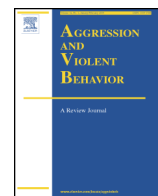




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## Aggression and Violent Behavior



# Weapon carrying in and out of school among pure bullies, pure victims and bully-victims: A systematic review and meta-analysis of cross-sectional and longitudinal studies

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## ABSTRACT

Weapon carrying has detrimental effects for perpetrators and victims alike. It is therefore imperative that research efforts are invested into establishing those contextual factors that are associated with this antisocial behavior. This systematic and meta-analytic review investigates the association of weapon carrying with bullying perpetration and victimization inside and outside the school context. Results on pure bullies, pure victims and bully-victims are also presented.

Further to extensive searches, across 20 databases and 46 journals, and careful screening of reports, in line with pre-established methodological criteria, a total of 35 manuscripts are included in the meta-analysis. Narrative results based on longitudinal studies are also presented but not meta-analyzed given the variability in study characteristics and the small number of studies.

Weapon carrying is significantly associated with both bullying perpetration (adjusted  $OR = 2.64$ ;  $p < 0.001$ ) and victimization (adjusted  $OR = 1.58$ ;  $p < 0.05$ ). Effect sizes are larger when looking at discrete categories of pure bullies (adjusted  $OR = 3.24$ ;  $p < 0.01$ ), pure victims (adjusted  $OR = 1.79$ ;  $p < 0.05$ ) and bully-victims (adjusted  $OR = 5.66$ ;  $p < 0.001$ ) when compared with non-involved school children. Subgroup analyses suggest that pure victims ( $Q = 6.77$ ;  $p < 0.01$ ) and bully-victims ( $Q = 8.01$ ;  $p < 0.01$ ) are significantly more likely to carry a weapon inside than outside the school, thus rendering support to the 'vulnerability/self-protection' hypothesis. Pure bullies have the same odds of carrying a weapon inside and outside the school context ( $Q = 0.60$ ;  $p = 0.44$ ), supporting a persistent antisocial personality theoretical framework.

Implications for policy and practice arising from our results are discussed.

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## 1. Introduction

Violence associated with weapons has emerged as a major public health problem among school-aged children in the United States (Bradshaw, Waasdorp, Goldweber, & Johnson, 2013), Australia (Hemphill et al., 2011), New Zealand (McGee, Carter, Williams, & Taylor, 2005), and Europe (McKeganey & Norrie, 2000) alike. Prevalence rates of school-aged students who reported carrying a weapon are indicative of this disturbing social problem. For example, a representative study in the US estimated that 15% of 10,269 adolescents aged 12 to 21 carried a weapon in the last 30 days (Lowry, Powell, Kann, Collins, & Kolbe, 1998). In the UK, a survey of 10,677 students found weapon carrying among 18% of males and 3% of females aged 11–12 and 29%

of males and 9% of females aged 15–16 (Balding, Regis, Wise, Bish, & Muirden, 1996).

Weapon carrying increases the risk of adolescent injury, with a recent comparative study between North American and European countries suggesting that weapon carrying was significantly associated with elevated risks for medically treated, multiple, and hospitalized injury events across seven countries (Pickett et al., 2005). Weapon carrying is also associated with other violent and antisocial behaviors such as involvement in serious group fights (Forrest, Zychowski, Stuhldreher, & Ryan, 2000), gang membership (Bradshaw et al., 2013), drug dealing (Lizotte, Krohn, Howell, Tobin, & Howard, 2000), and illegal drug use (McKeganey & Norrie, 2000).

Weapon carrying and weapon-related violent incidents in schools have detrimental effects on the healthy psychosocial development of perpetrators and victims alike (Flannery, Wester, & Singer, 2004; Simon, Richardson, Dent, Chou, & Flay, 1998). With recent examples of mass shootings in US schools (Leary, Kowalski, Smith, & Phillips,

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2003) and with a series of, primarily, knife-related homicides in the UK (Eades, 2006), the time is ripe to investigate the contextual explanatory factors for weapon carrying, a form of antisocial behavior, in a thorough systematic way.

The option to ban gun ownership or the option to confiscate or buy back all guns from the population may not be open to the United States, but it has been a viable approach in various other countries, including Australia (Mouzos, 1999) and the UK (Her Majesty's Stationery Office, 1997, Chapter 5). Nevertheless, it has been argued that it is not so much the issue of ownership, but rather the carrying of and the ready access to weapons that is linked to criminal injury and violence in general (Moore, 1980). It is therefore imperative that research efforts are invested into establishing those contextual factors that may explain why young people opt for carrying a weapon in the first place.

Various contextual factors and intervening mechanisms should be taken into account when explaining weapon carrying (Brennan & Moore, 2009). For example, fear of victimization due to crime involvement and the need for self-protection is the main motive among weapon carriers in both the US (DuRant, Krowchuk, Kreiter, Sinal, & Woods, 1999) and the UK (Bennett & Holloway, 2004). Notably, the need for self-protection is a shared feeling and common incentive for weapon carrying among perpetrators and victims correspondingly (Melde, Esbensen, & Taylor, 2009). It has been suggested that one of the driving factors behind weapon carrying in schools is involvement in bullying incidents as a perpetrator or a victim (Dukes, Stein, & Zane, 2010). Remarkably, in-depth investigation of 15 case studies of school shootings between 1995 and 2001 established that acute or chronic rejection—in the form of ostracism, bullying, and/or romantic rejection—was present in all but two of these incidents (Leary et al., 2003).

Various theoretical models could explain a significant association between school bullying (perpetration and victimization) and weapon carrying inside or outside the school. By definition, bullying involves a repetitive behavior that is based on an intention to harm and a power differential between the perpetrator and the target (Centers for Disease Control and Prevention, 2014). It may be that this element of repetition and imbalance in power dynamics encourages bullied children to opt for carrying a weapon at school for self-protection. This is consistent with earlier research that has highlighted how repeat incidents of victimization (Chang, Chen, & Brownson, 2003) and feeling vulnerable to being victimized (Simon, Dent, & Sussman, 1997) are linked to increased likelihood of weapon carrying. Such a theoretical model – based on a ‘vulnerability/self-protection hypothesis’ – may be supported if among bullied children the odds of carrying a weapon within school are significantly higher than the odds of carrying a weapon outside school. In other words, school victims may not feel the need for self-protection outside the school framework, thus resulting in smaller effect sizes for the association of victimization with weapon carrying outside the school setting (compared to weapon carrying within the school setting).

On the other hand, bullies may carry a weapon to intimidate their victims and to further enhance their social status in schools, consistent with studies on how weapon carrying might function as a status symbol in friendship networks and, consequently, be subject to peer influence (Dijkstra et al., 2010). Furthermore, and in line with earlier research (Ttofi, Farrington, & Lösel, 2012; Ttofi, Farrington, Lösel, & Loeber, 2011b), bullying perpetration and weapon carrying could both be seen as indicators of the same latent construct, such as a general underlying antisocial tendency. A theoretical model of a more general underlying antisocial tendency can be supported if school bullies have the same odds of carrying a weapon inside and outside the school context. If pure bullies do not feel a greater need for self-protection inside the school setting, then they would have the same likelihood of carrying a weapon across different (and not just the school) settings, thus rendering support to a more general antisocial behavioral pattern.

## 2. Current study

The current study aims to investigate, through a systematic review and a series of meta-analyses, the extent to which involvement in school bullying (as perpetrator, victim, or bully-victim) is associated with weapon carrying based on cross-sectional and longitudinal studies. Previous research is indicative of the detrimental effects of school bullying and victimization on the healthy psychosocial development of children (Arseneault, Bowes, & Shakoor, 2010). School bullies are more likely to be involved in both criminal (Ttofi et al., 2011b) and violent (Ttofi et al., 2012) incidents in their adult life, while bullied children are more likely to suffer from depression in later years (Ttofi, Farrington, Lösel, & Loeber, 2011a). To the extent that involvement in bullying is significantly associated with weapon carrying, effective bullying-prevention programs could successfully contribute to a reduction in weapon-related violence (Ttofi, 2015).

The current study focuses on cross-sectional and longitudinal studies that investigate whether school bullying (perpetration and victimization) is linked to weapon carrying. Ideally, longitudinal data from primary studies should aim to investigate the directionality of relationships identified, based on multiple assessments of both bullying and weapon carrying. Such studies could tease out the extent to which weapon carrying is facilitated by a ‘bullying persona’ (i.e. bullying qualities function as a stepping stone towards carrying a weapon inside/outside the school) or, alternatively, the extent to which bringing a weapon to school is a more effective way to bully (i.e. bullying incidents are facilitated by carrying a weapon at school). Within the school aggression literature, however, very few studies have examined the directionality of effects between school bullying and various outcomes, none of which on weapon carrying (Kim, Leventhal, Koh, Hubbard, & Boyce, 2006; Kochenderfer & Ladd, 1996).

A previous narrative review has investigated theories and other contextual factors that explain the association between weapon carrying and violence in general (Brennan & Moore, 2009), without any reference to the association of weapon carrying with school bullying in particular. Another meta-analytic review (Van Geel, Vedder, & Taniol, 2014) has investigated the association between school bullying and weapon carrying. The current paper extends the earlier review of Van Geel et al. (2014) in many ways.

First, the current study is based on systematic searches of the literature in twenty databases rather than six databases. Comprehensive searches of the literature could explain why the current review has located ten new manuscripts (i.e., Alsubaie, 2010; Baly, Cornell, & Lovegrove, 2014; Esselmont, 2014; Luster & Oh, 2001; Rajan, Namdar, & Ruggles, 2015; Sapouna & Wolke, 2013; Shetgiri, Lin, & Flores, 2012; Trajtenberg & Eisner, 2014; Turner, Phillips, Tigri, Williams, & Hartman, 2016; Wong, 2009).

Secondly, the earlier review combined studies with adjusted and unadjusted effect sizes (e.g., Andershed, Kerr, & Stattin, 2001; DeVoe, 2007; DeVoe & Murphy, 2011; Greene, 2003; Meyer-Adams & Conner, 2008; Stein, Dukes, & Warren, 2007; Testani-Cafiero, 2003). Unadjusted effect sizes show the bivariate association between two variables (here, bullying and weapon carrying), without controlling for potential confounds. Furthermore, unadjusted effect sizes tend to be larger, thus providing an overestimated effect on how two factors are associated (Ttofi et al., 2011a; Ttofi et al., 2012). In the present review, summary effect sizes are shown separately for unadjusted and adjusted effect sizes.

Finally, the earlier review has combined cross-sectional and longitudinal data (e.g., Hemphill et al., 2011). However, effect sizes based on cross-sectional data tend to be larger than effect sizes based on longitudinal data, as shown by earlier meta-analyses on the association between school bullying and drug use based on cross-sectional (Valdebenito, Ttofi, & Eisner, 2015) and longitudinal (Ttofi, Farrington, Lösel, Crago, & Theodorakis, 2016) studies.

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