ACTIVE & SAFE

Evidence Summary: Skateboarding

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BC INJURY research and prevention unit

The British Columbia Injury Research and Prevention Unit (BCIRPU) was established by the Ministry of Health and the Minister's Injury Prevention Advisory Committee in August 1997. BCIRPU is housed within the Evidence to Innovation research theme at BC Children's Hospital (BCCH) and supported by the Provincial Health Services Authority (PHSA) and the University of British Columbia (UBC). BCIRPU's vision is *to be a leader in the production and transfer of injury prevention knowledge and the integration of evidence-based injury prevention practices into the daily lives of those at risk, those who care for them, and those with a mandate for public health and safety in British Columbia.*

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Evidence synthesis tool

SPORT:	Skateboarding	**Target Group:**	Skateboarding participants	
Injury Mechanisms:	The main injury mechanisms include falling and doing tricks/performing stunts			
Incidence/Prevalence	**Risk/Protective Factors**	**Interventions**	**Implementation/Evaluation**	**Resources**
Injury Types Fractures and head injuries are common injuries among skateboarders.[1,2,3,4,5,6,7] The most common fracture sites were to the forearm, ankle, elbow, and wrist.[1,2,4,7] It was noted that skateboarders are more likely to sustain an open fracture than non-skateboarders.[7] **Incidence/Prevalence** One study found that there was an average of 2.4 head injuries per patient while another study found that over half of the patients sustained a head injury.[6,7]	**Sex** Males are at a higher risk for traumatic brain injury compared to females. Males were 1.68 times more likely to suffer a traumatic brain injury than females (95% CI: 1.17-2.42).[8] **Helmets/Skate Parks** Wearing a helmet (Adjusted OR: 0.45, 95% CI: 0.27-0.75), skateboarding near home (Adjusted OR: 0.54, 95% CI: 0.37-0.79), and skateboarding at a skate park (Adjusted OR: 0.70, 95% CI: 0.53-0.92) were found to reduce the odds of suffering a traumatic brain injury.[8]	No interventions to reduce injury in skateboarding were found from this review; however, some studies direct attention to recommendations to reduce the risk of injury: Studies specifically examining skate parks as a risk factor did not distinguish between skateboarders and other users of the skate park. However, it is recommended that people utilize skate parks while skateboarding.[8,9] Comprehensive educational programs surrounding skateboard safety are imperative. This should include initiatives about using safety equipment as well as preventive techniques such as how to roll during a fall in order to reduce the potential of sustaining an injury.[3,9].	No implementation or evaluation studies were found in the literature.	**Websites** Center for Injury Research and Policy: Skateboarding Safety Head's Up Program: Get a Heads Up On Skateboard Helmet Safety National Safety Council: Skateboarding Safety Tips Parachute: Safe Skateboarding Safe Kids Worldwide: Skating and Skateboarding Safety Tips Skateboard Safely: Skate Safe From the Start (New Zealand Transport Agency) U.S. Consumer Product Safety Commission: Skateboarding Safely York Region: Safety for Skateboarding
Works Cited: [1]Hawkins, R. W., & Lyne, E. D. (1981). Skateboarding fractures. *The American Journal of Sports Medicine, 9*(2), 99-	**Works Cited:** [8]Lustenberger, T., Talving, P., Barmparas, G., Schnriger, B., Lam, L., Inaba, K., & Demetriades, D. (2010).	**Works Cited:** [3]McGeehan, J., Shields, B. J., & Smith, G. A. (2004). Children should wear helmets while ice-skating: A comparison of skating-		

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645-649. [7]Zalavras, C., Nikolopoulou, G., Essin, D., Manjra, N., & Zionts, L. E. (2005). Pediatric fractures during skateboarding, roller skating, and scooter riding. *American Journal of Sports Medicine, 33*(4), 568-573.				

Review of Sport Injury Burden, Risk Factors and Prevention

Skateboarding

Incidence and Prevalence

Fractures and traumatic brain injury (TBI) are two of the most common injuries among skateboarders (Allum, 1979; Hawkins & Lyne, 1981; Lustenberger et al., 2010; Tominaga, Schaffer, Dandan, Coufal, & Kraus, 2015). Tominga et al. (2015) examined 168 skateboarders admitted to hospital. Their definition of head injury was any sort of injury that occurred to the head including fractures and traumatic brain injuries. One hundred and forty-one patients were diagnosed with at least one form of head injury, representing three quarters of the sample. There were 343 head injury diagnoses overall, an average of 2.4 head injuries per patient. Eighty-eight percent of skateboarders with a head injury were discharged, 3.5% were moved to another acute care hospital, 6.3% were transferred to a rehabilitation hospital, and 2.1% died from their injuries.

Zalavras et al. (2005) examined fractures in skateboarders, roller skaters, and scooter users under the age of 17. In this study, authors compared 187 patients who sustained a skateboarding fracture to a control group of 1965 patients that suffered a fracture outside of skateboarding. Skateboarders were 2.6 times more likely to sustain an open fracture than non-skateboarders (95% CI: 1.3-5.3). Overall there were 191 fractures sustained by the 187 patients. The majority of fractures were to the forearm (48.2%), followed by the ankle (23%), and elbow (12.6%) (Zalavras, Nikolopoulou, Essin, Manjra, & Zionts, 2005).

Osberg et al. (1998) had similar findings after studying 254 skateboarders admitted to hospital. Many sustained multiple injuries. 50.8% sustained a head injury, 27.2% sustained an upper extremity injury and 26% suffered a lower extremity injury. 16.5% of patients had severe injuries as defined by injury severity scores.

Lindsay and Brussoni (2014) examined 4982 skateboarding injuries in children between 5 and 16 years of age who suffered a total of 5583 injuries. Many children sustained multiple injuries to multiple areas of the body. The majority of patients suffered a fracture (n=2315, 41.5%), 1765 patients sustained a musculoskeletal injury (31.6%), 293 sustained a minor head injury (5.2%), and 27 sustained severe head injuries (0.5%). Most fractures were to the elbow and forearm with 806 fractures (34.8%), followed by 695 fractures to the wrist and hand (30%), and 130 fractures to the clavicle/shoulder/upper arm (5.6%).

With the exception of the study by Lindsay and Brussoni (2014), all the studies were retrospective. Tominga et al. (2015) and Zalavras et al. (2005) utilized administrative data which may not have been complete. Lindsay and Brussoni (2014) utilized an injury surveillance system in their prospective study; however, not all hospitals within Canada participate in this system which may lead to an underestimation of injuries. Almost all studies examined patients who

attended an emergency department or were admitted to hospital. As a result, people who were not seen in an emergency department were not captured.

Risk and Protective Factors

Lustenberger et al. (2010) examined injuries resulting in hospitalization across the United States over 5 years, across all age groups. They conducted an in-depth review of all the risk and protective factors associated with skateboarding. Risk factors included age and sex. Children ages 10-16 were 1.52 times more likely to suffer a TBI compared to those under the age of 10 (95% CI: 1.07-2.17). Three hundred and fifty patients over the age of 16 suffered a TBI. They were 2.64 times more likely to have a TBI than those under the age of 10. (95% CI: 1.83-3.79). Sex was also found to be a risk factor; 577 males opposed to 38 females were injured. Males were 1.68 times more likely to suffer a TBI than females (95% CI: 1.17-2.42).

Lustenberger et al. (2010) found several protective factors. Helmet use was found to be a protective factor (OR: 0.45, 95% CI: 0.27-0.75) and skateboarding near home was also found to be a protective factor for traumatic brain injury (OR: 0.54, 95% CI: 0.37-0.97). Skateboarding at a skateboard park resulted in less traumatic brain injuries (OR: 0.70, 95% CI: 0.53-0.92) compared to those who did not utilize a skate park.

Several studies included in this review found low usage of personal protective equipment (PPE) among those who were injured, the majority of those injured were male, and that most injuries occurred outside of a skate park,. These studies; however, did not provide estimates of risk, only descriptive statistics (Atienza, Sia, & American Academy of Pediatrics, 1976; Hawkins & Lyne, 1981; McGeehan, Shields, & Smith, 2004).

Limitations from work in this area include the use of administrative databases over in-hospital collection. Administrative databases may have missing data and may not adequately capture all injuries. They also did not include patients who were seen outside of a hospital setting.

Opportunities for Prevention: Effective Interventions, Cost-Effectiveness, Implementation and Evaluation

There were no studies found that examined interventions to reduce the risk of injury in skateboarding; however, some studies suggest interventions that should be further investigated. Shuman and Meyers (2015) emphasized the need for more rigorous education programs for skateboarders, not just on the importance of PPE, but on how to prevent falls. This includes proper rolling and falling techniques to minimize or prevent injuries altogether (Shuman & Meyers, 2015). Dedicated skate parks may also be another way to avoid injuries as demonstrated by Lustenberger (2010) but studies specifically dedicated to observing skate park injuries did not distinguish between skateboarders and other users of wheeled sports (Shuman & Meyers, 2015). Further studies investigating only skateboarders at skate parks are needed in order to determine the effectiveness of skate parks in preventing skateboarding injuries. There is a significant amount of literature in other sports including skiing, snowboarding, and cycling

that demonstrate the effectiveness of helmet use in reducing the risk of head injury. Helmet use must therefore, be emphasized due to the sheer amount of TBI and head injuries reported in the literature (Lustenberger et al., 2010; McGeehan et al., 2004; Shuman & Meyers, 2015).

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