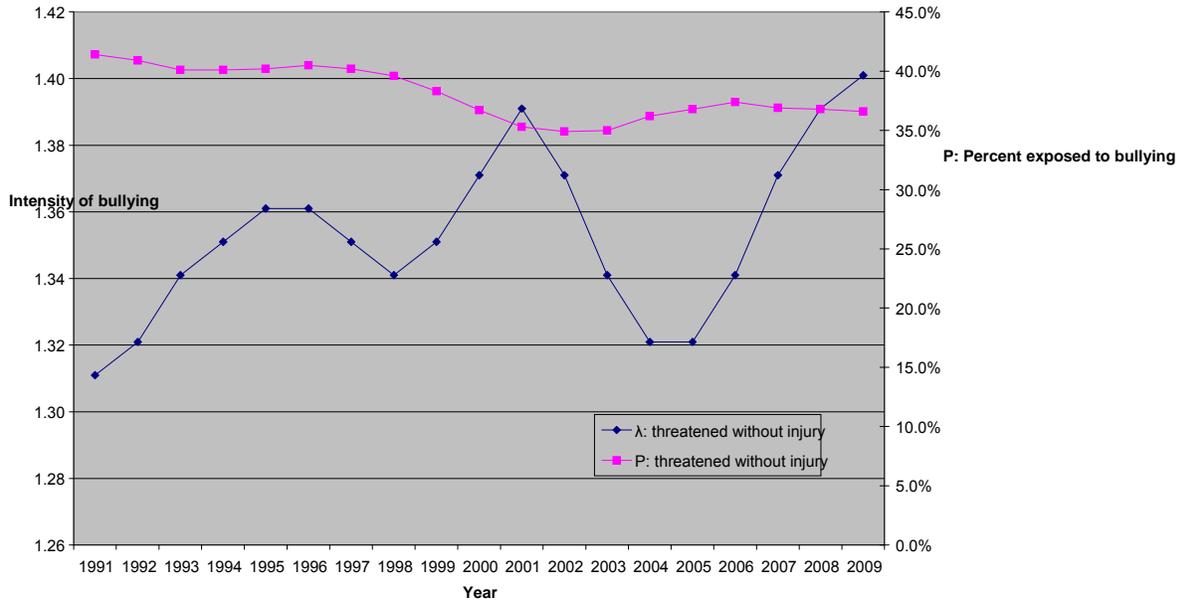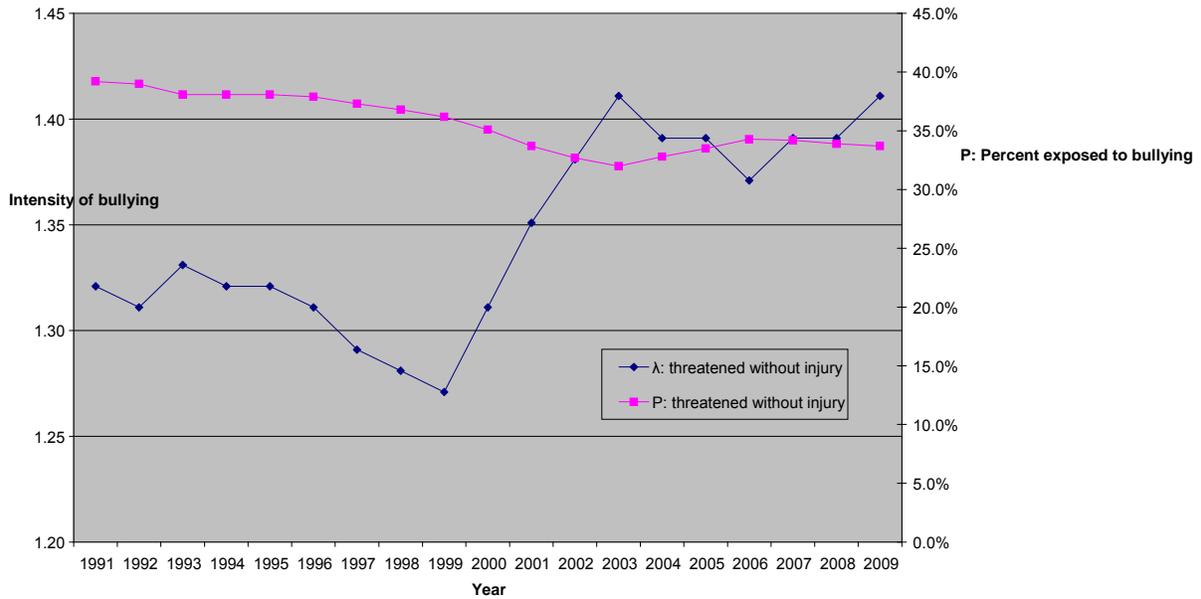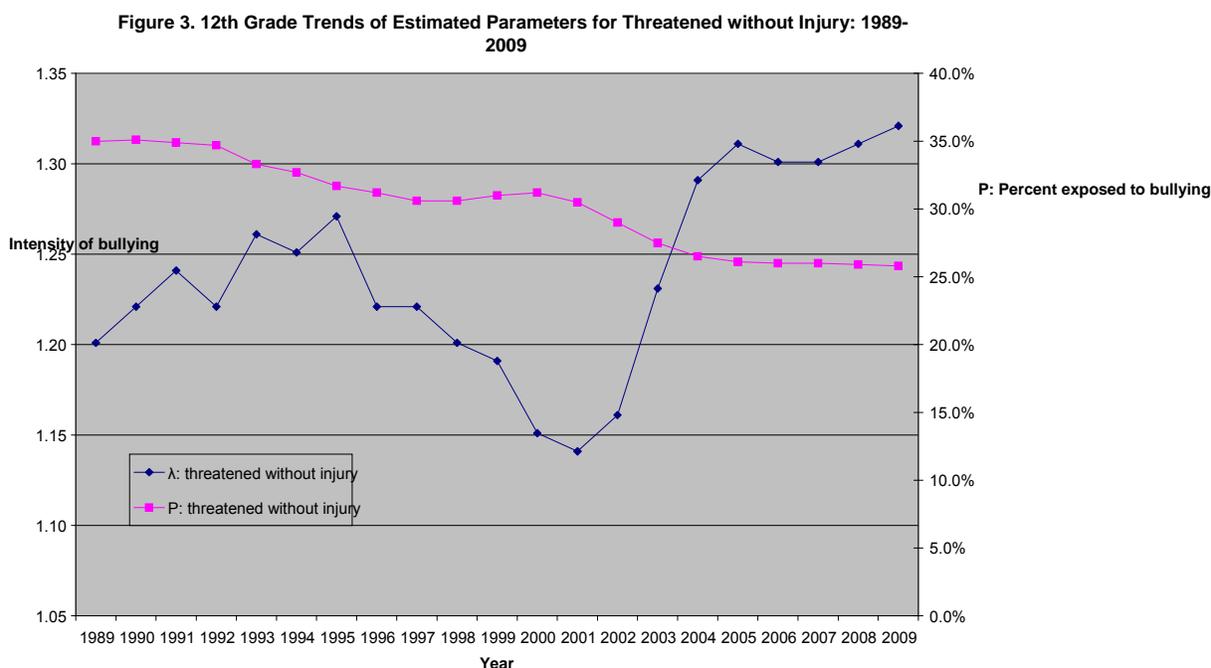**Figure 1. 8th Grade Trends in Parameter Estimates for Threatened without Injury: 1991-2009**
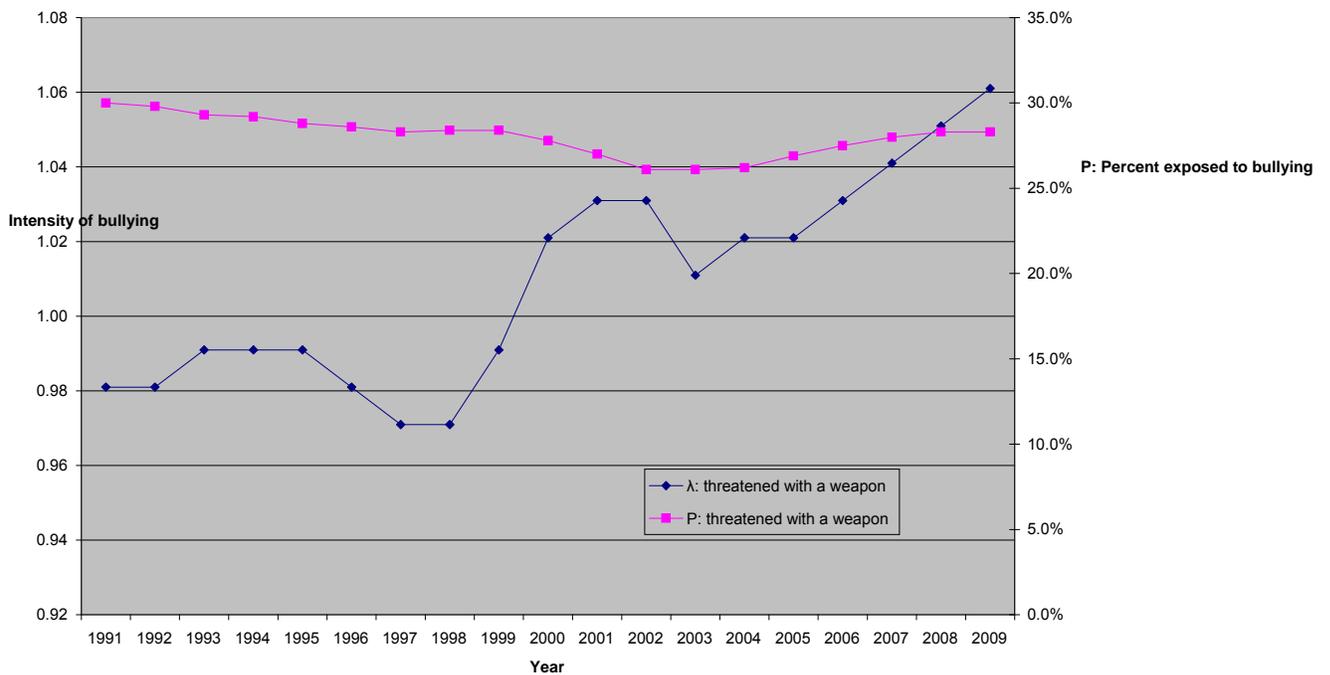

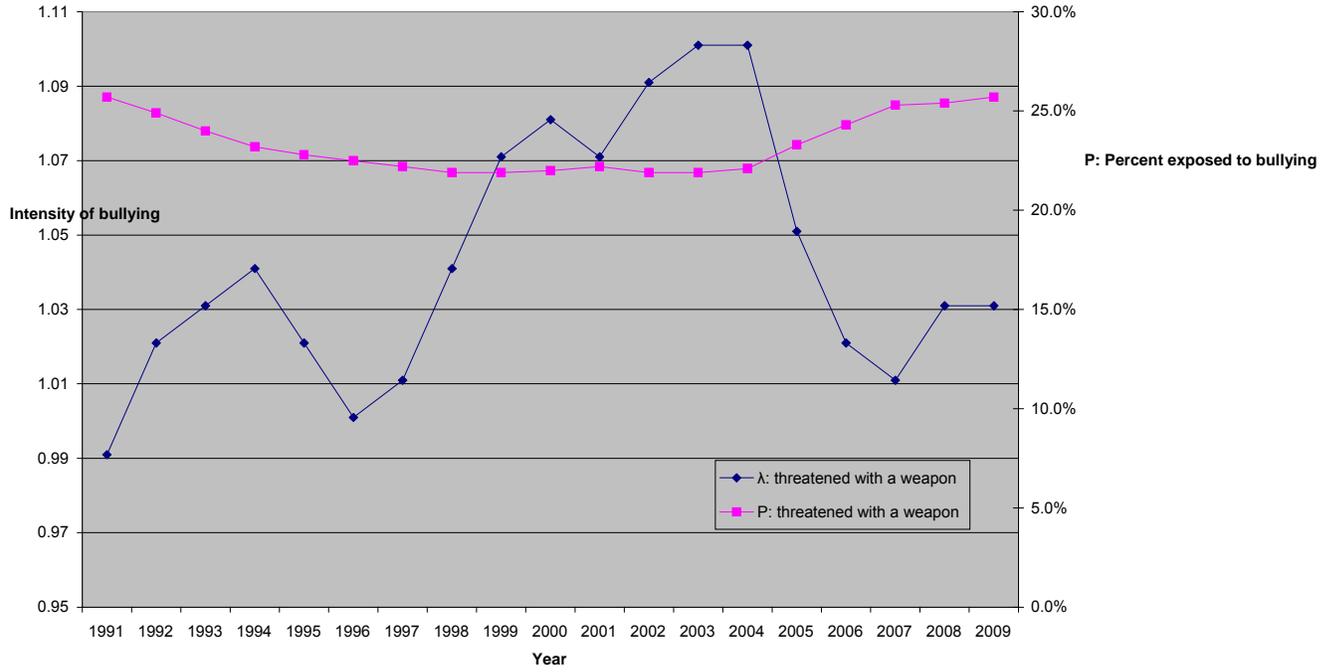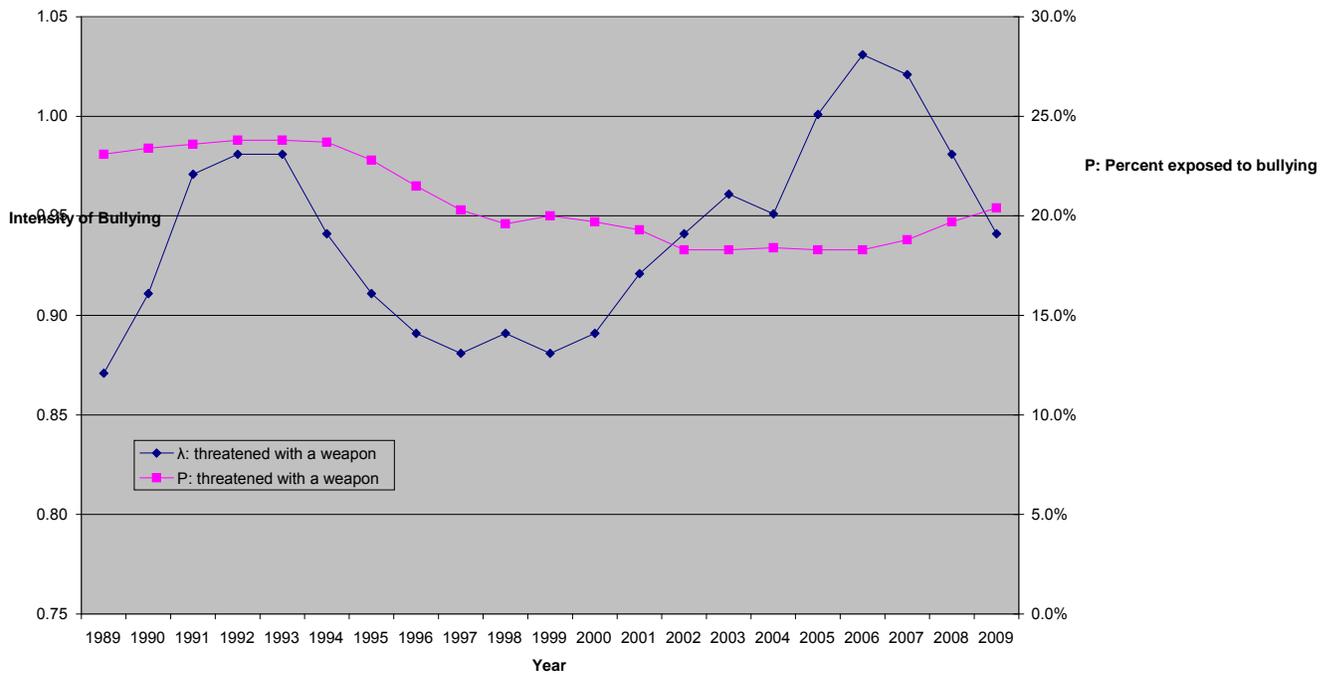**Figure 2. 10th Grade Trends in Estimated Parameters for Threatened without Injury: 1991-2009**

Figure 3. 12th Grade Trends of Estimated Parameters for Threatened without Injury: 1989-2009

2) Trends in Being Threatened with a Weapon:

8th Graders: As shown in Figure 4, *8th graders experienced higher levels of exposure (P) to being threatened with a weapon from 2003 (26.1%) to 2009 (28.3%).* For those at risk of being threatened, the intensity of occurrences (λ) of being threatened with a weapon also increased during this period. As with being threatened without injury, *the trend for 8th graders exposed to being threatened with a weapon (P) was highest during the 1990s, declined in the early 2000s, and then increased after 2002-2003.* However, *among those at risk of being so threatened, the rapid rise in the average number of times threatened (λ) after 2003 is particularly striking – and it takes the annual estimates of this parameter to higher levels than observed for the 1990s.*

10th Graders: Figure 5 presents estimates of the trends in the percent of 10th graders being threatened with a weapon. Again, a period effect is evidence in that the 10th grade pattern of increased exposure (P) is similar to that of 8th graders – it begins in 2003 (21.9%) and continues through 2009 (25.7%) and reaches the levels of the 1990s in the most recent years. In contrast, the estimates of the intensity of bullying parameter (λ) show a decline during the 2003-2009 period. Thus, *for 10th graders, the period from 2003 to 2009 was one of an increased likelihood of being threatened with a weapon, but, for those at risk of being threatened, the average number of threats per year decreased.*

It will be seen throughout these analyses that estimates of these two parameters tend to move in opposite directions. That is, when the likelihood of exposure (P) of a particular threat goes up (goes down), this implies that a larger and broader (smaller and narrower) array of youths are being exposed to the threat, including some who are less likely (more likely) to be exposed to repeated threats, thus reducing (increasing) the average numbers of threats (λ) experienced by those who are threatened.

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12th Graders: Figure 6 shows that the estimates of the percents (P) of 12th grade students being exposed to threats with a weapon generally were lower in the early 2000s than in the late-1980s and early-to-mid-1990s. The high levels of these percents in the earlier years likely were related to the crack cocaine fueled violence of those years. In the 2000-2009 decade, the estimates in Figure 6 do exhibit an upward trend of 12th grade students being exposed (P) to threats with a weapon that commenced in 2006. This is two to three years later than the trend for the 8th and 10th graders and is *indicative of a cohort effect* in that the 12th grade trend increased in 2006 when the 2003-2004 10th graders had moved up to the 12th grade.

When comparing the *years of peak intensity rates (λ) of occurrences of being threatened with a weapon across the three grades, a surge of occurrences occurred in 2001-2002 for the 8th graders, in 2003-2004 for the 10th graders, and in 2006 for the 12th graders*. This pattern *also is indicative of a cohort effect* in the intensity of being threatened with a weapon that took place as the cohort of 8th graders in 2001-2002 were promoted to 10th and 12th grades.

Figure 4. 8th Grade Trends in Parameter Estimates for Threatened with a Weapon: 1991-2009

Figure 5. 10th Grade Trends in Estimated Parameters for Threatened with a Weapon:
1991-2009

Figure 6. 12th Grade Trends of Estimated Parameters for Threatened with a Weapon:
1989-2009

3) Trends in Injury without a Weapon:

8th Graders: Figure 7 shows the trends for 8th graders of the estimated parameters for *being injured without a weapon. The highest rates of exposure (P) to such bullying occurred from 2005 to 2009.* This was during an upward trend that started in 2003. The intensity of being injured without a weapon (λ) increased markedly from 1996 to 2002 and then dropped afterwards from 2002 to 2005 even though the exposure rate was increasing during this period. This is consistent with the often-observed inverse movements of these two parameters noted above. After 2005, by contrast, estimates for both the rate of exposure and the intensity of occurrences increased to the end of the period of study.

10th Graders: *The patterns of estimated probabilities of exposure (P) and rates of occurrences (λ) for being injured without a weapon for 10th graders in Figure 8 are almost identical to those of the 8th graders in Figure 7*, although both sets of rates are higher for the 8th graders. The intensity rate for both began to rise around 1997, as the probabilities of exposure declined in the late-1990s and peaked in 2002, which is the same year the exposure rate began an increase for both grades. The 8th grade exposure rate then rose from 27.5% in 2002 to 40.3% in 2008 and 2009. The 10th grade exposure rate rose from 19.9% to 31.3% during the same time frame.

12th Graders: As shown in Figure 9, *the intensity rate (λ) of occurrences of being injured without a weapon for 12th graders follows a similar pattern of an upward surge from 1997 to 2002*.

By comparison, *the pattern of increased exposure (P) of 12th graders to such bullying did not begin until 2004, two years after the 8th and 10th grade surges – again indicative of cohort effects.* The increased percent of 12th graders exposed to being injured without a weapon only rose slightly from 17.1% in 2004 to 18.8% in 2009. And, as noted above for the two previous categories of bullying behavior, the long-term trend in the estimates of P in Figure 9 is down for the 2000-2009 decade as compared to the 1990s.

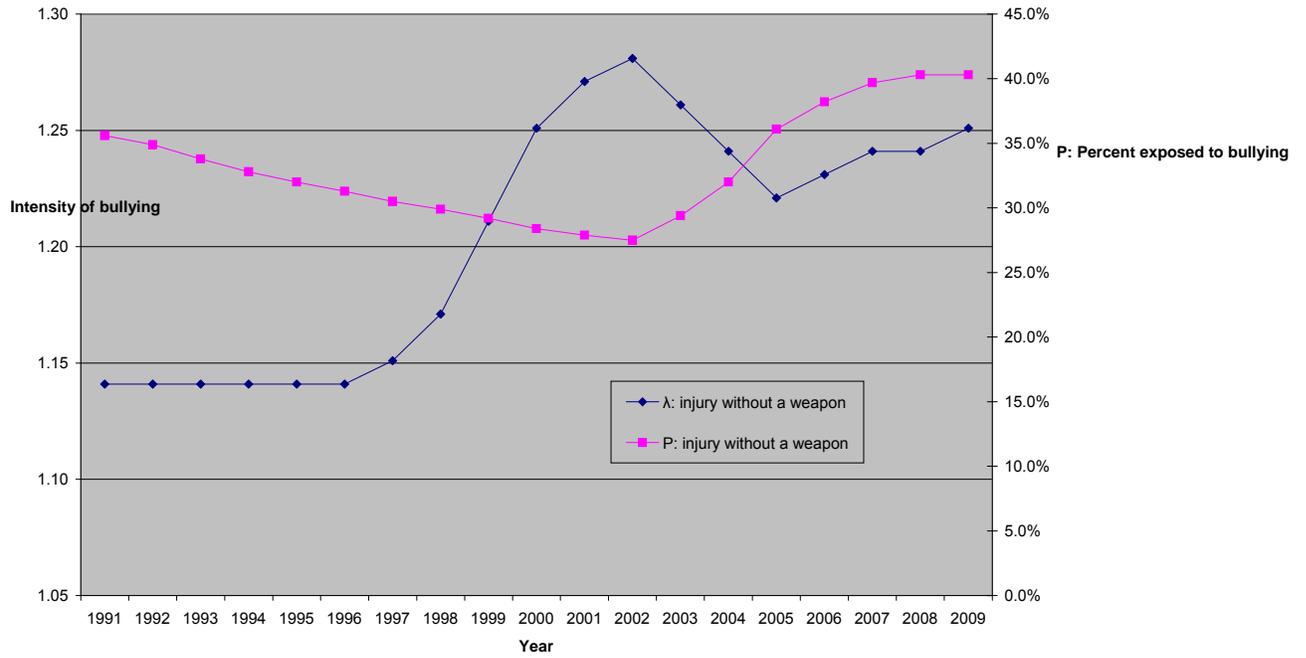**Figure 7. 8th Grade Trends in Parameter Estimates for Injury without a Weapon: 1991-2009**

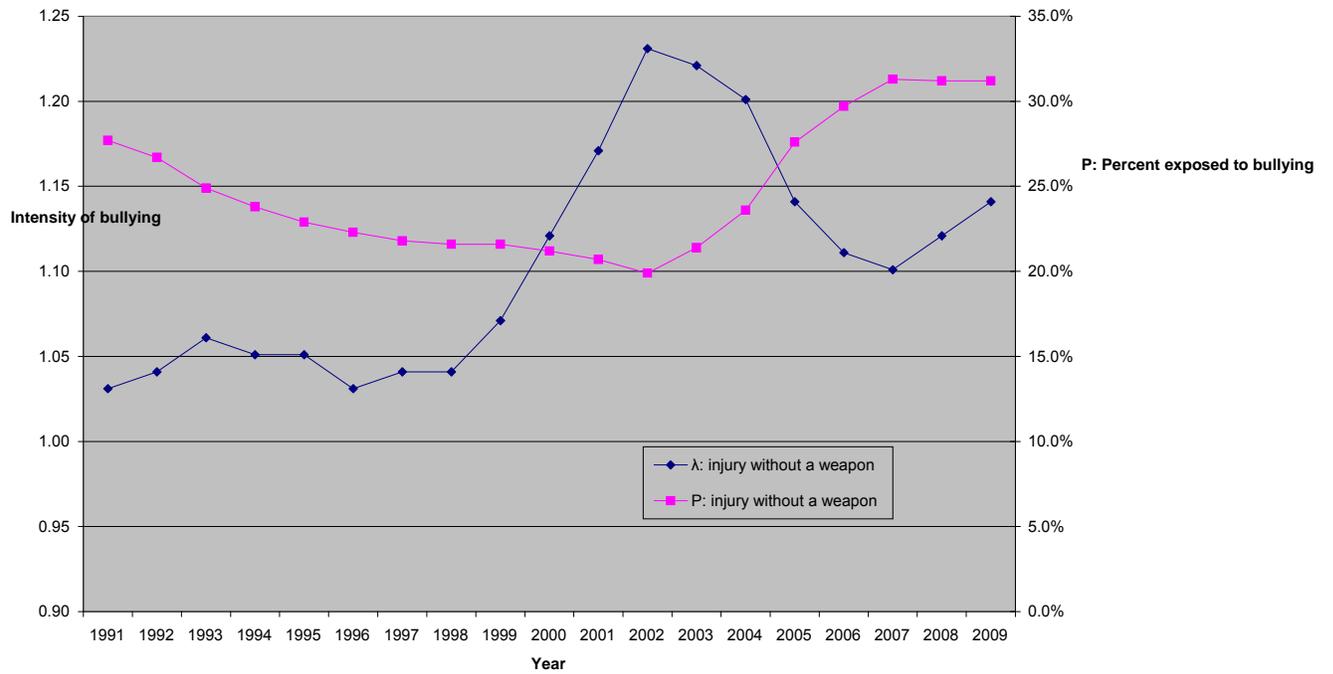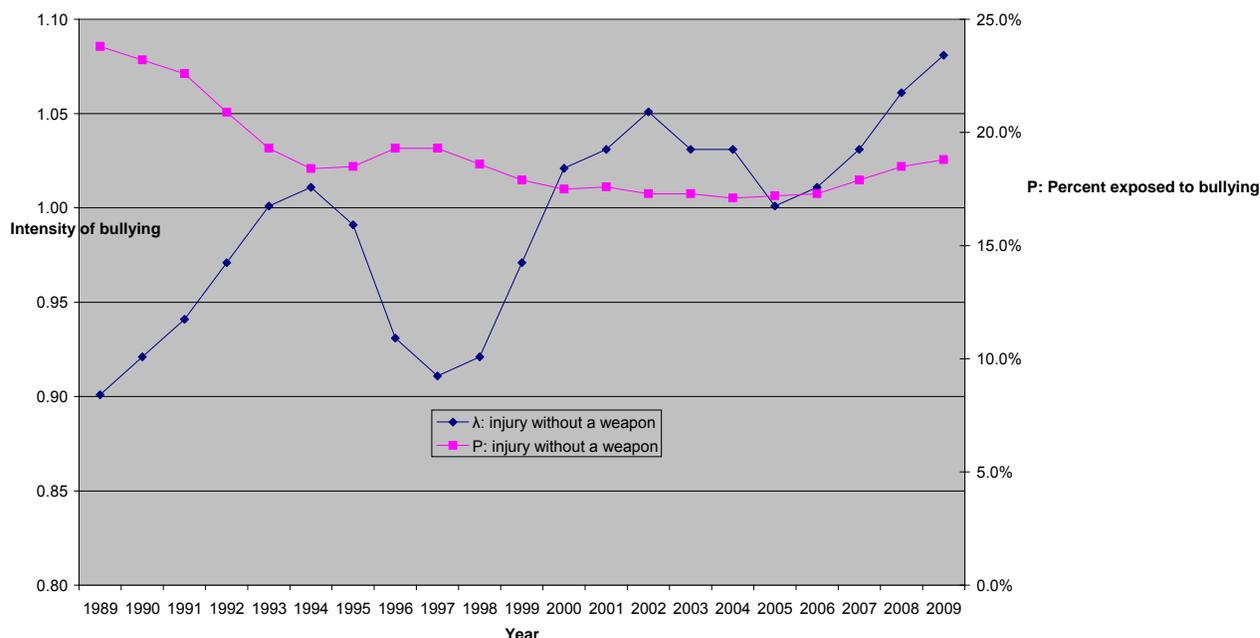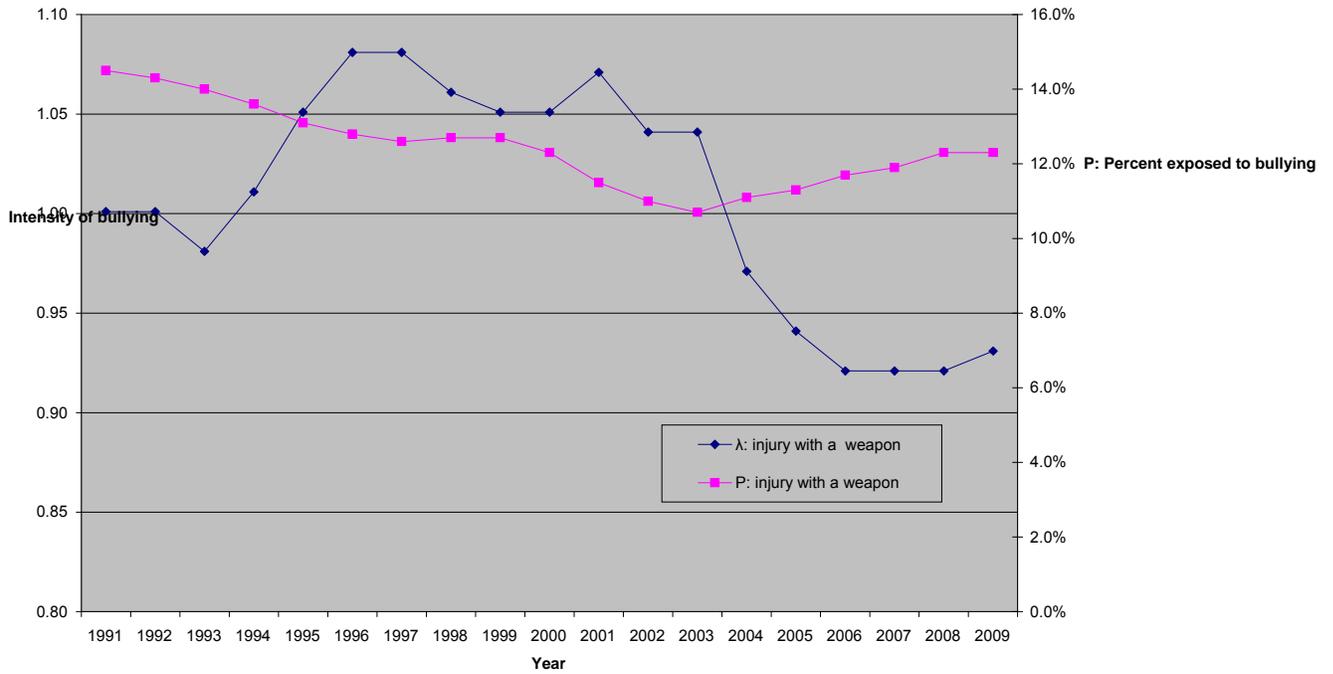**Figure 8. 10th Grade Trends in Estimated Parameters for Injury without a Weapon: 1991-2009**

Figure 9. 12th Grade Trends of Estimated Parameters for Injury without a Weapon: 1989-2009

4) Trends in Injury with a Weapon:

8th Graders: As with the three previous 8th grade bullying behavior trends, there was an *increase in the percent exposed (P) to injury with a weapon since 2003,* as shown in Figure 10. The rate rose from 10.7 percent in 2003 to 12.3 percent in 2008 and 2009. The 8th grade intensity rate (λ) of occurrences of injury with a weapon differs from the previous three bullying behaviors in that it is highest in 1996-1997, and again in 2001, then declines from 2003 to 2006, becomes stable from 2006 to 2008 and increases a bit in 2009.

10th Graders: The trend of exposure (P) to injury with a weapon for 10th graders shown in Figure 11 is somewhat different than the trend for 8th graders. That is, similarly to the long-term patterns noted above, Figure 11 indicates that *the percent of 10th graders exposed to injury with a weapon followed an overall decline from 1991 to 2009.* The intensity (λ) of occurrences of such behavior was highest between 1997 and 2003 followed by a decline until 2007 after which time the rate began to increase.

12th Graders: *Twelfth graders also exhibited a long-term downward trend from 1989 to 2009 in the estimated probabilities (P) of exposure to injury with a weapon* (Figure 12). The mid-1990s and the early-2000s were periods in which the intensity rate (λ) was high for 12th graders; however, a steep increase in intensity rates occurs from 2006 to 2009 as the probabilities of exposure decline.

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For all three grades, the highest trends of percent exposed to being injured with a weapon took place in the 1990s. The exposure rates were highest in 1991 with 14.5 percent for 8th graders, 12.6% for 10th graders, and 10.5% for 12th graders.

Figure 10. 8th Grade Trends in Estimated Parameters for Injury with a Weapon: 1991-2009

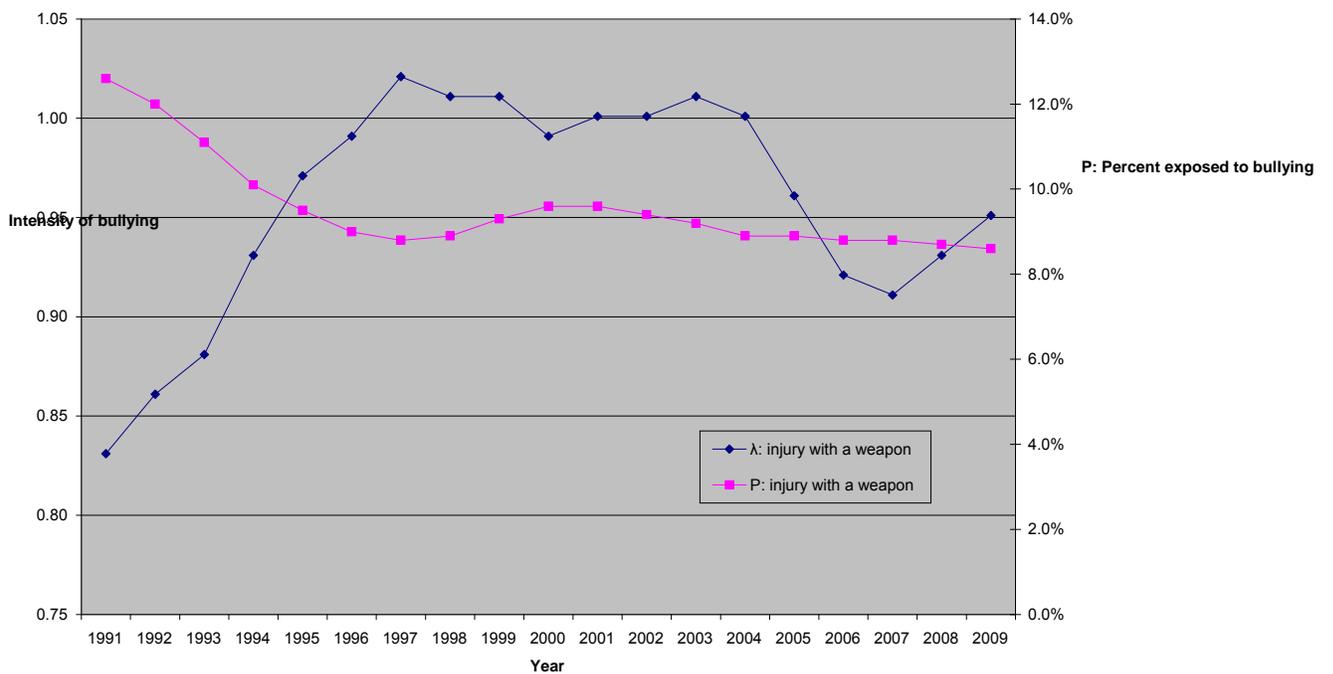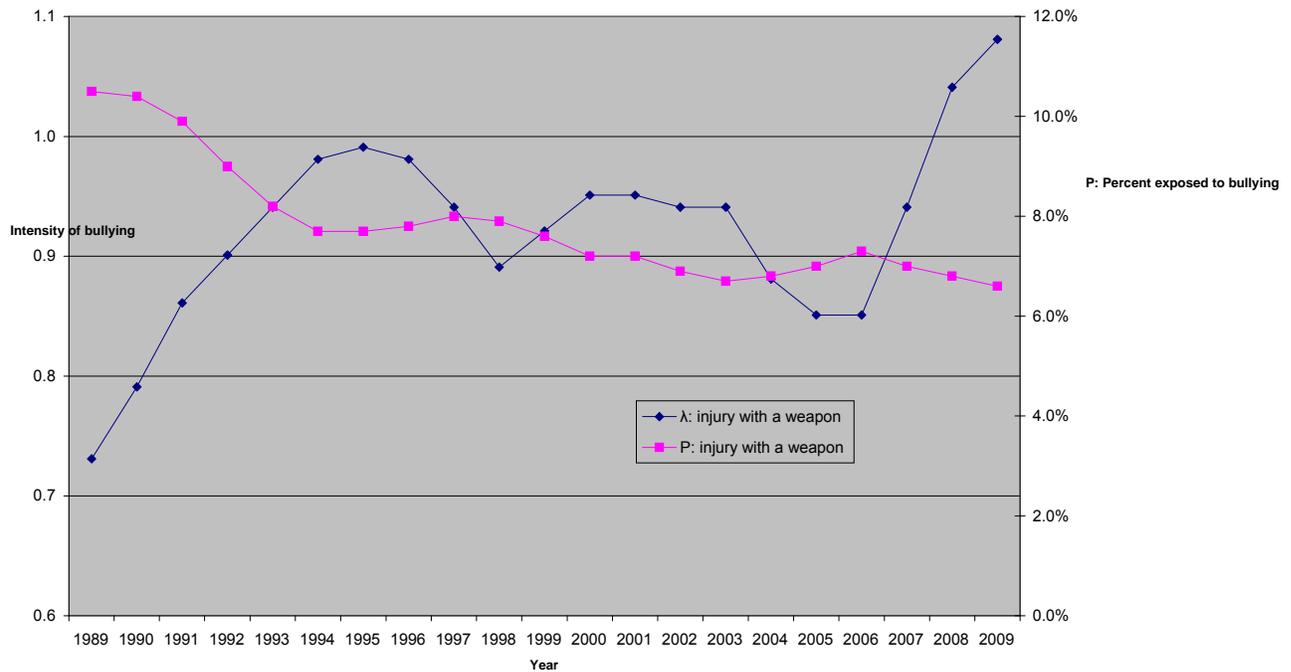**Figure 11. 10th Grade Trends in Estimated Parameters for Injury with a Weapon: 1991-2009**

Figure 12. 12th Grade Trends of Parameter Estimates for Injury with a Weapon: 1989-2009

5) Summary – Overall Trends

Overall, the trends over the past two decades in the estimated exposure (P) and intensity (λ) of the four types of bullying behaviors lead to the following conclusions:

➢ **The 8th graders had the highest percentages exposed to each of the four bullying behaviors, followed by 10th graders, with the 12th grade having the lowest rates of exposure.**

➢ **The percent of 8th graders exposed to the four specific types of bullying behavior all began an upward trend starting around 2002-2003.**

➢ **In 2002-2003, a period effect occurred for 8th and 10th graders towards increases in percents exposed to three of the four bullying behaviors: threatened without injury, threatened with a weapon, and injury without a weapon.**

➢ **For all three grades, there were higher rates of being exposed to bullying behavior during the 1990s, with the exception of being injured without a weapon. The highest exposure rates for the latter type of bullying occurred in the 2000-2009 decade.**

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> ➤ **There was a cohort effect from 10th to 12th grade for increases in the percent exposed (P) to being threatened with a weapon – as they aged into the 12th grade, the 10th graders brought with them their higher prevalence of this form of bullying.**

> ➤ **A longer cohort effect was shown from 8th to 10th to 12th grade in the increased intensity (λ) of occurrences of being threatened with a weapon.**

> ➤ **There was less similarity among the three grades in the patterns of exposure to injury with a weapon than in these patterns for the other three types of bullying behaviors.**

Persistent Risk Factors in School Bullying Victimization

We next report findings on differences in the risk of bullying victimization experiences of students as a function of a number of risk factors – sociodemographic, contextual, and behavioral characteristics of the students and their environment as they relate to bullying victimization for the three grade levels. These characteristics include: *gender* (male *vs.* female), *residency* (on a farm or in the country *vs.* in a city), *parental structure* (single-parent and no-parent families *vs.* two-parent families), *father's educational attainment* (secondary education and below *vs.* tertiary education), *race* (African American *vs.* non-African American), and *Grade Point Average—GPA* (B+ and below *vs.* A- and above). Major findings will be highlighted and the accompanying figures can be found in Appendix B.

Period effects:

By Gender: Figures B-1 and B-2 show *almost identical temporal trends in percent exposed (P) and intensity of occurrences (λ) of injury without a weapon for 8th and 10th grade males and females*. The percents exposed to bullying victimization for males are higher than those of females and the 8th grade rates are higher than those of the 10th grade. The recent upturns in risks began in 2002-2003.

By Region: *Eighth and 10th grade students living in rural areas had very similar levels and trends in risk (P) of being threatened with a weapon to those living in cities, although the swings up and down are stronger for students in rural areas* (Figures B-3 and B-4) A first upswing began in 1995 for 10th graders and in 1997 for 8th graders and lasted until 2000. A second period of increase began in 2004 for both grades and lasted through 2009.

By Parental Structure: Students who come from single- and no-parent families have higher risks of bullying victimization compared to students from intact families. As presented in Figures B-5 and B-6, *both types of parental structure show similar trends in exposure to injury without a weapon for 8th and 10th graders, respectively*. The rates of exposure declined from 1991 to the early 2000s and then begin to increase around 2002-2003.

        In addition, the rate of exposure to bullying exhibited a *long-term reduction in the exposure of 10th and 12th grade students from intact parental homes to injury with a weapon* from the beginning to the end of the periods under study (see Figures B-7 and B-8).

By Father's Education: *Both 8th and 10th grade students having fathers with less than a tertiary education had similar trends of intensity of occurrences (λ) of injury without a weapon.* Figures B-9 and B-10 indicate this trend peaked for both grades around 2003, with an average of 1.34 incidents for 8th graders exposed to such bullying and 1.22 occurrences for 10th graders thusly exposed. *The two figures also show that there was virtually no difference by father's education in exposure to risks of injury without a weapon.*

By Race: Figures B-11 and B-12 show *non-African American and African American 8th and 10th grade students, respectively, each have similar patterns of risk of being threatened without injury that gradually decline from 1991 to 2003, and then begin to gradually increase.* In addition, the non-African American risk rates for both 8th and 10th graders are higher than those for African Americans although the gap between the two is smaller by the 10th grade. *The intensity of occurrences of being threatened without injury for African American students follows a similar pattern for 8th and 10th grade students* with the peak lasting longer for the 10th graders.

        African American students have higher rates of exposure to injury with a weapon. *The 8th and 10th grade African American students had increased exposure (P) to injury with a weapon from 1998-2001, and again 2003-2005/6 for 8th grade and 2004-2007 for 10th grade* (Figures B-13 and B-14, respectively). Around the time these students experienced an upward trend in exposure to injury with a weapon, *the 8th and 10th grade African American students also were experiencing peaks in the intensity (λ) in 1998 and 2003 of such bullying behavior.*

By Average Grade: *There were period trends of exposure and intensity of injury without a weapon for 8th and 10th graders who had grades of B+ and lower.* The percent exposed (P) to this type of bullying declined from 1991 to 2002-2003 and then began a period of increase to 2007-2008, as indicted in Figures B-15 and B-16. The intensity rates (λ) for students with lower grades rose from 1991 to 2002-2003, declined to 2006-2007, and then began an increase until 2009. The patterns of exposure and intensity for students with higher grades also followed similar trends, although not as consistently as those for students with lower grades.

Cohort Effects:

By Gender: Figures B-17, B-18, and B-19 show trends by gender for being threatened without injury for 8th, 10th, and 12th grades, respectively. *The increase in the percent (P) of females exposed to being threatened without a weapon shows a cohort effect in the early-21st century in that the trend starts in 8th grade in 2002, 10th grade in 2004, and 12th grade in 2006.* The trend of increase for males does not follow this pattern. The increase in the proportion of males being threatened without injury in both the 8th and 10th grades began around 2003 (see Figures B-17 and B-18), whereas there is a long-term decline in this bullying behavior for 12th grade males (Figure B-19).

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By Parental Structure: There is *a cohort trend in an increase in the percent (P) of being threatened with a weapon for students from intact families starting in 2002 for 8th grade* (Figure B-20), *2004 for 10th grade* (Figure B-21), *and 2007 for 12th grade* (Figure B-22). In addition, there is a *trend for the increase (P) by cohort in being threatened with a weapon for 10th to 12th grade students from single- and no-parent families from 2004* (Figure B-21) *to 2006* (Figure B-22), respectively. The increase in being threatened with a weapon for both 10th and 12th graders from single- and no-parent families continues through 2009.

By Father's Education: Father's education is associated with cohort patterns of bullying in the 2000s. In particular, *8th and 10th grade students whose fathers have at least a tertiary education experienced an uptick in the percent (P) being threatened with a weapon in 2002 and 2004, respectively*, as shown in Figures B-23 and B-24. This cohort pattern does not extend to the 12th graders.

By Race: Figures B-25 and B-26 show 10th and 12th grade trends, respectively, in threatened with a weapon by race. The exposure (P) rates indicate a gradual long-term decline for African American students in both grades into the early to mid-2000s. After that time there was a *cohort effect in that African American 10th grade students experienced an increase in the percent in being threatened with a weapon in 2003 and the 12th grade African American students reported an increase beginning in 2005*. Both trends surged upwards for the next four years, from 23.7 to 28.9 percent exposed for 10th grade (2003-2007), and from 19.6 to 26.2 percent exposed for 12th grade (2005-2009).

Discussion and Implications

Using annual MTF data on 8th, 10th and 12th graders, this study has focused on historical trends across the past two decades in four specific forms of physically threatening, violent, injurious school bullying victimization and the prevalence of these victimizations across demographic, social and economic groups. To be sure, there are other forms of bullying behaviors and students with personal characteristics that often are targets of bullying for which these data do not provide information. The MTF data also do not explicitly address the extent to which the bullying behaviors studied were cyber-mediated. And the methods of analysis applied here are tuned to the detection of general trends, but do not address the interplay of individual-level attributes of the students with period and cohort contexts.[6] These are the limitations of this study.

Nonetheless, all of the foregoing analyses point to an upturn in physically threatening, violent, injurious forms of school bullying victimization for middle and high school students that began in 2002-2003 and extended through the 2000-2009 decade. There also is substantial evidence that these forms of bullying behavior emerged for 8th and 10th graders in 2002-2003 and did not extend to 12th graders until the 8th and 10th graders were themselves in the 12th grade. In

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[6] A full-scale age-period-cohort analysis of the repeated cross-section MTF surveys could be conducted by application of statistical models developed by Yang Yang and Kenneth C. Land 2006 "A Mixed Models Approach to the Age-Period-Cohort Analysis of Repeated Cross-Section Surveys, With an Application to Data on Trends in Verbal Test Scores." *Sociological Methodology*, 36:75-98. Given the size of the MTF surveys and the many annual surveys, such an analysis would be a massive undertaking.

a two-decade long historical perspective, this recent upturn in school bullying echoes an upturn that occurred in the late-1980s and early-1990s. That is, there indeed was an upturn in school bullying in the mid-to-late-2000s, but this is not unique in recent U.S. history, and the peaks of exposures to bullying behaviors in the most recent upturn generally were lower than those that occurred in the previous peak years.

Implications for parents, school teachers and administrators, community leaders, and policy makers are clear: Vigilance against bullying behavior must be ever present, as new cohorts of children age into the adolescent and teenage years every decade or so. Winning the war against bullying in the sense of reducing it to low levels in one decade, accordingly, is not predictive of a continued period of low levels in a subsequent decade. Children must continually be socialized into acceptable forms of interpersonal behaviors. And policies that have strong impacts on reducing bullying behaviors in the middle and early high school years should be particularly sought.

Acknowledgements and Contact Information

On the Web: More information about the CWI, its construction, and the scientific papers and publications on which it is based can be found on the World Wide Web:

http://www.soc.duke.edu/~cwi/

APPENDIX A

Statistical Methodology for Estimating

Trends in Parameters of Truncated Frequency Distributions

of Bullying Victimization

The research for this Special Report is based on the Monitoring the Future (MTF) project, a nationally representative study designed to explore trends and changes in values, behaviors and orientations of American adolescents. The survey of 12th graders was initiated in 1975 and surveys of 8th and 10th graders have been conducted since 1991. Every year, thousands of 8th, 10th, and 12th graders participate in this survey and respond to questions on a series of subjects, such as drug use, religious orientation, school performance, violence, and socio-economic status of their parents.

Measures of Bullying Behaviors

Questions regarding school bullying appear in the questionnaire as follows:

"The next questions are about some things which may have happened TO YOU while you were at school (inside or outside or in a school-bus). During the LAST 12 MONTHS, how often …"
1. Has an unarmed person threatened you with injury, but not actually injured you?
2. Has someone threatened you with a weapon, but not actually injured you?
3. Has someone injured you on purpose without using a weapon?
4. Has someone injured you with a weapon (like a knife, gun, or club)?

These four questions are hereinafter referred *as threatened without injury*, *threatened with a weapon*, *injury without a weapon* and *injury with a weapon*, respectively. Response categories for all four questions are the same: 1) not at all; 2) once; 3) twice; 4) 3-4 times; and 5) 5+ times. For each of the four questions for each year from 1991 to 2009 for 8th and 10th graders and from 1989 to 2009 for 12th graders, the frequency distributions of the total samples were obtained from MTF codebooks. Frequency distributions of certain demographic, economic, and social groups were retrieved and computed from individual MTF datasets for the years under study. Due to relative small sample sizes of some single socio-economic groups in the individual years, data smoothing via application of three-point moving averages was applied to the observed frequency distributions in each of three adjacent years centered on each focal year in order to facilitate the detection of temporal trends.

Covariates include six dummy variables denoting demographic background, family structure, and average grades of the 8th, 10th and 12th graders: sex (male *vs.* female), residency (on a farm or in the country *vs.* in a city), parental structure (single-parent and no-parent families *vs.* two-parent families), father's educational attainment (secondary education and below *vs.* tertiary education), race (African American *vs.* non-African American), and GPA (B+ and below *vs.* A- and above).

Classic statistical models for analyzing frequency distributions of rare events (such as school bullying) are built on the Poisson distribution (see, e.g., Fox 2008: 383; Long and Freese 2006: 394-396). The Poisson distribution has the restrictive property that its expected value (mean) and variance are equal. Empirical frequency distributions of rare events often do not satisfy this constraint, and, indeed, these distributions often have variances that exceed their means, i.e., they are overdispersed. The source of overdispersion in empirical frequency distributions often is an excess of observations with zero events, i.e., an excess of zeroes. Exploratory data analyses showed that this is the case for the MTF bullying count data. Accordingly, we applied *zero-inflated Poisson (ZIP) models* (Lambert 1992) to the MTF time series of frequency distributions of the four types of bullying behavior. The ZIP model has two components: (1) A binary logistic probability model for membership in the *latent class* of individuals for whom the response or outcome variable is necessarily 0, and (2) a Poisson probability model for the *latent class* of individuals for whom the response variable may be 0 or a positive count.

Applied to the MTF data on the numbers of incidents of the four types of bullying that MTF respondents experience in the past year, the ZIP model incorporates the idea that some adolescent and teenager students are not at any risk of school-based bullying – perhaps because they attend schools in highly protected environments (e.g., very small suburban or religious schools) where bullying behaviors do not occur. According to the ZIP model, these individuals are in the first latent class for whom bullying processes are not operative, and they account for the excess density in the empirical frequency distributions on zero bullying events. For other students, the ZIP model specifies that the frequency of the bullying incidents is distributed as a Poisson random variable.

The probability mass function of the ZIP model is given by:

$$\begin{cases} P(x=0 \mid P, \lambda) = (1-P) + P * Poisson(\lambda) = (1-P) + P * \exp(-\lambda) \\ P(x \mid P, \lambda) = P * Poisson(\lambda) = P * \dfrac{\exp(-\lambda) * \lambda^x}{x!} \qquad when \ \ x > 0 \end{cases}$$

where the two parameters of the model are (1) the proportion, P, from the logistic component of the model, of individuals exposed to bullying behaviors, i.e, a member of the latent class of individuals for whom bullying processes are operative, and (2) the mean number, λ, of occurrences (average number of school bullying incidents) in a year, for an individual in the second latent class, i.e., at risk of being bullied. These are the two ZIP model parameters that we estimated for the combined ZIP model processes for each year of MTF data on the 8th, 10th, and 12th graders for each of the four types of bullying behaviors.

The reported numbers of bullying behaviors in the MTF data are combined (3-4 times) and right-censored (5+ times) in response categories, which mean that no existing statistical software package can be readily applied to analyze such data. To overcome the challenge imposed by this data structure, an R program was written to estimate the parameters of the zero-inflated Poisson distributions over observed frequencies by minimizing mean absolute deviations in each year (Gelman and Hill 2007; Zeileis, Kleiber, and Jackman 2008).

References

Fox, John. 2008. *Applied Regression Analysis and Generalized Linear Models*. Los Angeles: Sage.

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Lambert, D. 1992. "Zero-Inflated Poisson Regression, with an Application to Defects in Manufacturing." *Technometrics* 34: 1-14.

Long, J. Scott and Jeremy Freese. 2006. *Regression Models for Categorical Dependent Variables Using Stata*. College Station: Stata Press.

Zeileis, Achim, Christian Kleiber, and Simon Jackman. 2008. "Regression Models for Count Data in R." Journal of Statistical Software 27:1–25.

APPENDIX B

Additional Figures of Period and Cohort Trends in Bullying Victimization

Figure B-1. 8th Grade Trends of Estimated Parameters of Zero-inflated Poisson Distributions of
MTF: 1991-2009
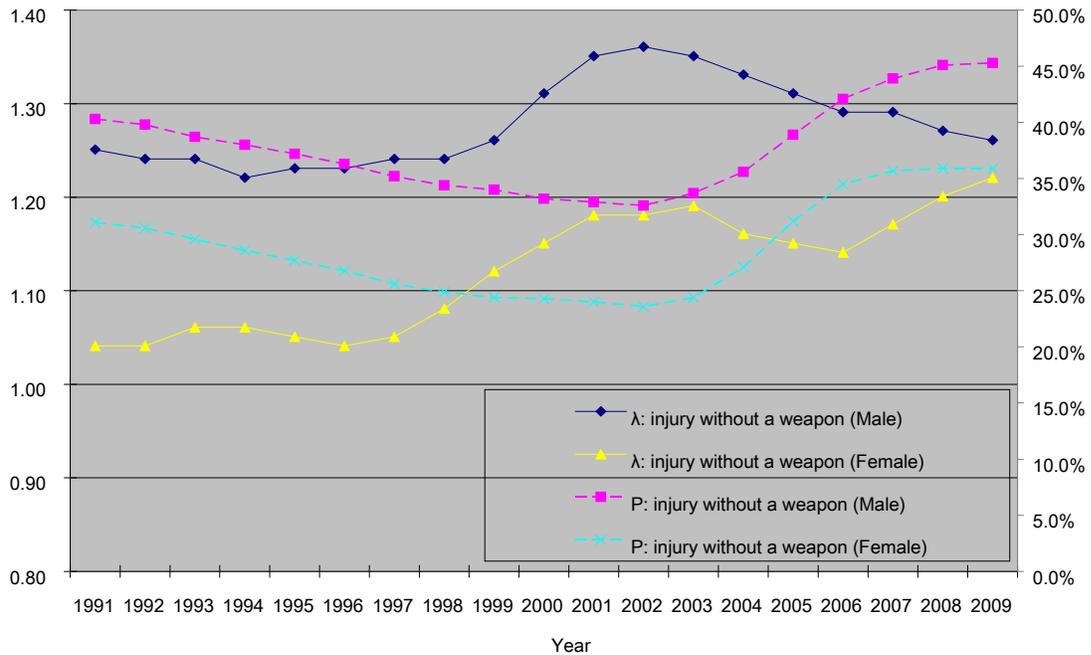
Figure B-2. 10th GradeTrends of Estimated Parameters of Zero-inflated Poisson Distributions of
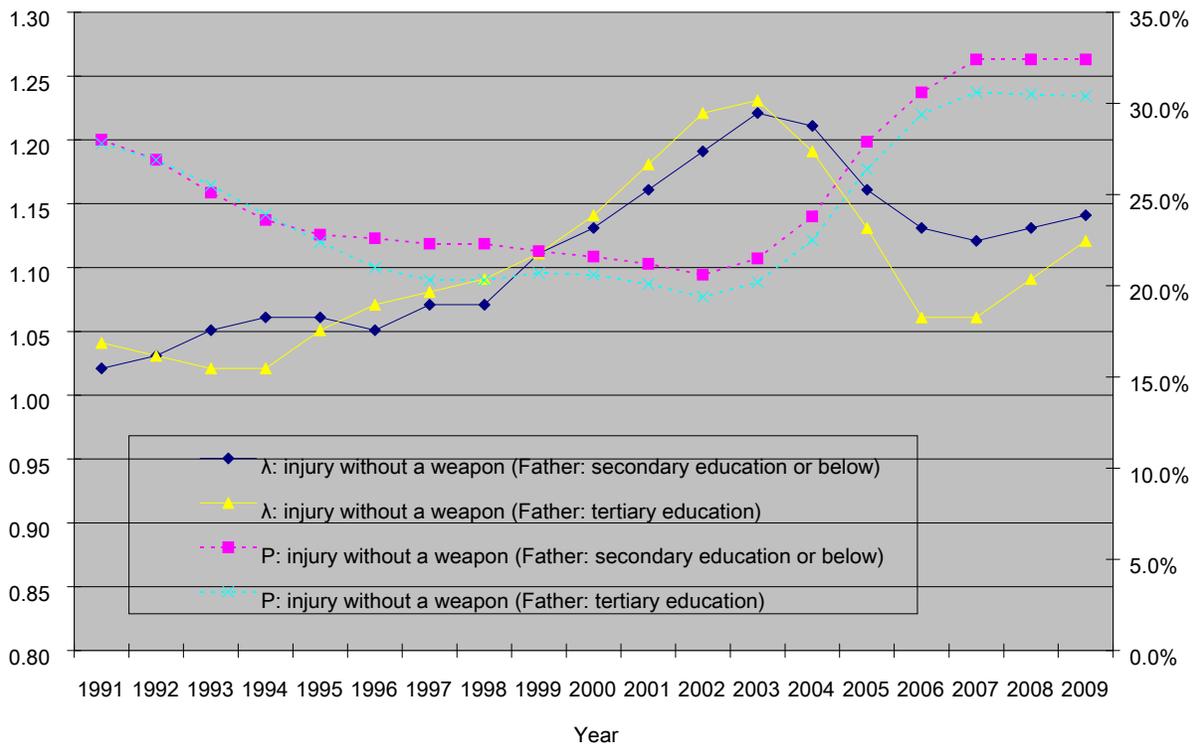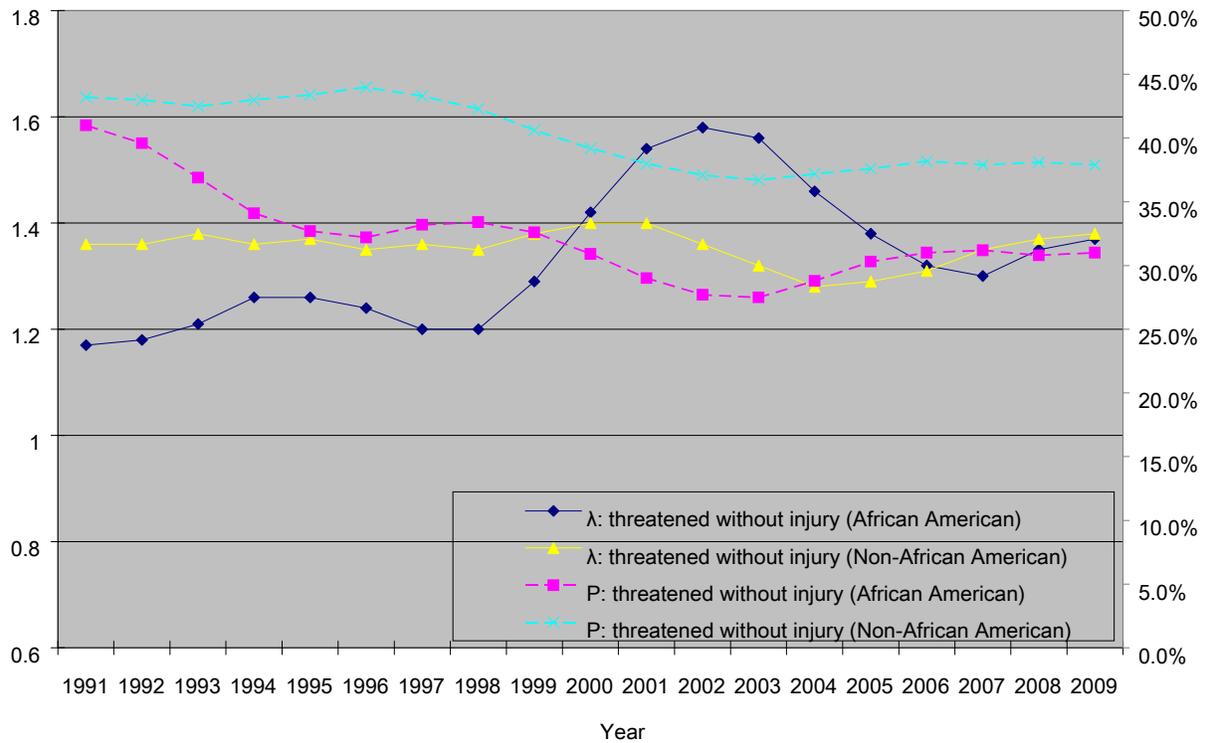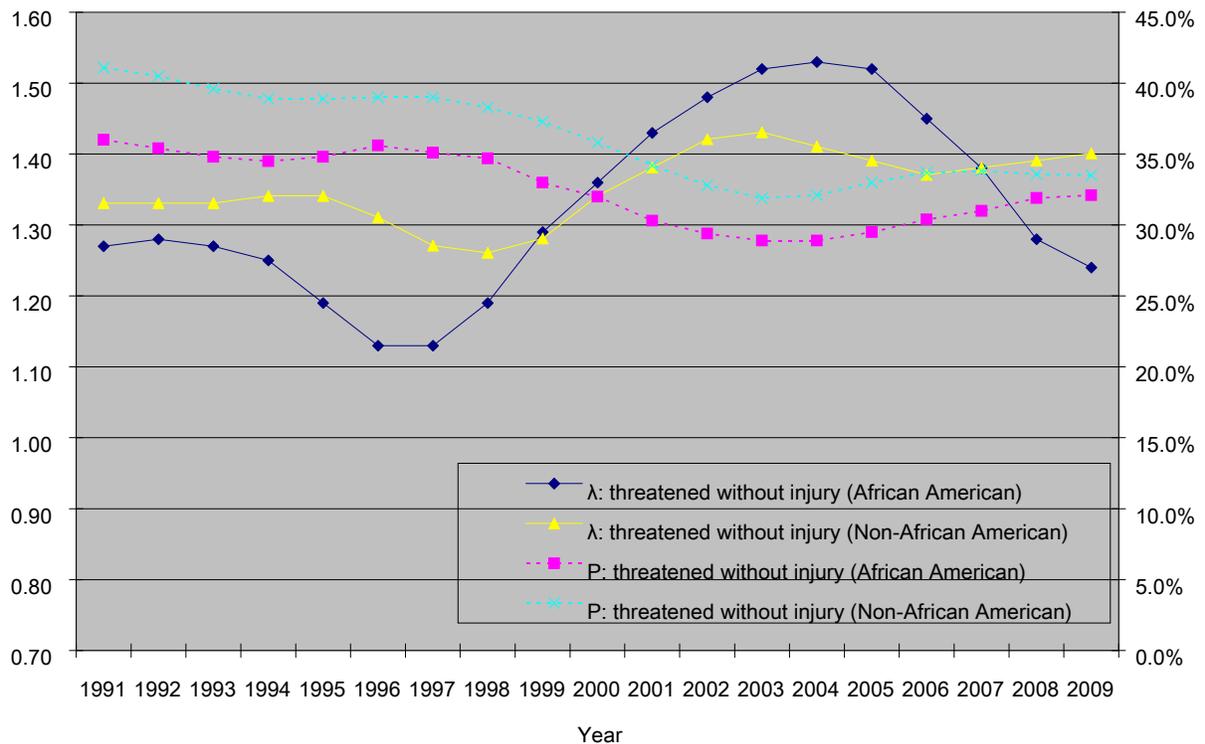MTF: 1991-2009
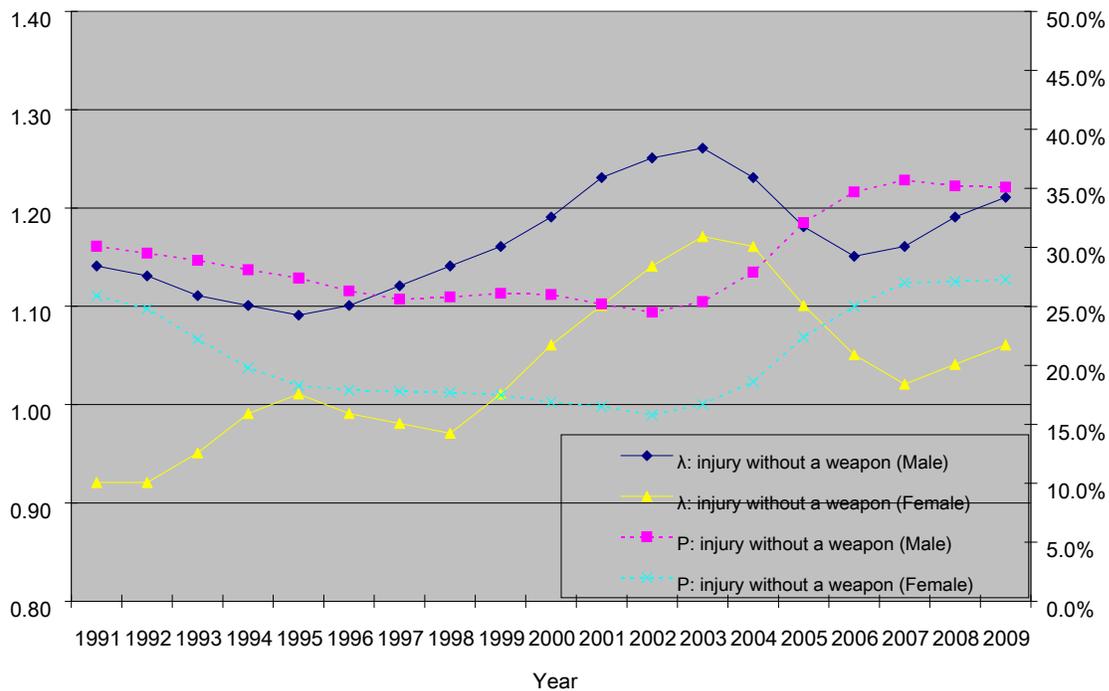
Figure B-3. 8th GradeTrends of Estimated Parameters of Zero-inflated Poisson Distributions of
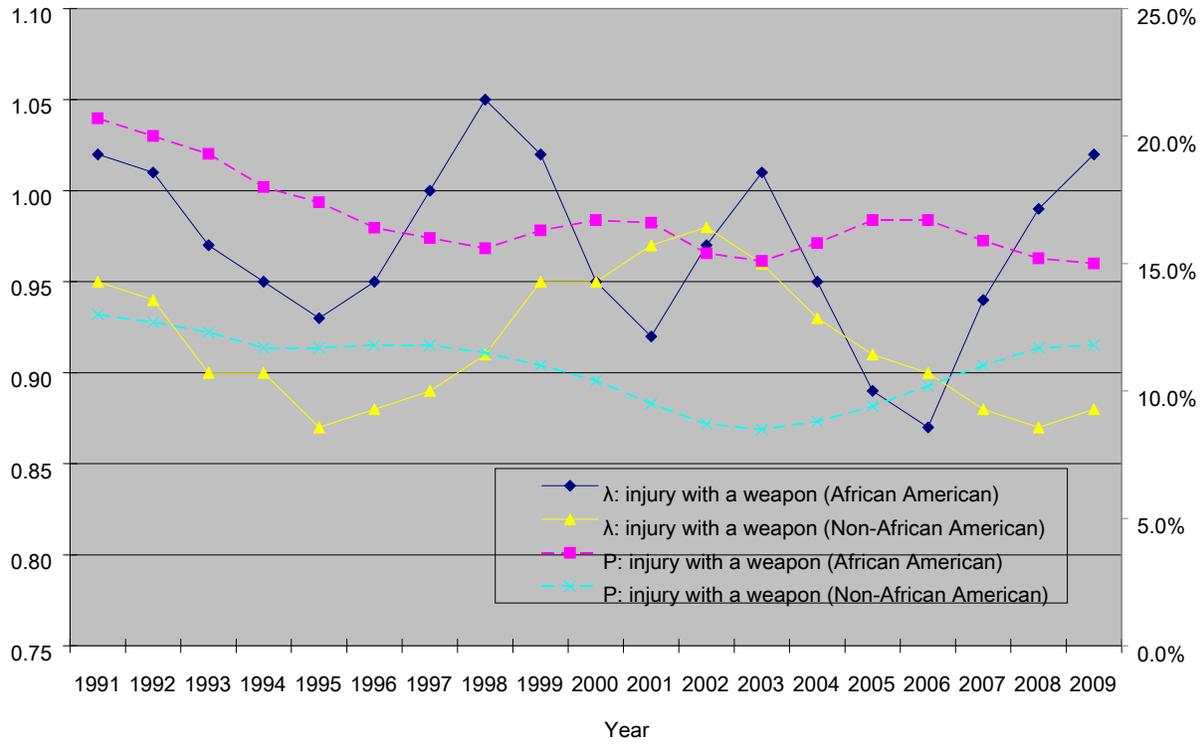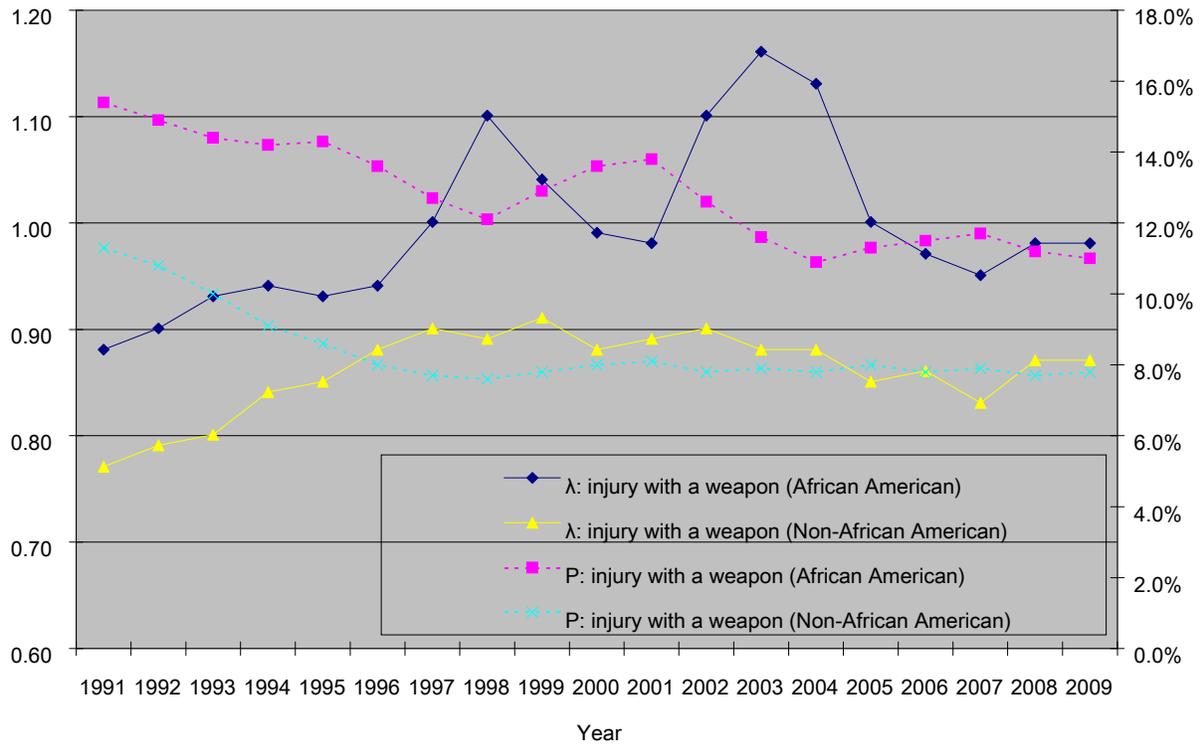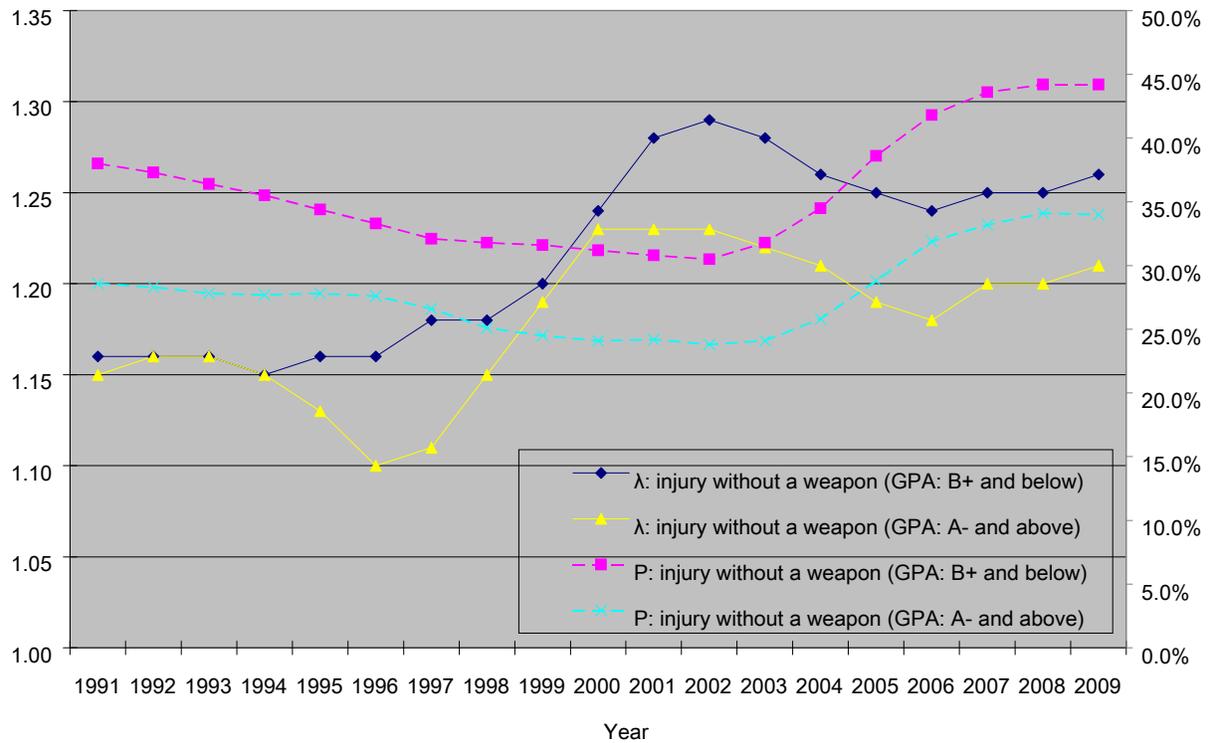MTF:
1991-2009
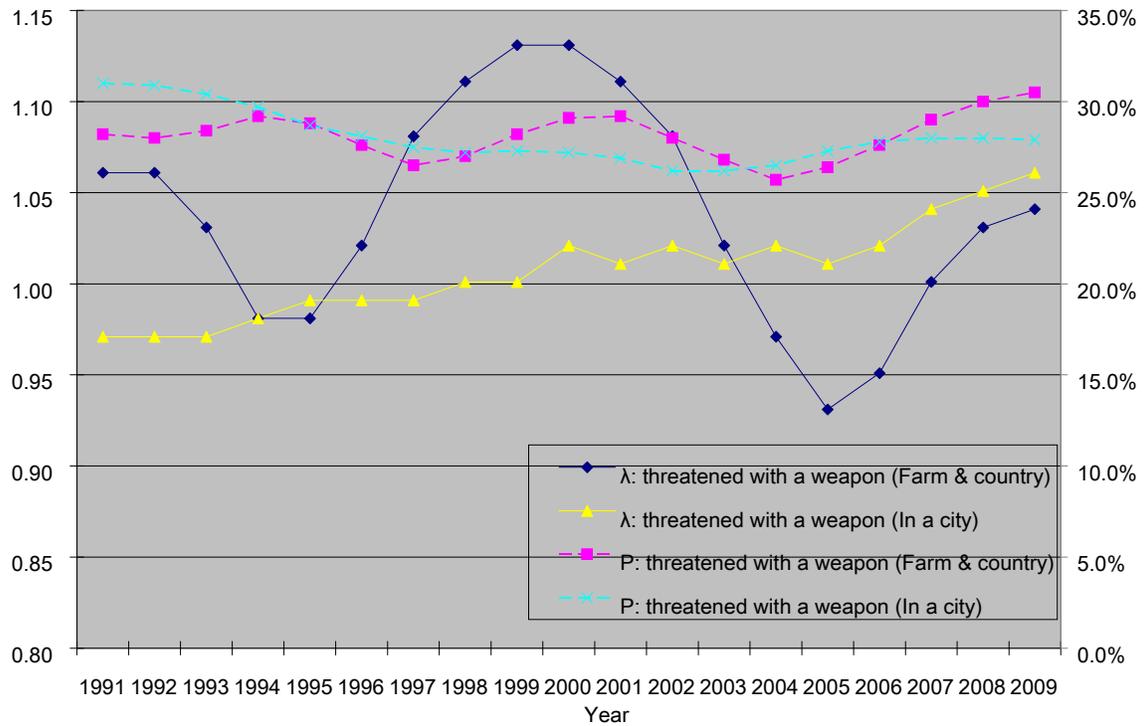
Figure B-4. 10th Grade Trends of Estimated Parameters of Zero-inflated Poisson Distributions of
MTF:
1991-2009

25
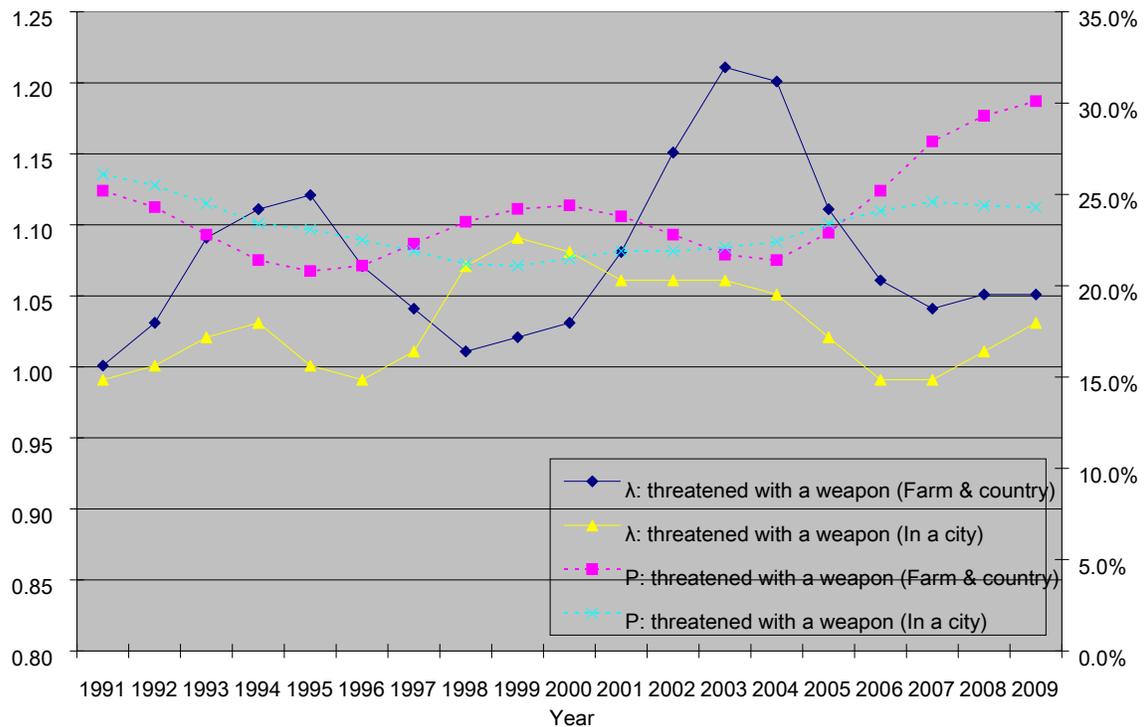
Figure B-5. 8th Grade Trends of Estimated Parameters of Zero-inflated Poisson Distributions of
MTF:
1991-2009
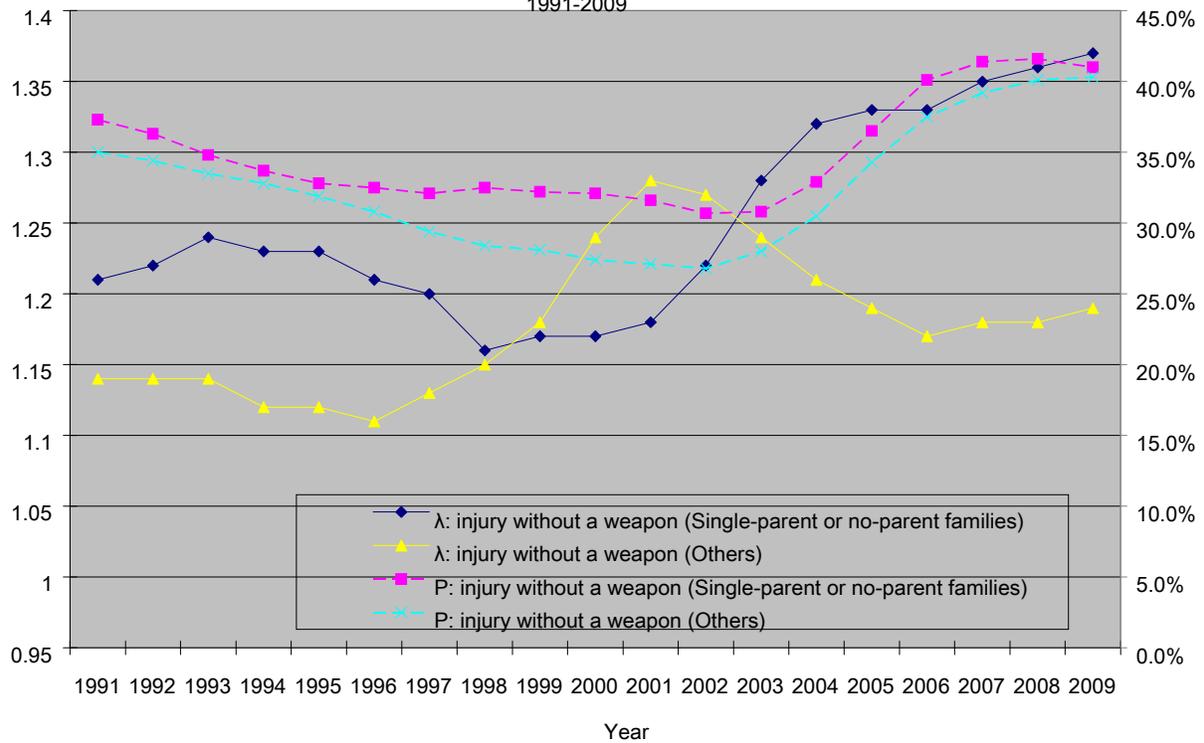
Figure B-6.10th Grade Trends of Estimated Parameters of Zero-inflated Poisson Distributions of
MTF:
1991-2009
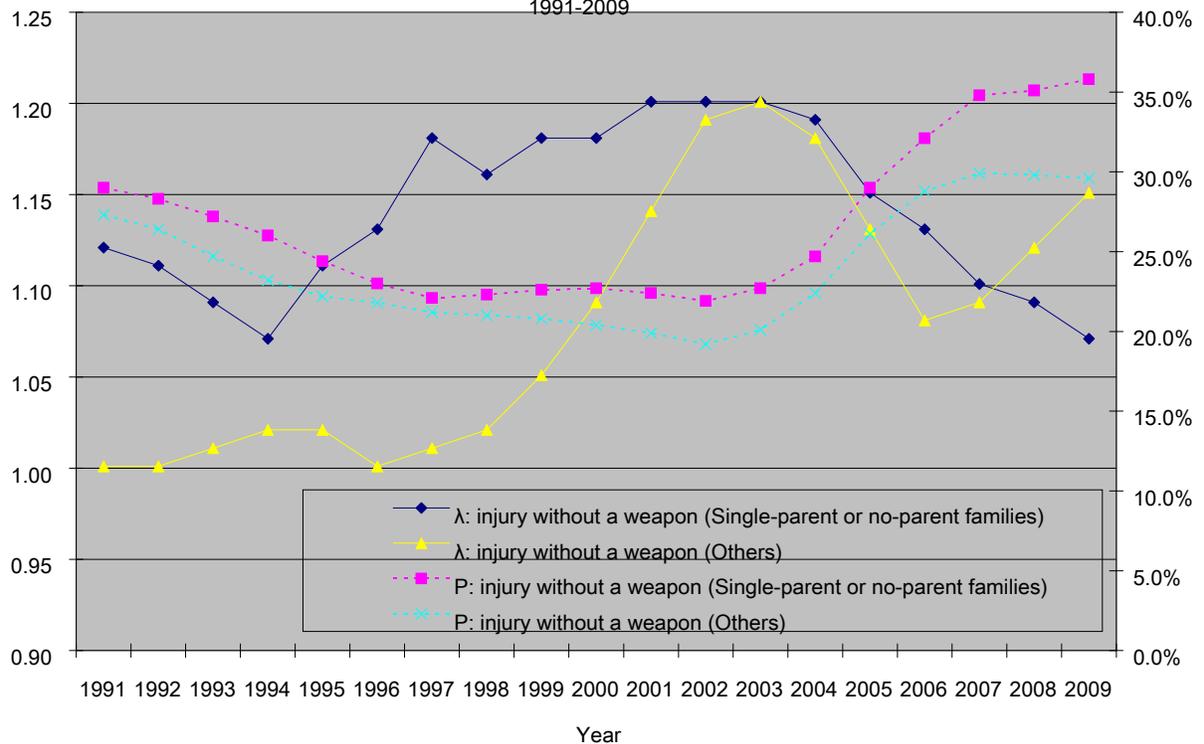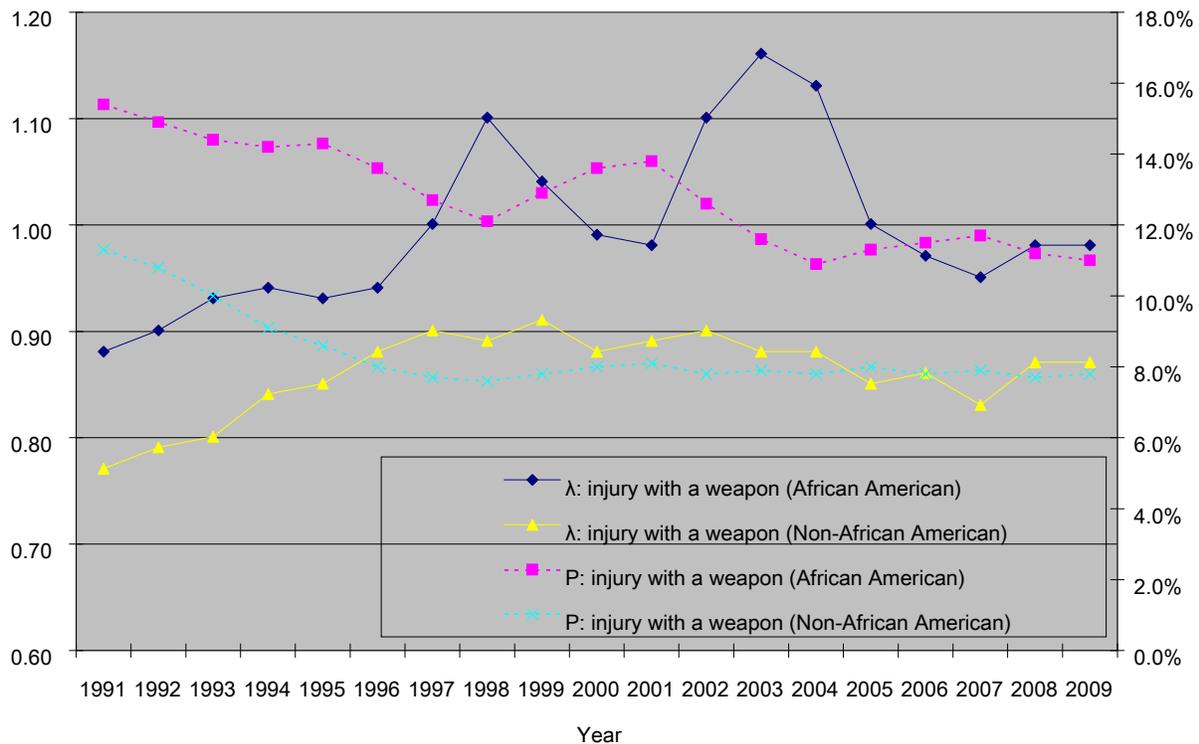
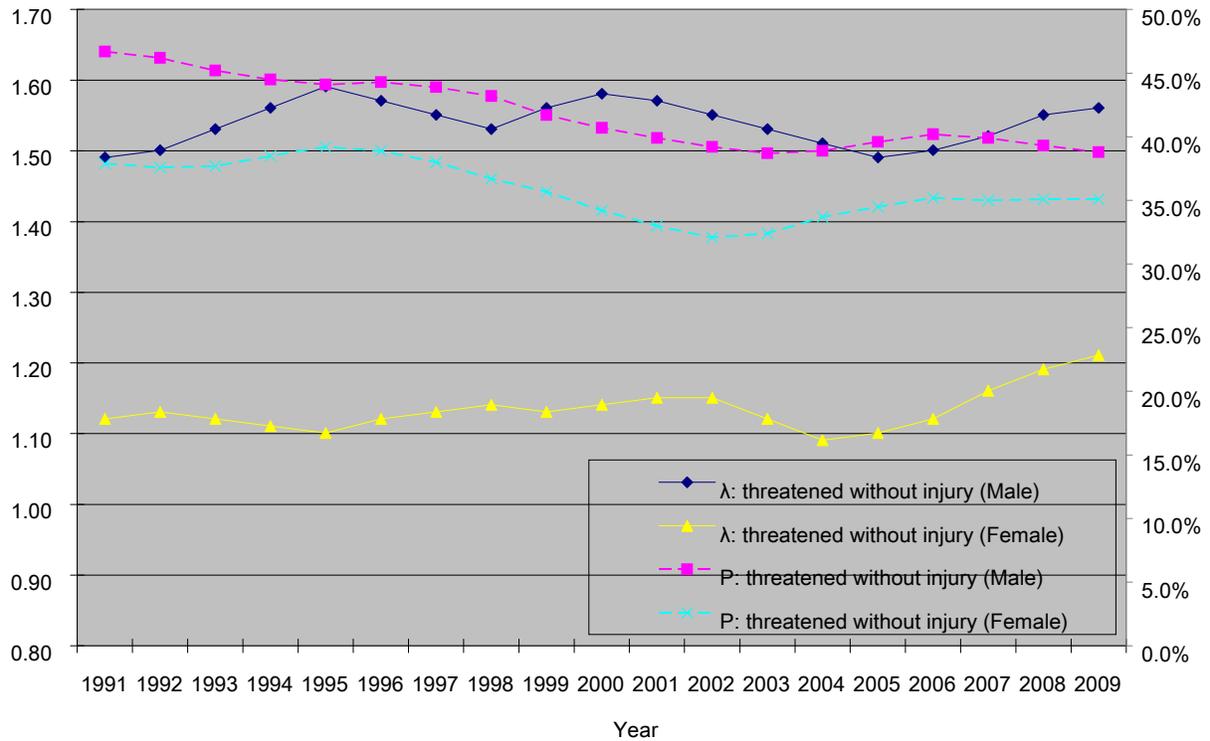Figure B-7.10th Grade Trends of Estimated Parameters of Zero-inflated Poisson Distributions of MTF: 1991-2009
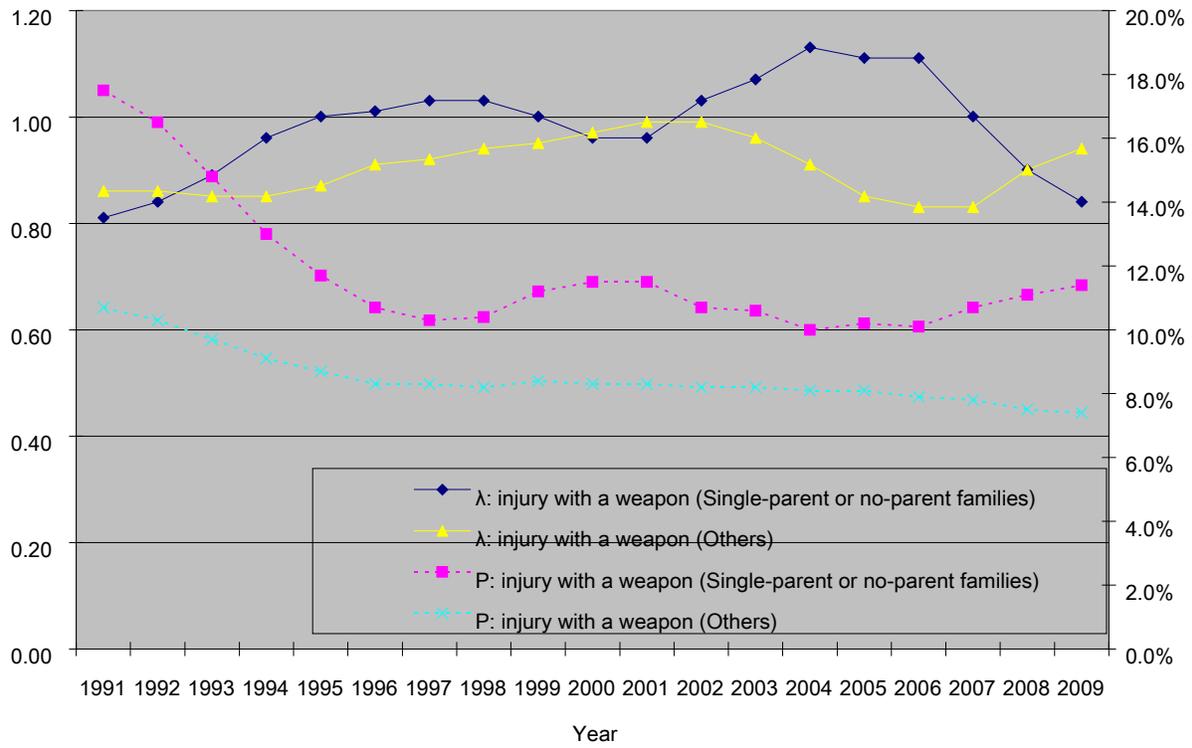
Figure B-8. 12 Grade Trends of Estimated Parameters of Zero-inflated Poisson Distributions of MTF: 1989-2009

27
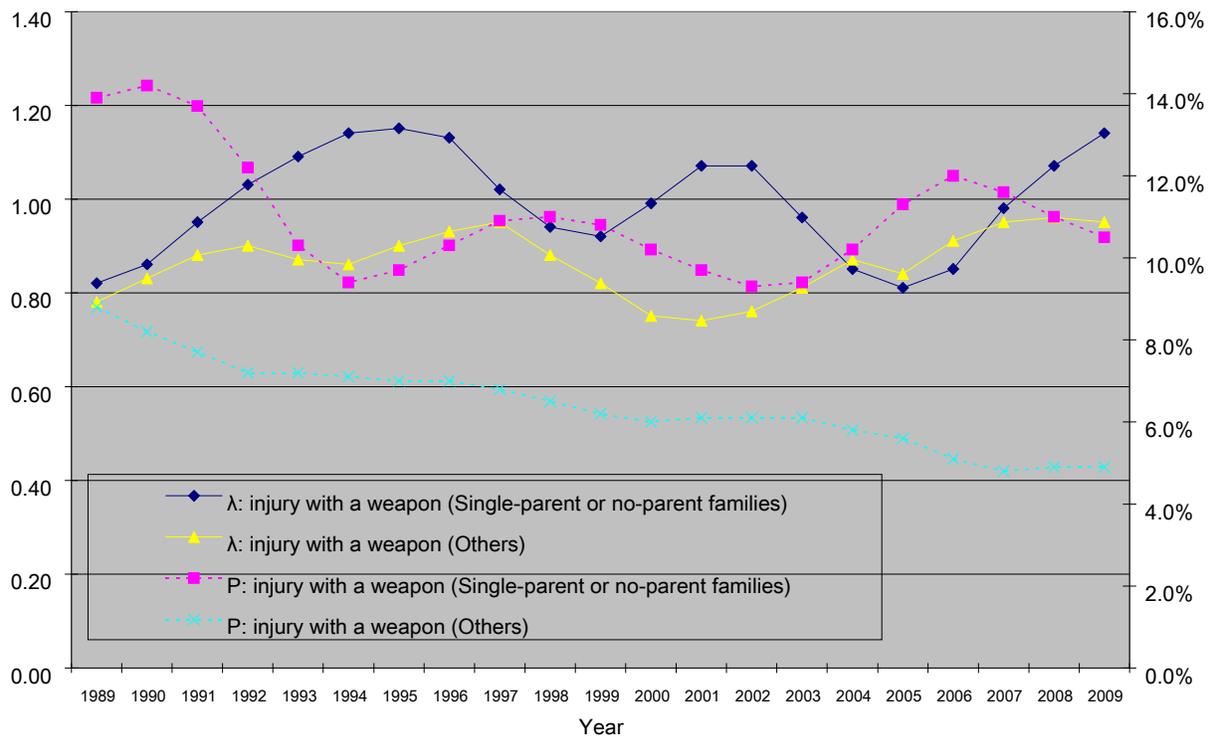
Figure B-9. 8th Grade Trends of Estimated Parameters of Zero-inflated Poisson Distributions of MTF: 1991-2009
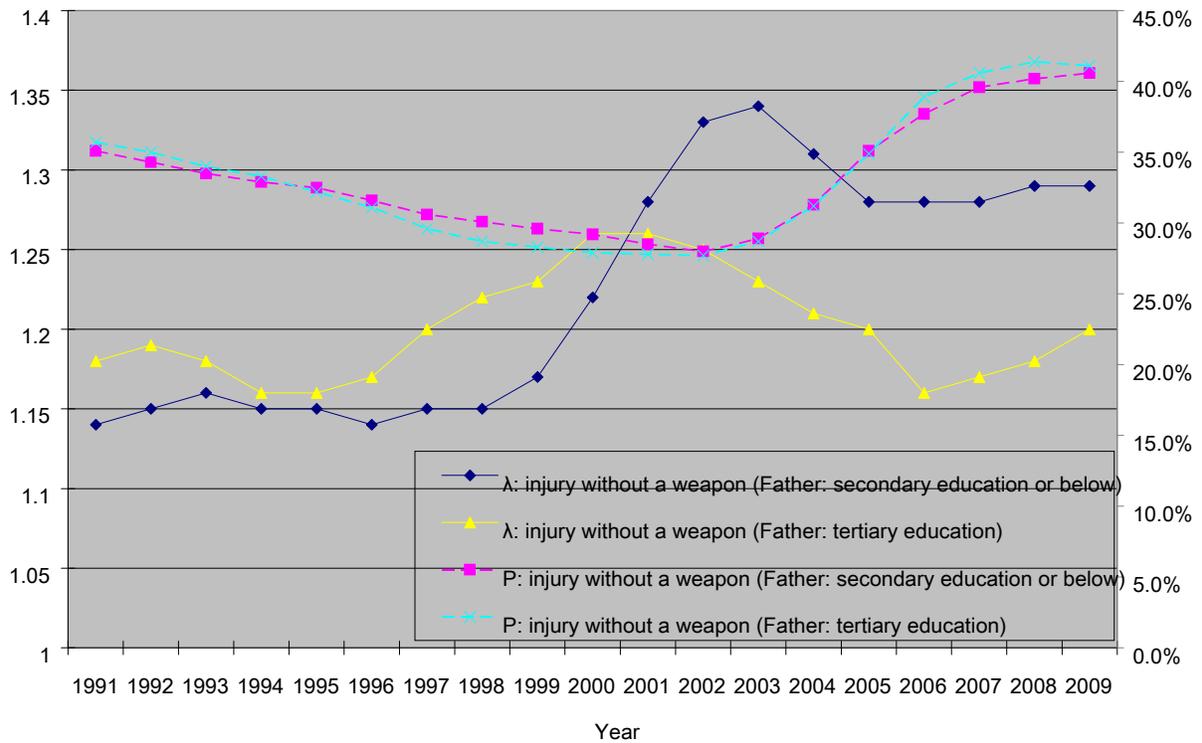
Figure B-10. 10th Grade Trends of Estimated Parameters of Zero-inflated Poisson Distributions of MTF: 1991-2009
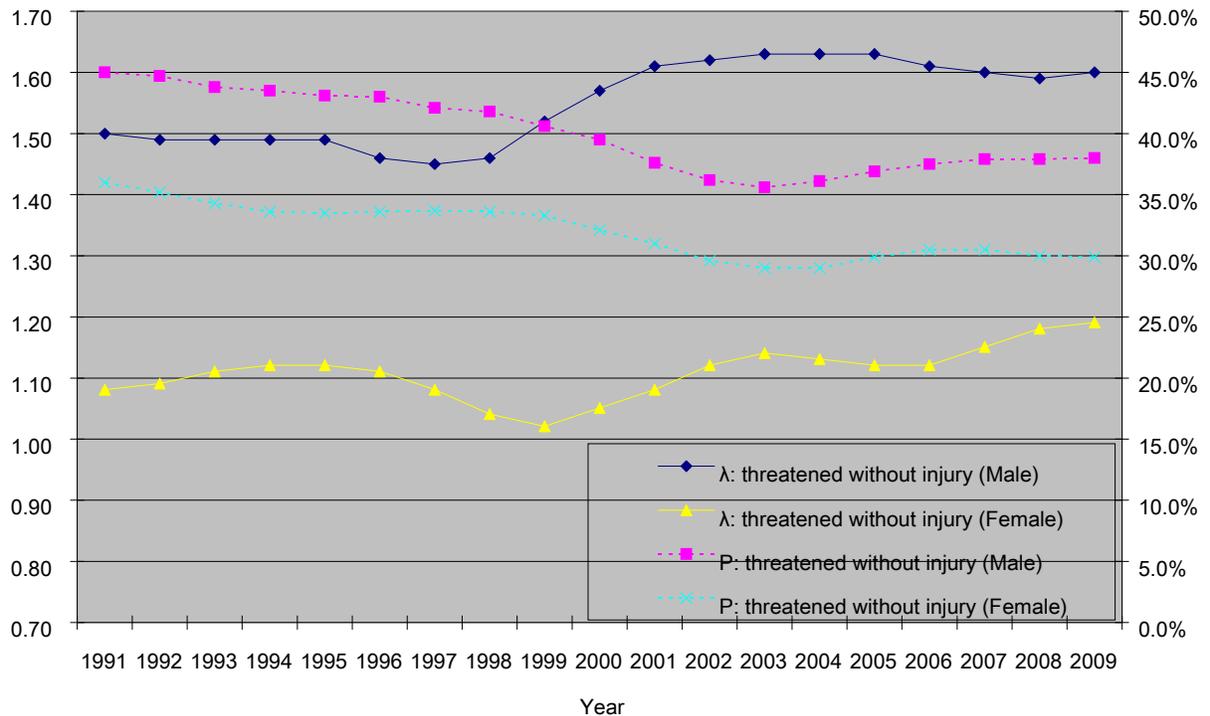

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Figure B-11. 8th Grade Trends of Estimated Parameters of Zero-inflated Poisson Distributions of MTF: 1991-2009

B-12. 10th Grade Trends of Estimated Parameters of Zero-inflated Poisson Distributions of MTF: 1991-2009
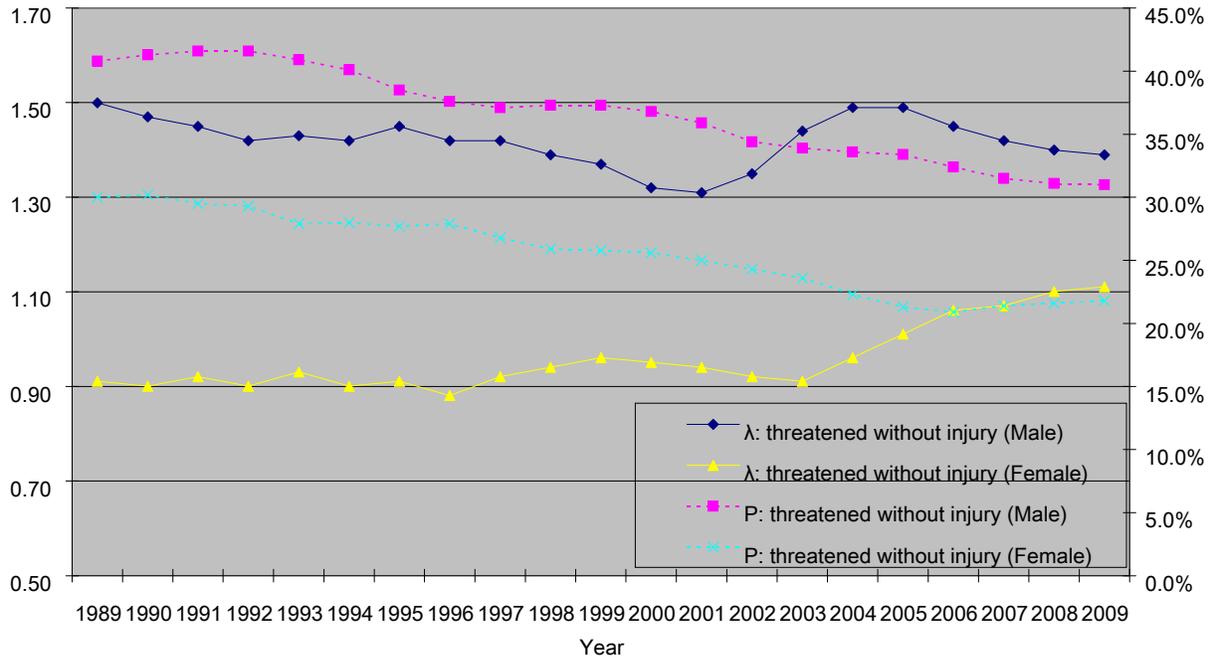

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Figure B-13. 8th Grade Trends of Estimated Parameters of Zero-inflated Poisson Distributions of MTF: 1991-2009

Figure B-14. 10th Grade Trends of Estimated Parameters of Zero-inflated Poisson Distributions of MTF: 1991-2009

Figure B-15. 8th Grade Trends of Estimated Parameters of Zero-inflated Poisson Distributions of MTF: 1991-2009
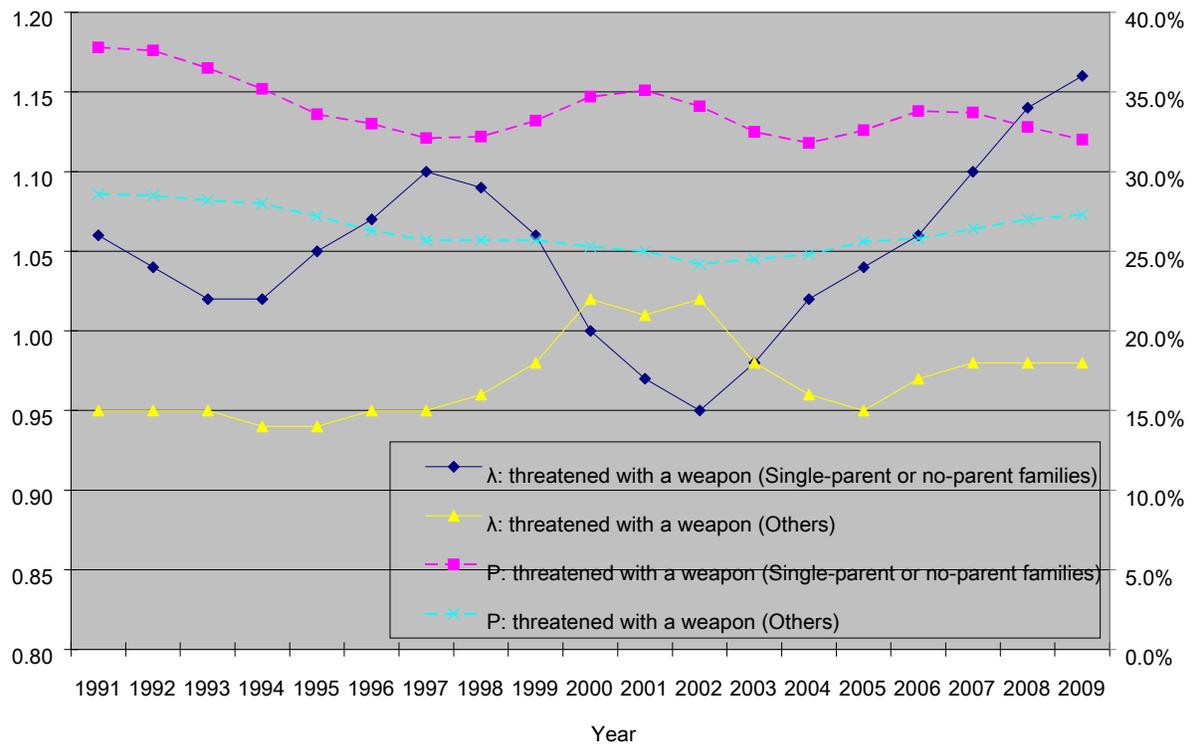

Figure B-16. 10th Grade Trends of Estimated Parameters of Zero-inflated Poisson Distributions of MTF: 1991-2009
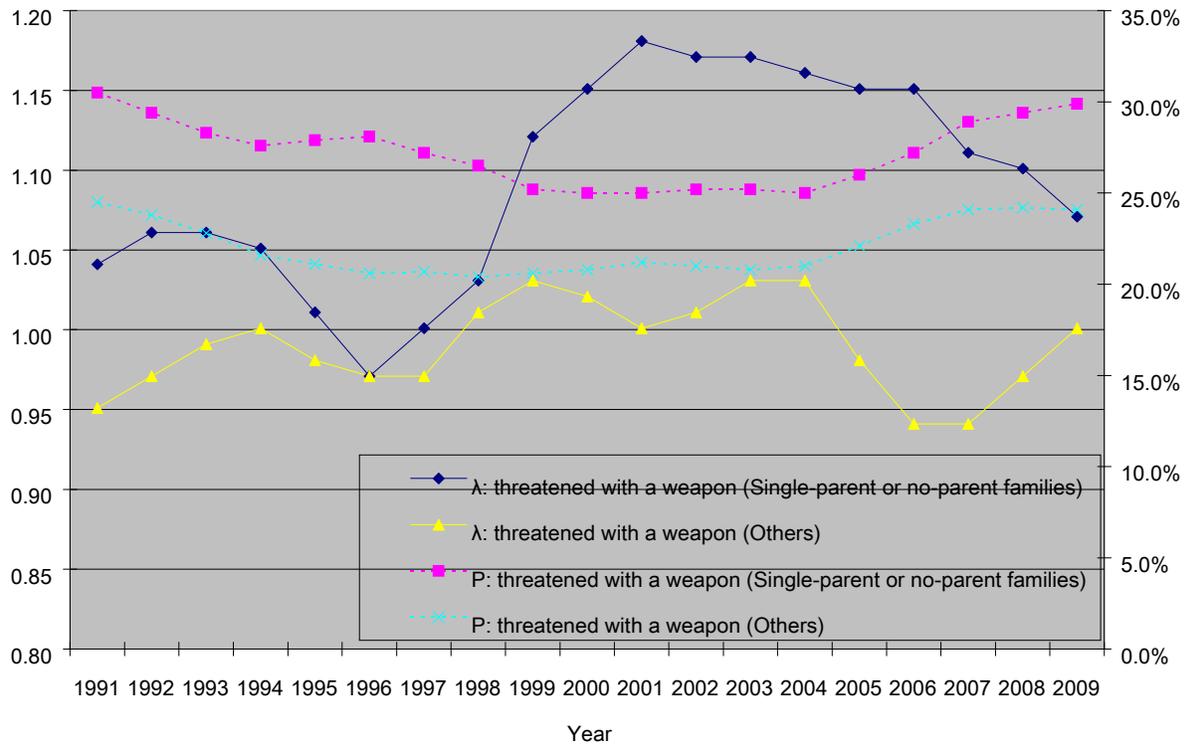
Figure B-17. 8th Grade Trends of Estimated Parameters of Zero-inflated Poisson Distributions of MTF: 1991-2009

Figure B-18. 10th Grade Trends of Estimated Parameters of Zero-inflated Poisson Distributions of MTF: 1991-2009

Figure B-19. 12th Grade Trends of Estimated Parameters of Zero-inflated Poisson Distributions of MTF: 1989-2009
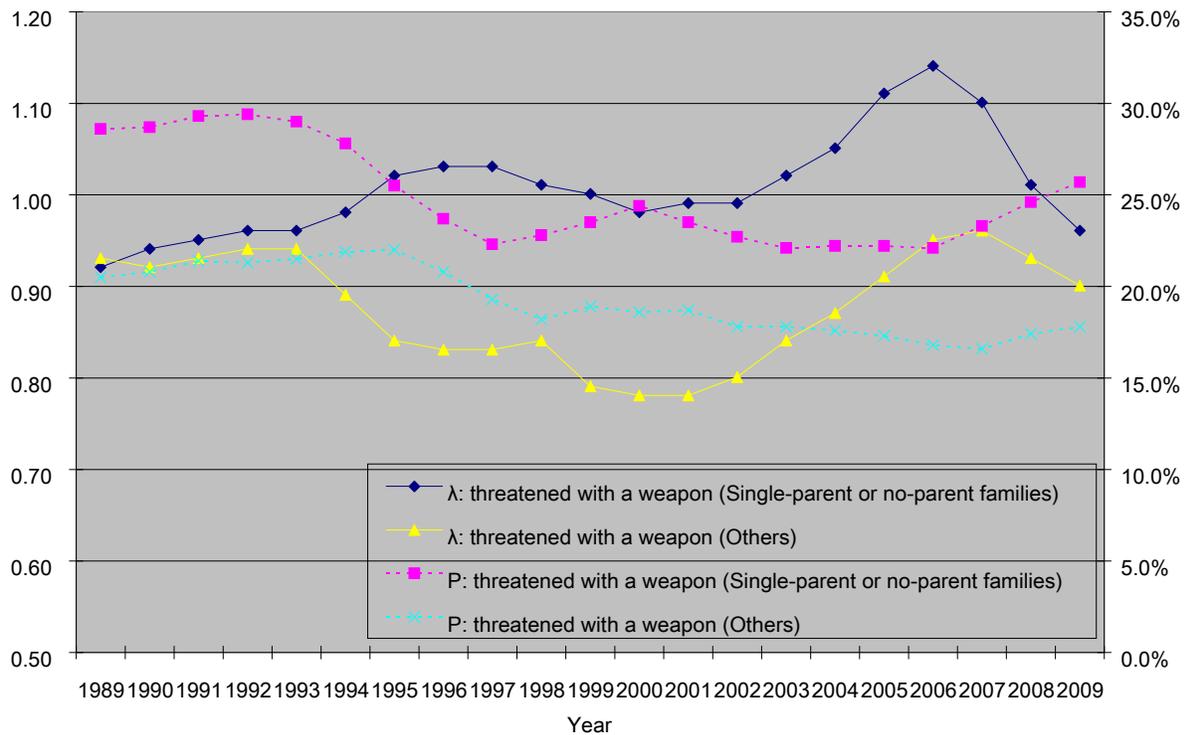

Figure B-20. 8th Grade Trends of Estimated Parameters of Zero-inflated Poisson Distributions of MTF: 1991-2009
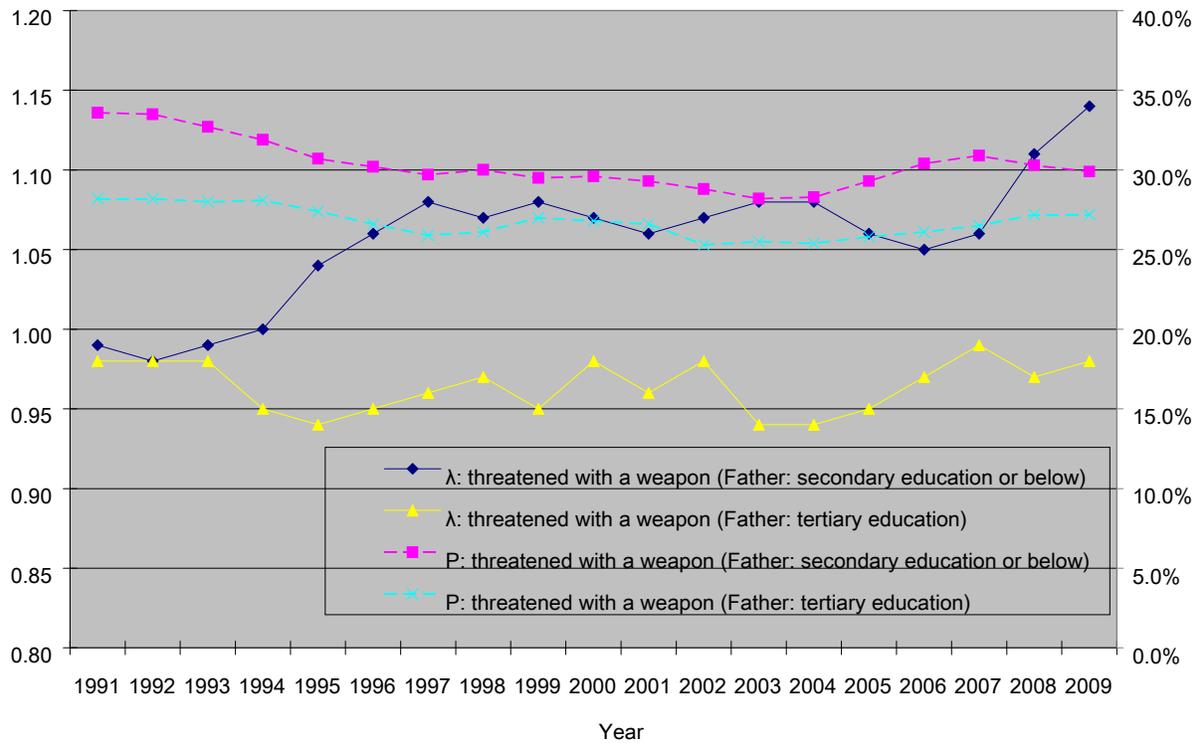
Figure B-21. 10th Grade Trends of Estimated Parameters of Zero-inflated Poisson Distributions of
MTF: 1991-2009

Year

Figure B-22. 12th Grade Trends of Estimated Parameters of Zero-inflated Poisson Distributions of
MTF: 1989-2009

Year

Figure B-23. 8th Grade Trends of Estimated Parameters of Zero-inflated Poisson Distributions of MTF: 1991-2009

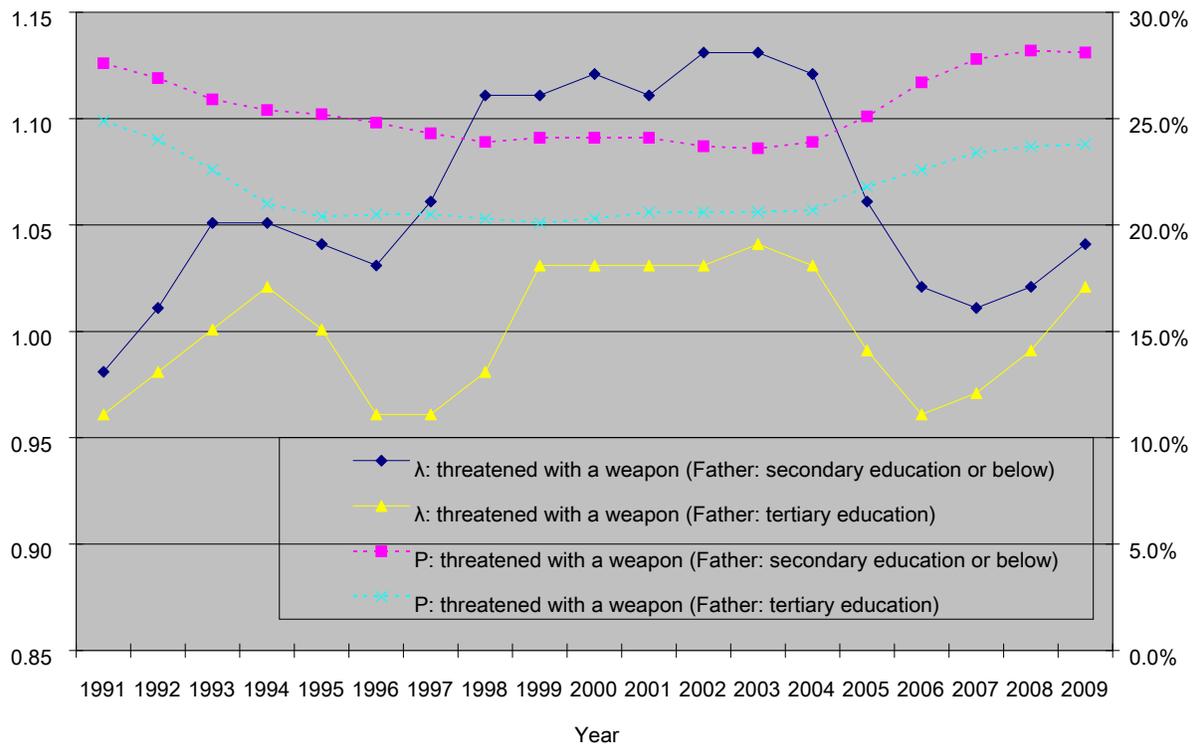Figure B-24. 10th Grade Trends of Estimated Parameters of Zero-inflated Poisson Distributions of MTF: 1991-2009

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Figure B-25. 10th Grade Trends of Estimated Parameters of Zero-inflated Poisson Distributions of
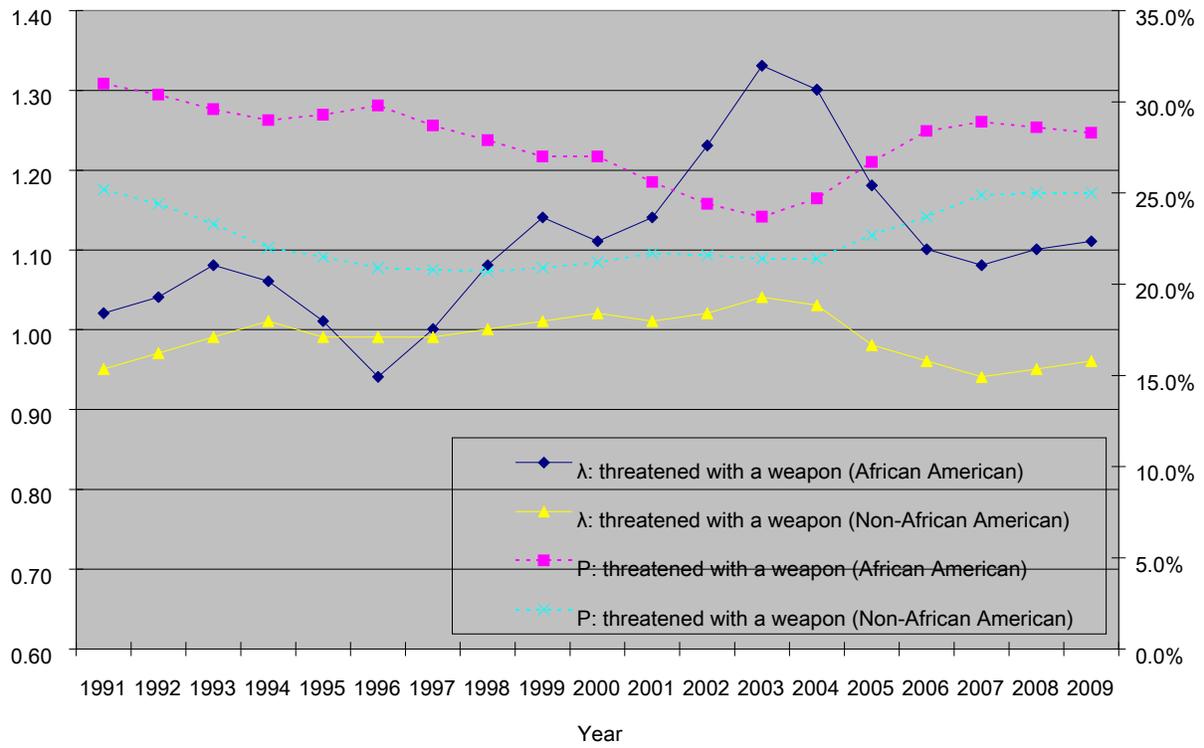MTF: 1991-2009

Year

Figure B-26. 12th Grade Trends of Estimated Parameters of Zero-inflated Poisson Distributions of
MTF: 1989-2009

Year

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