

# **Suicide and Violence Towards Others Among Those With High- Risk Behavior**

*Firearm Access and the Inherent Risks*

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# Background

- There is strong evidence that access to firearms is associated with completed suicide (Anglemyer 2014)
  - Additionally, a history of psychiatric illnesses is linked with an increased risk of suicide (Li 2011)
- There is moderate evidence that access to firearms is associated with homicide victimization (Anglemyer 2014)

# Background

- Empirical evidence suggests mental illness not a primary influencing factor in most violent acts
- Mental illness accounts for only about 4% of violent acts in US (Swanson 1990, 1994)
  - and about 5% in UK (Flynn 2014)
  - 6.5% of homicide offenders diagnosed with schizophrenia (Large 2009)
- Convicted murderers with severe mental illness are less likely to use firearm than murderers without illness (Matejkowski 2014)

# Background

- Females have a higher probability of being a homicide victim than males when comparing firearm access(Anglemyer 2014)
  - most homicide victims know their assailants(Wiebe 2003, Grassel 2003)
- Approximately 40-50% of all murdered women in US are murdered by intimate partners(Frye 2005)
- Access to firearms and prior arrests for domestic violence have been previously linked with intimate terrorism(Frye 2006)

# Methods

- To better understand the impact of firearm accessibility among individuals at highest risk of harming themselves or others, a systematic review and meta-analysis was performed
  - a) Evaluated studies that estimated the impact of firearm accessibility among mentally ill patients on risk of suicide
  - b) Evaluated studies that estimated the impact of firearm accessibility among people with criminal past on risk of homicide and/or violence

# Methods

- PubMed, Scopus (including EMBASE), and Web of Science were searched (without limitations)
- Study designs included: pre- or post-intervention evaluations and observational studies if a comparator was available
  - includes both population-level and individual-level data

# Methods

- Included populations: 1) individuals who exhibited suicidal behavior, 2) individuals with known risk factors for harming others
  - Suicidal behavior: previous suicide attempts, aggressive or impulsive tendencies, depression, mental illness history, or alcohol/drug dependencies
  - Harming others: prior arrest for violence, previous convictions of violent crimes

# Methods

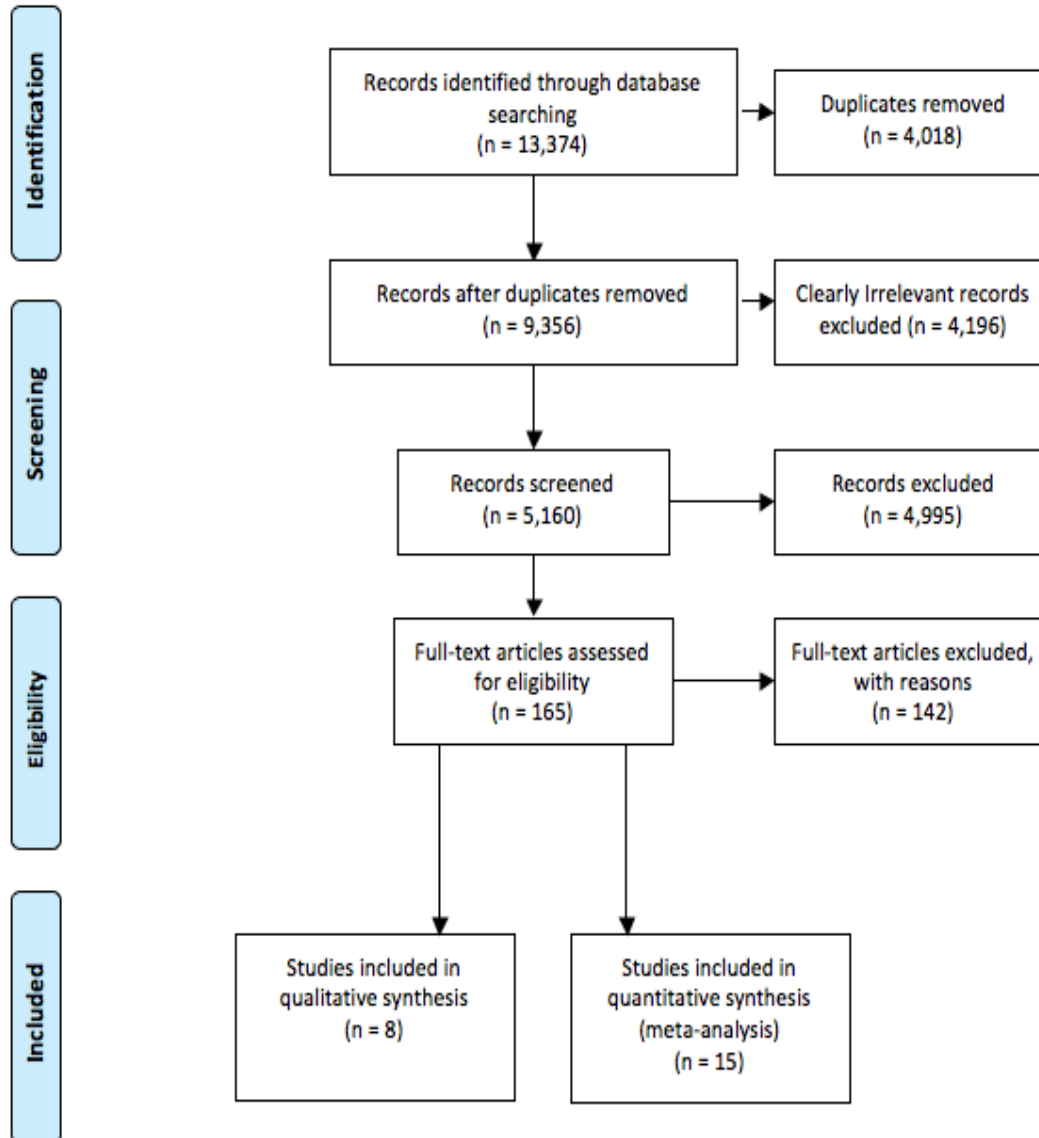
- Individual-level studies needed to assess whether firearms were available for all individuals
- Population-level studies needed to assess before and after a policy initiative limiting ready access for individuals displaying suicidal behavior or harmful to others



# Methods

- Risk of Bias assessed with Newcastle-Ottawa Scale
- Meta-analysis of individual-level data
  - pooled odds ratio and 95% confidence interval calculated
  - both fixed- and random-effects models calculated
  - heterogeneity assessed with  $I^2$  test statistic
- Narrative review of population-level data

# Results: Study Selection



# Results: Individual-Level Study Selection

- 11 studies estimated odds of suicide comparing firearm access adjusting for suicidal behavior history
  - 4 studies estimated odds of suicide comparing firearm access specifically among those with mental illness history
- 5 studies estimated odds of homicide adjusting for violent behavior history
  - 3 studies estimated odds of homicide comparing firearm access specifically among those with violent or arrest history

# Results: Exposure Definition

- All 11 studies of suicide interviewed proxies to ascertain firearm availability
  - 7 of 10 case-control studies used school or community controls, 1 used in-patients at a mental health facility, and 2 used deaths from other causes
- 2 of 5 studies of homicide or violent behavior interviewed proxies to ascertain firearm availability
  - both case-controls used community controls

# Descriptive Results: Self-Harm

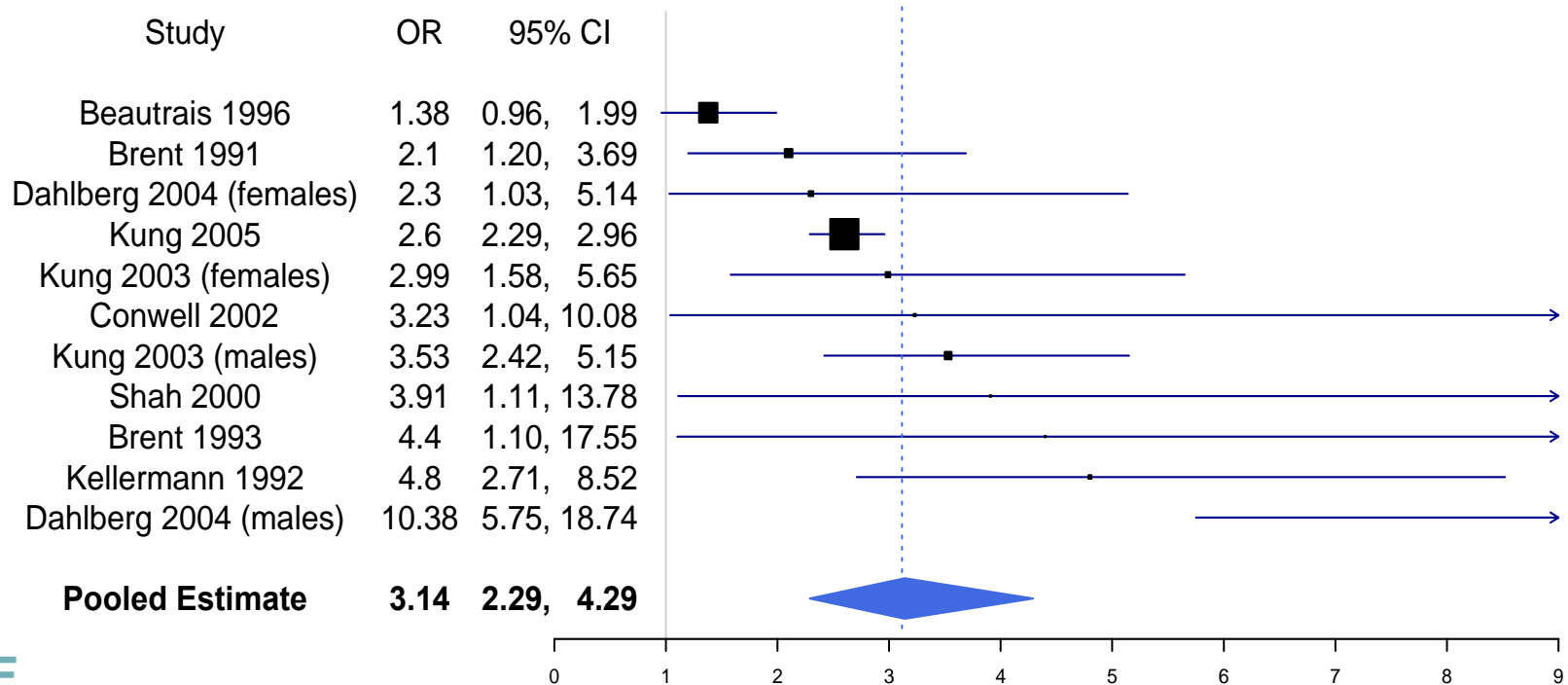
- 3 of 9 (33%) suicide studies of individual-level data which adjusted for mental illness history were among adolescents only
  - 3 of 4 (75%) studies of individual-level data specifically among those with mental illness history were adolescents only
- Suicide cases were slightly more commonly male than controls (mean 81%, range 70-96%; vs mean 75%, range 57-92%, respectively)

# Descriptive Results: Violence

- All homicide or violence studies of individual-level data which adjusted for arrest or violent history were among adults only
- Homicide or violence cases were mostly male in non-IPV studies (63-100%) and controls were also mostly male (56-100%)
- Outcomes included: homicide victimization (60%), new firearm or violence offense (20%), IPV threats (20%).

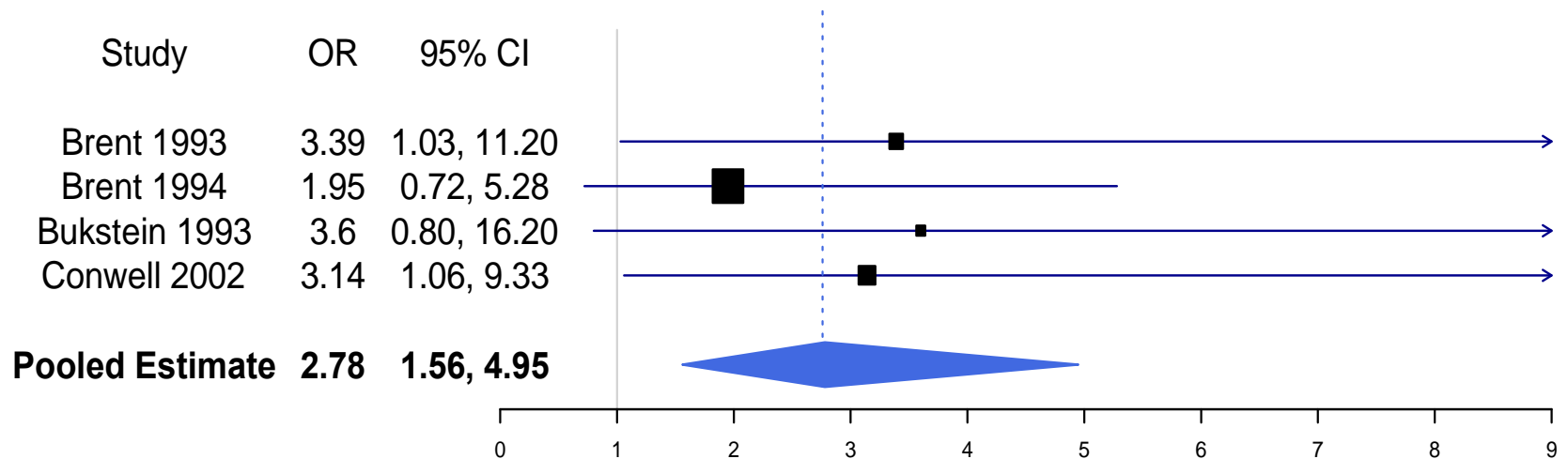
# Meta-Analysis Results: Self-Harm

The pooled effect of firearm exposure, adjusting for mental illness history, suggests a three-fold higher odds of suicide for those with firearm access (OR=3.14; 95% CI 2.29-4.29)



# Meta-Analysis Results: Self-Harm

The pooled effect of firearm exposure, among those with mental illness history, suggests a nearly three-fold higher odds of suicide for those with firearm access (OR=2.78; 95% CI 1.56-4.95)





# Meta-Analysis Results: Self-Harm

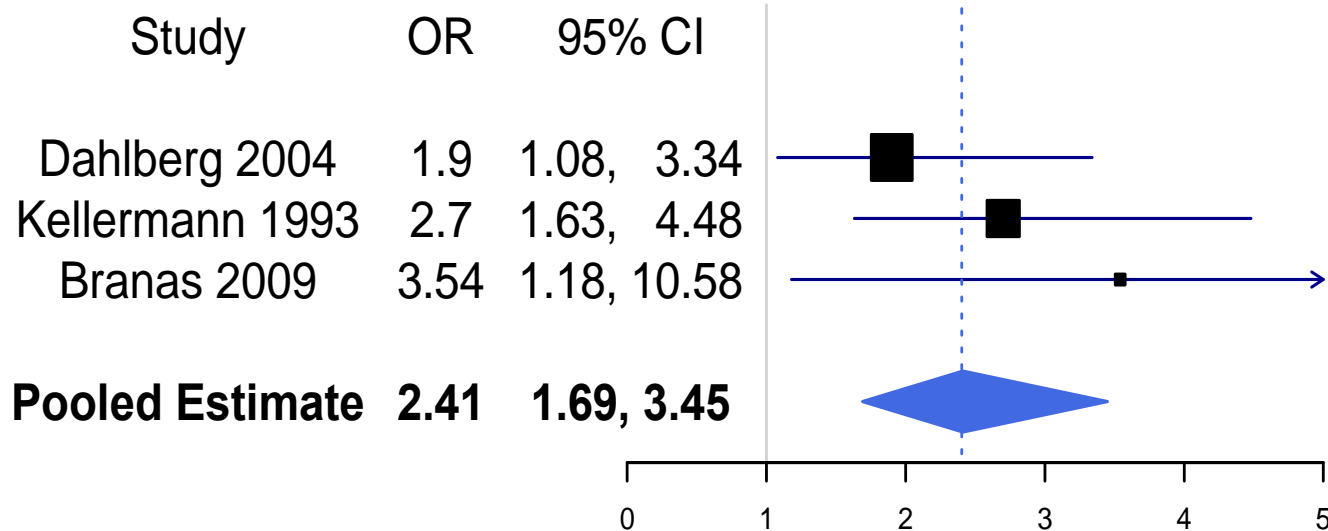
- Subgroup analyses were performed to examine the effect of firearm type or storage on suicide risk among those with mental illness history
  - 3 studies provided adequate data for subgroup analyses of firearm types
- Access to handguns was strongly linked with completed suicide (pooled OR=10.27; 95% CI 3.41-30.96)
- Access to long guns or loaded firearms were not significantly related to suicide

# Meta-Analysis Results: Self-Harm

- Secondary analyses were performed to explore possible differences in risks between those with and without mental illness history
  - 2 studies provided data for individuals specifically without suicidal behaviors (pooled OR=4.35; 95% CI 1.21-15.57)
  - The test for differences between subgroups was not significant (p value = 0.53)

# Meta-Analysis Results: Violence

The pooled effect of firearm exposure, adjusting for harmful behavior, suggests a two-fold higher odds of homicide victimization for those with firearm access (OR=2.41; 95% CI 1.69-3.45)



# Results: Violence

- 1 study found no significantly increased odds of homicide victimization among individuals in households where at least 1 person had a history of arrest (OR=1.67; 95% CI 0.61-1.48)
- The risk of violent offending among those who committed a prior violent crime was significantly higher among those who purchased assault-type handgun compared with those who purchased other types of firearms (RR=3.00; 95% CI 1.93-4.67)
- Another study found a significantly higher likelihood of threatening a partner among those with recent firearm ownership compared with those without recent ownership (OR=7.8; 95% CI 5.6-11.0)

# Results: Violence

- Secondary analyses were performed to explore possible differences in risks between those with and without prior arrest history
  - 1 study provided data for individuals in households in which all were without prior arrest history (OR=1.55; 95% CI 1.00-2.40)
  - The test for differences between subgroups was not significant (p value = 0.89)

# Narrative Review Results: Population-Level Study Selection

- 8 population-level studies and reviews identified
- 6 primary analyses and 2 reviews
  - 2 of the 6 primary analyses evaluated IPH outcomes
  - 3 of the 6 evaluated homicides and 3 evaluated suicides
- The impacts of acquisition restrictions or background checks were evaluated in all primary analyses and reviews
- Waiting periods were evaluated in 1 primary analysis and both reviews

# Narrative Review Results: Self-Harm

Study-Year	Policy Type	Direction of the Effect
<b>Firearm Restriction or Background Check Laws: Suicide</b>		
Rodriguez Andres-2011 <sup>6</sup>	Mental Health Problems Alcohol Abuse	↓ Among males 25-44 year old ↓ Among males 65 years old or older
Sen-2012 <sup>5</sup>	Mental Illness Prohibitory	↓ In states with background checks
Kleck-1993 <sup>60</sup>	Mental Illness History Drug or Alcohol Addiction	↔ Contrasting areas with background checks ↔ Contrasting areas with background checks
<b>Waiting Period Laws: Suicide</b>		
Kleck-1993 <sup>60</sup>	Waiting Period	↔ Suicide rate contrasting areas with laws
Hahn-2005 <sup>48</sup>	Waiting Period <sup>a</sup> Waiting Period <sup>a</sup> Waiting Period <sup>a</sup>	↔ Total suicide rate ↓ Firearm-related suicide among adolescents ↓ Firearm-related suicide among adults

a. Multiple primary studies contributed to these results within this review

b. Review did not distinguish between background check and waiting period laws

↑ Indicates an increase in risk; ↓ Indicates a decrease in risk; ↔ Indicates mixed effects or no difference

# Narrative Review: Violence

Study-Year	Policy Type	Direction of the Effect
<b>Firearm Restriction or Background Check Laws: Homicide or Assault</b>		
Vigdor-2006 <sup>44</sup>	Restraining Order Laws Dom. Violence Misdemeanor Confiscation Laws	↓ Firearm IPH incidence ↔ Any measure of IPH incidence ↔ Any measure of IPH incidence
Zeoli-2010 <sup>45</sup>	Restraining Order Laws Others	↓ Firearm IPH incidence ↔ Any measure of IPH incidence
Ruddell-2005 <sup>46</sup>	State background checks	↓ State-level homicide rates
Sen-2012 <sup>5</sup>	Restraining Order Laws Fugitive Status Prohibitory	↓ State-level homicide rates ↓ State-level homicide rates
Kleck-1993 <sup>60</sup>	Criminals Prohibitory Criminals Prohibitory	↔ Homicide rate contrasting areas with laws ↓ Assault rate contrasting areas with laws
Hahn-2005 <sup>48</sup>	Felony Conviction <sup>a</sup> Felony Conviction <sup>a</sup> Misdemeanor Conviction <sup>a</sup>	↓ Violent crime rate ↔ Homicide rate among younger US adults ↔ Rate of first violent crime arrest
Makarios-2012 <sup>47</sup>	Background Check <sup>a,b</sup>	↔ Crime rate contrasting areas with laws
<b>Waiting Period Laws: Homicide or Assault</b>		
Kleck-1993 <sup>60</sup>	Waiting Period Waiting Period	↔ Homicide rate contrasting areas with laws ↔ Assault rate contrasting areas with laws
Hahn-2005 <sup>48</sup>	Waiting Period <sup>a</sup>	↔ Homicide rate contrasting areas with laws
Makarios-2012 <sup>47</sup>	Waiting Period <sup>a,b</sup>	↔ Crime rate contrasting areas with laws

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IPH: Intimate partner homicide

↑ Indicates an increase in risk; ↓ Indicates a decrease in risk; ↔ Indicates mixed effects or no difference



# Discussion: Self-Harm

- From available individual-level data, we know that firearm access increases the probability of suicide by nearly three-fold among individuals with a mental illness history
  - there is no evidence of a difference in probability of suicide between those with and without mental illness
- Mental illness may not act as effect modifier beyond baseline risk due to firearms access (Miller 2013)

# Discussion: Self-Harm

- Population-level data evaluating restrictions to purchase firearms among individuals with mental illness history are largely inconsistent, though may be marginally effective at reducing suicide
  - similar to individual-level data results, suggests firearm-related suicides primarily driven by ready access
- Waiting periods maybe have a weak impact on suicide

# Discussion: Self-Harm

- Individual-level data evaluating suicide are limited mostly to male adolescents, though this population may be most at risk for impulsive suicide
  - this is somewhat supported by population-level data

# Discussion: Violence

- Mixed results from individual-level data assessing the risk of homicide or other violent outcomes when comparing firearm access
  - Studies too heterogeneous to warrant meta-analysis
- 1 study found no significant difference in probability of homicide among those with prior arrest history

# Discussion: Violence

- 1 study estimated a significantly higher likelihood of threatening a partner comparing recent firearm ownership, adjusting for restraining order or previous arrest for IPV(Rothman 2005)
- Laws targeted at individuals with a restraining order from accessing firearms are generally effective in reducing IPH

# Implications for Future

- Future research and policy regarding firearm possession and acquisition and its impact on violence should not necessarily focus on mental illness, but rather history of violence
  - more reliable data (e.g., criminal records) may yield more impact on reducing violence
- Future studies focusing on mental illness should be powered to explicitly compare diagnosis subgroups

# Implications for Future

- Future research suggestion: estimate the impact of different types of policies on IPV or IPH by comparing two cohorts of couples with similar firearm possession but located in 2 different areas with disparate policies
  - could examine individual effects of factors such as alcohol or drug abuse, prior convictions, history of violence

# Implications for Future

- Future studies would greatly benefit from thoroughly collected data containing specific details including the perpetrators of the crime, circumstances, weapon type, location or legality of ownership
- Because individuals with certain types of mental illness are more vulnerable to violence victimization, it is important for future research to consider the effects firearms laws may have on their ability to legally defend themselves



# Implications for Future

- To combat misunderstandings of the data and perception regarding the risk to society mentally ill pose:
  - those at high-risk should start with individual counseling
  - communities should be educated about mental illness

# Acknowledgments

- Thanks to my search coordinator, Hacsí Horvath, at the HIV/AIDS Cochrane Group!!!



# Narrative Review Results: Self-Harm

- 2 of 3 primary analyses evaluating impact of firearm restriction and background check laws concerning mental illness history estimated decreased rates of suicide
- 1 of 2 primary analyses concerning alcohol abuse history estimated decreased rates of suicide
- The solitary primary analysis estimating the impact of waiting periods on suicide rates found no significant effect
- The solitary review estimating the impact of waiting periods on total suicide rates found no significant effect
  - significantly lower rates of firearm-related suicide

# Narrative Review Results: Violence

- No significant results in the primary analysis or in both reviews evaluating the impact of waiting period laws on homicide or assault
- Both primary analyses evaluating the impact of firearm restriction or background checks on restraining order laws found reduced rates of firearm-related IPH or homicide rates
  - other measures of IPH were not significantly reduced as a result of domestic violence misdemeanor or confiscation laws

# Narrative Review Results: Violence

- 1 primary analysis of general state background checks found a significant reduction in homicide rates
- 1 primary analysis that examined the effect of making fugitive status a prohibitory factor in background checks found a reduced rate of homicide
  - 1 study found criminal history in general as a prohibitory factor was not effective at reducing homicide rates, though it is linked with lowered assault rates
- 1 review found background checks in general are not universally linked with reduced crime rates
- 1 review found misdemeanor convictions as prohibitory in background checks not linked with homicide or violent crime arrest rates
  - a felony conviction is linked with reduced violent crime rates