Dangerous "Toys": The Burden of Non-Powdered Firearm Injuries in Canadian Children and Youth

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Abstract

Injuries in children and youth from non-powdered firearms are a significant public health concern in Canada and other high-income countries. Injury burden, healthcare utilization and costs related to non-powdered firearm use in Ontarians under 25 years of age were analyzed using ICES data. They demonstrate the need for effective policy interventions and awareness campaigns to improve the safety of these popular "toys."

Background

In May 2022, Toronto police fatally shot a man after receiving reports of a person carrying a rifle in an area of several schools; a pellet gun was later found on the scene (Brown 2022). Separate similar incidents involving non-powdered firearms have left several youth injured and one young person killed (Ngabo 2022). These high-profile shootings and police encounters have captured the attention of both policy makers and citizens but reflect only the tip of the iceberg in terms of total injury burden associated with non-powdered firearms.

What Are Non-Powdered Firearms?

Non-powdered firearms, also known as "air guns," or "airsofts" (referring to the weapon's mechanism) or "BBs" or "pellet guns" (referring to the weapon's bullets), fire projectiles through the force of air pressure, carbon dioxide or spring action. Because most fire at less than 152.4 metres/second – and with muzzle energy less than 5.7 joules – they are not considered "firearms" under Canada's *Firearms Act* (1995) and as defined by the *Criminal Code* (1985). While slower and less forceful than traditional firearms, many of these devices do discharge with speed and force great enough to penetrate skin or a human eye (Kennedy et al. 2006; McKenzie et al. 1995).

Falling outside of the *Firearms Act* (1995), these devices are often marketed as and considered by many to be "toys." They are widely accessible and can be purchased online, in person at major retailers or through private sale, and there is no oversight or requirement for formal training prior to use. Importantly, they are often used by children and youth (without adult supervision), whose developing brains and impulse control put them at an increased risk of injury (Sawyer et al. 2018).

Findings

Non-powdered firearm injuries in Ontario

In Ontario, from 2003 to 2018, there were 2,416 hospital encounters with young people under the age of 25, related to non-powdered firearm injuries, accounting for half of all firearm injuries in the province (48.6%; 3.9/100,000 population).

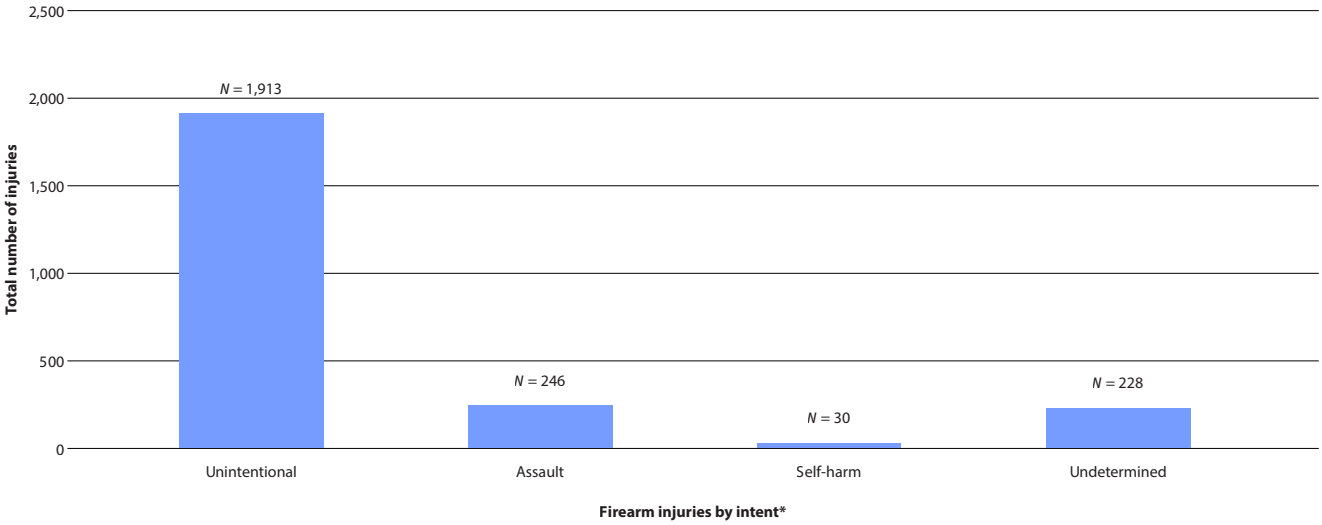
Most injuries were unintentional, but a significant number were related to assault or were self-inflicted (Figure 1). Young people living in low-income neighbourhoods were at the highest risk of experiencing firearm injuries across all weapon types and intents (Saunders et al. 2021). One in every six non-powdered firearm injuries occurred in children 12 years of age and younger.

Though most will survive their injuries, many experience lasting health needs or permanent disability (de Oliveira et al. 2022; Pulcini et al. 2021). Most presentations involved open wounds or injuries to the head or torso. One in five injuries was coded as a traumatic brain injury (including concussion). Eye injuries were also common, which are costly to treat and may lead to permanent visual impairment or blindness (Keles et al. 2014).

Healthcare Utilization and Costs

Over and above healthcare costs associated with management of the acute injury, the data indicate that utilization of healthcare services is higher among children and youth who experience non-fatal non-powdered firearm injuries in the first year post-injury, as compared to healthy children and youth (de Oliveira et al. 2022) (Table 1).

FIGURE 1.
Non-powdered firearm injuries in Ontario from 2003 to 2018 in 0- to 24-year-olds



Cell sizes less than six are not reportable due to ICES institutional policy on data privacy.

*Legal intervention not included.

Source: Adapted from Saunders et al. 2021.

TABLE 1.
Healthcare utilization in the first year post-injury for children and youth who experienced a non-powdered firearm injury, compared to healthy controls

Health service	Cases (*n* = 2188) Mean [95% CI]±SD	Controls (*n* = 4375) Mean [95% CI]±SD	Standardized mean difference	Between-group difference
In-patient medical hospitalizations	0.1 [0.1, 0.1]±0.3	0.0 [0.0, 0.0]±0.2	0.24	0.1 [0.0, 0.1]
Psychiatric hospitalizations	0.0 [0.0, 0.0]±0.2	0.0 [0.0, 0.0]±0.1	0.09	0.0 [0.0, 0.0]
Length of stay (psychiatry)	21.9 [12.5, 31.4]±31.3	33.9 [3.3, 64.5]±88.3	0.18	–11.9 [–43.9, 20.0]
Emergency department visits	2.0 [1.9, 2.0]±1.8	0.4 [0.4, 0.5]±1.0	1.04	1.5 [1.4, 1.6]
Outpatient physician visits	3.9 [3.7, 4.1]±4.8	1.9 [1.8, 2.0]±3.1	0.48	2 [1.7, 2.2]
Home care visits	0.3 [0.1, 0.4]±4.3	0.1 [0.1, 0.2]±2.5	0.04	0.1 [–0.1, 0.3]

CI = confidence interval.

Source: Adapted from de Oliveira et al. 2022.

Mean one-year healthcare costs for children and youth with non-powdered firearm injuries were $2,349 (95% confidence interval [CI] [$2118, $2578]) versus $753 (95% CI [$591, $911]) for age- and sex-matched healthy children and youth.

Legislation and Safety

The Canadian Medical Association (CMA) and the Canadian Paediatric Society (CPS) have published statements on firearms safety (CMA 2021; CPS 2018) that support classifying non-powdered firearms capable of causing injury as firearms under Canada's *Firearms Act* (1995). This would involve redefining firearms to include all barrelled weapons with a discharge force and/or velocity capable of causing significant injury, instituting new thresholds for speed and energy that are based on physical science and medical evidence (Kennedy et al. 2006; McKenzie et al. 1995).

For non-powdered weapons with forces and velocities falling below current thresholds, safety regulation is also important. In Canada, the *Canada Consumer Product Safety Act* (CCPSA) (2010) is designed to protect the public by addressing dangers to human health or safety that are posed by consumer products. Though it regulates thousands of items – including clothing, household items and children's toys – strangely, non-powdered firearms are out of scope for the *CCPSA*. Therefore, in parallel

to changes in the definition of a firearm, the CMA and CPS also call for the regulation of non-powdered firearms with less forceful projectiles under the *CCPSA* (CMA 2021; CPS 2018).

While not a comprehensive response to the issue of non-powdered firearms, the current federal Liberal government has recently introduced landmark legislation, Bill C-21 (Parliament of Canada 2021), focused on restricting the sale, transfer and accessibility of handguns. The bill also seeks to address the dangers associated with replica firearms, which are mid-velocity non-powdered firearms that closely resemble a weapon as classified under the *Firearms Act* (1995) (Parliament of Canada 2021). This will address some of the issues related to injuries, assaults and police responses in situations in which near-identical weapons are being used, but it will not address the larger issue of physical injury among children using other non-powdered firearms.

International Standards

There are no universally accepted international standards for the sale, purchase and use of non-powdered firearms, but there is evidence that countries that have implemented restrictions experience lower rates of injury from these weapons. Australia and Japan, for example, regulate and tightly restrict access to non-powdered firearms (Alleman 2000; Australian Border Force 2017). In these countries, overall firearm injuries, including those from non-powdered firearms, are very low (The Global Burden of Disease 2016 Injury Collaborators 2018).

In contrast, the US employs a limited patchwork of relatively permissive municipal and state legislation to regulate the sale and use of non-powdered firearms. Akin to what has been documented in Canada, evidence indicates that injury rates from non-powdered firearms in children and youth in the US are high (McLoughlin et al. 2020).

Prevention and Long-Term Change

Canadians are passionate gun owners, with approximately ~21% of households having at least one firearm in their home (Finley et al. 2008). Non-powdered firearms are also highly prevalent, though no data can quantify the exact number of these weapons in the country.

Bill C-21 offers an opportunity to address issues associated with replica firearms but leaves the significant issue of non-powdered firearms unaddressed. There is an opportunity to leverage existing and powerful consumer product safety infrastructure offered by the *CCPSA* to regulate ownership and monitor the effects of lower velocity, non-powdered firearms. Recognizing that there is significant injury burden associated with non-powdered firearms, it is clear that these "toys" are not safe, and children and youth must be protected from their harms. HQ

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