#headstrong_TO

An innovative approach to reducing head injury among Toronto cyclists

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Introduction

Cycling crashes are inevitable, even where better cycling road infrastructure is in place.(1-5) Helmet use is central to mitigating injury when a crash occurs. Evidence from multiple systematic reviews demonstrates that **helmets reduce the risk of head and brain injury** by 63-88% among cyclists involved in a collision or a fall, even in crashes involving a motor vehicle.(6-7)

The Ontario Cycling Death Review examined 129 cases of cyclists who died between January 2006 and December 2010 and determined that **each one of the cycling-related deaths was preventable**.(8) The proportion of helmet use was very low – only 26 percent of those cyclists killed during the review period were wearing a helmet.

Strategies to increase helmet use include community and school-based awareness campaigns, legislation, and less commonly, helmet giveaway programs. Among children and youth, **free helmets have resulted in the greatest uptake of helmet-wearing** compared to educational interventions or even cost-subsidized helmets. One study demonstrating a long-term increase in compliance (1.3% to 32.5%) incorporated annual education, material, and support strategies for the duration of the 4-year study.(9) Previous helmet giveaways among adults have resulted in immediate increases in helmet use, but these effects diminished over time.(10-11) No helmet giveaway offered participants formal support or follow-up to track self-reported helmet use in the long-term.

The goal of the HEADSTRONG Behaviour Study (#headstrongTO) is to identify injured adult cyclists who do not regularly wear helmets, provide participants with a free helmet, and enroll them in a one-year follow-up **program to facilitate sustained helmet use**.

Framework for behavioural change

Our behaviour change intervention is based in principles of health behaviour change.(12-14) #headstrongTO incorporates "the nudge" element of behavioural economics with education and support strategies to support non-helmet wearers to adopt the desired behaviour. Long-term follow-up and engagement using social media to improve compliance with helmet wearing is a novel element of the study.

Role modelling is an important factor in changing social behaviour. Observational data suggest that adult cycling companions tend to adopt the same helmet wearing behaviour.(15) Using #headstrongTO as a surrogate for rider companionship, injured cyclists who are new helmet-wearers will be connected with other enthusiasts and cycling advocates, including peers who demonstrate safe cycling practices.

As a social media platform, Twitter is broadly used by Toronto cyclists: formal and informal Twitter handles based in Toronto have more than 20,000 followers and encourage active engagement from users on topics such as road safety, infrastructure and design, and policy improvement, especially at the local level. By capitalizing on this communication strategy that is entrenched in cycling culture , we hope to foster a community of support for new helmet-wearers in Toronto.

Objectives

- To determine the effectiveness of #headstrongTO to facilitate sustained uptake of desired behaviour (helmet wearing) among injured cyclists who present to the ED (primary participants).
- To evaluate the utility of #headstrongTO to achieve direct spread and uptake of the desired behaviour among nominated peers (secondary participants).
- To characterize safe cycling practices and compliance by age, gender, barriers to helmet use, and injury history among injured cyclists in Toronto.
- To explore the use of the #headstrongTO social media platform to engage injured cyclists and their peers in dialogue regarding helmet use and cycling safety practices.

HEADSTRONG Behaviour Strategy

1) Components of the intervention

HEADSTRONG Behaviour Strategy

Set the stage (T1)	Give the nudge (T2)	Support the change (TO1-4)
➢ Intercept patient post-injury in the ED (engage & educate)	➢ Provide and fit free helmet (remove barriers)	➢ Engage participant on SoMe (model behaviour) ➢ Commitment to follow-up (social contract) ➢ Peer nomination (provide reward)

2) Study sequence for enrolled participants

T1 (in-person)	Enroll in study and take survey @ ED
	Pick up helmet upon ED discharge
TO1 (online)	Engage with @headstrongTO
TO2 (online)	Complete 2 week follow-up survey
TO3 (online)	Complete 2 month follow-up survey
TO4 (online)	Complete 6 month follow-up survey
TO5 (online)	Complete 12 month follow-up survey

Enrollment
Active participation
KT opportunity
Participation concludes

3) KT material used to engage & educate at T1

Think About It

Cycling accidents happen. Each year, roughly 7,500 cyclists are seriously injured in Canada.

The greatest threat to injured cyclists is a head injury. Among all cycling injures, head injuries account for 1/3 of ED visits, 2/3 of hospital admissions, and ¾ of deaths.

Some head injuries result in lasting injury to the brain. Brain injury can affect how a person thinks, moves, talks, feels or behaves and can also cause memory loss.

In the event of an cycling accident, helmets are the best way to protect your head and brain from injury. Helmets reduce the risk of head and brain injury during a cycling accident by about 75%.

How would a brain injury change your life?

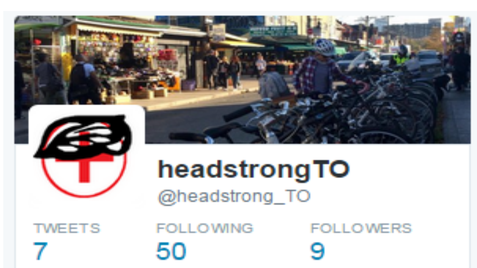
Reasons to Wear a Helmet

- **We call for better cycling infrastructure across Toronto and Canada…**but crashes and falls will always occur.
- **Without a helmet, you get zero protection.** In the event of a crash, wearing a helmet while cycling reduces the risk of a head, brain or severe brain injury by about 75%.
- **Poor visibility due to low-light is a major factor in one-third of cycling deaths.** Cyclists who use helmets with reflective elements and front and rear lights are more visible to drivers and other cyclists.
- **Helmets keep the sun out of your eyes** and protect you from rain and other elements.
- **Help build cycling culture in Toronto.** Helmets help establish your presence among cyclists, pedestrians and drivers.
- **Free stuff is awesome.** By wearing your free #headstrongTO helmet, you can nominate a friend to receive a free helmet, too.

#headstrongTO

#headstrongTO

4) #headstrong_TO social media group



5) #headstrong_TO follow-up survey

Thank you for your continued participation in the HEADSTRONG Behaviour Study

1. **Have you returned to cycling since your injury?**
2. **Did your accident change your cycling behaviour?**
3. **Since you were injured, how often do you wear your helmet when riding your bicycle?**
4. **If you ever cycle without wearing a helmet, please tell us what stops you from wearing a helmet.**

To complete this follow-up, please take a selfie while wearing your #headstrong_TO helmet (not while riding, please!) and send it via email or DM to @headstrongTO

Methods

This is a prospective cohort study of injured cyclists presenting to a Toronto ED. Voluntary participants are recruited by the ED clinician (EP or NP) and enrolled in #headstrong_TO, a multi-pronged education, material, and social support strategy to promote sustained helmet use in **non-helmeted** injured cyclists.

Candidates will be considered **eligible to participate** if they provide consent and:

- present to TWH ED with a cycling injury, non-helmeted, during daytime hours;
- are at least 18 years of age;
- will be able to resume cycling within 8 weeks of injury (per self-report);
- wish to receive a free helmet for the purpose of personal use while cycling;
- have access to email and a member of Twitter social media platform.

Candidates will be ineligible to participate if they refuse to provide consent or:

- are unable to consent (e.g. language barrier, intoxication, altered mental status);
- are deemed medically unable to participate; or, are admitted to hospital.

The following outcomes will be collected in order to evaluate the intervention:

1. Rate of recruitment of i) injured cyclists recruited in the ED (primary participants) and ii) nominated peers who receive a free helmet (secondary participants)
2. Confirmation of enrollment by voucher redemption for free helmet by i) primary and ii) secondary participants.
3. Compliance with follow-up prompts and self-reported helmet use by primary participants.
4. Active engagement with @headstrong_TO Twitter group.

A sample size of 100 injured cyclists will detect prevalence of usage/compliance of ±10%, assuming 80% study completion and 50% of participants reporting helmet wearing at 12 months (power >90%, $\alpha = 0.05$). We will also characterize cycling safety practices and barriers to helmet use using the demographic information, cycling tendencies and behaviours collected at T1.

Implications & Limitations

This project seeks to demonstrate proof-of-concept of a healthcare intervention to to increase cycling helmet use in a *sustained* manner. This goal addresses a well-described public health problem, and is in alignment with the direction of the Ontario Coroner's Office, the Canadian Association of Emergency Physicians, and the Canadian Medical Association.(8,16-17) The project draws upon existing principles of behavioural change and health promotion, integrating them in a manner that is sustainable and scalable to other EDs. Accepted principles of engagement in the ED for purposes of screening and harm reduction (i.e. smoking, intimate partner violence) prove the efficacy of this model. The costs of a TBI (including health care costs and lost productivity) relative to the cost of a helmet are well documented and should support the scalability of this model to other acute care settings. Further study will explore best practices for doing so.

References

1. Fishman E, Washington S, Haworth N. Barriers and facilitators to public bicycle scheme use: A qualitative approach. *Transp Res Part F Traffic Psychol Behav.* 2012;15(6):686-698.
2. Harris MA, Reynolds CC, Winters M, et al. Comparing the effects of infrastructure on bicycling injury at intersections and non-intersections using a case-crossover design. *Inj Prev.* 2013;19(5):303-310.
3. Reynolds CC, Harris MA, Teschke K, Cripton PA, Winters M. The impact of transportation infrastructure on bicycling injuries and crashes: a review of the literature. *Environ Health.* 2009;8:47.
4. Teschke K, Frendo T, Shen H, et al. Bicycling crash circumstances vary by route type: a cross-sectional analysis. *BMC Public Health.* 2014;14:1205.
5. Teschke K, Harris MA, Reynolds CC, et al. Route infrastructure and the risk of injuries to bicyclists: a case-crossover study. *Am J Public Health.* 2012;102(12):2336-2343.
6. Thompson DC, Rivara FP, Thompson R. Helmets for preventing head and facial injuries in bicyclists. *Cochrane Database Syst Rev.* 2000(2):Cd001855.
7. Thompson D, Rivara F, Thompson R. Wearing a helmet dramatically reduces the risk of head and facial injuries for bicyclists involved in a crash, even if it involves a motor vehicle. *Cochrane Database of Systematic Reviews.*2009.
8. *Cycling Death Review.* Toronto, ON: Office of the Chief Coroner, Ministry of Community Safety and Correctional Services;2012.
9. Farley C, Haddad S, Brown B. The effects of a 4-year program promoting bicycle helmet use among children in Quebec. *Am J Public Health.* 1996;86(1):46-51.
10. Constant A, Messiah A, Felonneau ML, Lagarde E. Investigating helmet promotion for cyclists: results from a randomised study with observation of behaviour, using a semi-automatic video system. *PLoS One.*2012;7(2):e31651.
11. Ludwig TD, Buchholz C, Clarke SW. Using social marketing to increase the use of helmets among bicyclists. *J Am Coll Health.* 2005;54(1):51-58.
12. Thompson NJ, Sleet D, Sacks JJ. Increasing the use of bicycle helmets: lessons from behavioral science. *Patient Educ Couns.* 2002;46(3):191-197.
13. Green LW. *Health education planning: a diagnostic approach.* University of Michigan, Ann Arbor, MI: Mayfield Pub. Co.; 1980.
14. Briscoe C, Aboud F. Behaviour change communication targeting four health behaviours in developing countries: a review of change techniques. *Soc Sci Med.* 2012;75(4):612-621.
15. Dannenberg AL, Cote TR, Kresnow MJ, Sacks JJ, Lipsitz CM, Schmidt ER. Bicycle helmet use by adults: the impact of companionship. Public Health Rep. 1993;108(2):212-217.
16. Letovsky E, Rowe BH, Friedman SM, Snider C, Sullivan E. *Position Statement: Improving Bicyle Safety in Canada.* Ottawa, ON: Canadian Association of Emergency Physicians;2014.
17. The Role of Physicians in Prevention and Health Promotion (Update 2001). Ottawa, ON: Canadian Medical Association; 2001.

#headstrong_TO: Helmet Education Awareness and Distribution Social Media Trial to Reduce Obstacles and Nudge Group Behaviour Strategy

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