

Prevention and management of sports-related mild traumatic brain injury in children and adolescents: A mixed-methods multi-stakeholder approach in Switzerland

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Final report of the funded project under the “2023 SSPH+ Call for Academic Activities to Foster Inter-University Initiatives and Collaborations”

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1. Introduction and Objectives

Children and adolescents practicing sports, especially contact sports, are particularly susceptible to mild Traumatic Brain Injuries (mTBI). mTBI, commonly called concussion, requires the implementation of effective prevention and management strategies. However, the lack of data makes it difficult to fully understand the extent and characteristics of mTBI and thus develop effective strategies (1). At the same time, raising awareness about the issue by promoting attitude and behavior change is critical (2). Raising awareness involves educating coaches and adolescents together with their caregivers about the risks and signs of sports-related concussions (SRCs), including, as well as encouraging safe practices in sports and other physical activities. In addition to this, sufficient professional resources are needed to handle increased cases of suspected SRCs after initiatives promoting early diagnosis and management. Prevention can be categorized according to four different strategies (3): *technical*, (4,5), *legislative* (6), *monetary* (7,8) and *communication measures*, typically in form of health communication campaigns or education interventions.

In the present project, we focused on *communication measures* to achieve three consecutive objectives (O), with the goal of translating health communication research into policy and action:

- (O1) *Systematic evidence collection* of a) SRC incidence among children and adolescents in Switzerland and b) health education and communication strategies promoting SRC awareness among adolescents and their caregivers.
- (O2) *Establishment of an interdisciplinary network* of experts and representatives of target groups to foster dialogue and obtain collective insights about their awareness, knowledge, opinions, and perceived usefulness, barriers and facilitators of communication strategies aimed at SRC prevention.
- (O3) *Development of recommendations for designing, implementing and evaluating communication measures* (e.g., intervention, campaign) targeted at adolescents and their caregivers in Switzerland to prevent SRC.

2. Project team composition

This collaborative, interdisciplinary project was conducted between January 2024 and December 2024. It included SSPH+ members from all three language regions across Switzerland (*Figure 1*) and with a diverse and complementary expertise (*Table 1*). Yara Barrense-Dias, Anne-Linda Camerini, Marta Fadda, Oliver Gruebner, and Michael von Rhein co-coordinated the project. Giovanna Pedroni and Chantal Kuske (formerly Lüdi) were financed with project funds and organized and conducted the main project activities. Furthermore, they organized regular online team meetings where activities were planned, reported and discussed with all team members.

Table 1. Overview of project team members

Name	Affiliation	Expertise
Yara Barrense-Dias	Department of Epidemiology and Health Systems, Research Group on Adolescent Health, Center for Primary Care and Public Health (Unisanté), University of Lausanne, Lausanne, Switzerland	Public Health, Expert in adolescent and young adults health, Mixed-methods approach
Anne-Linda Camerini	Institute of Public Health, Faculty of Biomedical Sciences, Università della Svizzera italiana, Lugano, Switzerland	Health Communication, Expert in child and adolescent well-being and health campaign development and evaluation
Marta Fadda	Institute of Public Health, Faculty of Biomedical Sciences, Università della Svizzera italiana, Lugano, Switzerland	Health Communication, Qualitative Research Methods, Bioethics
Oliver Grübner	Faculty of Health Sciences and Medicine, University of Lucerne, Lucerne, Switzerland	Public Health and Epidemiology
Michael von Rhein	University Children's Hospital Zurich, Child Development Center, Pediatric Health Care Research, University of Zurich, Switzerland	Developmental Pediatrics, Pediatric Neurology, and Pediatric Health Care Research. Research foci: Pediatric Health Care Research, long-term outcome and imaging of children with developmental risks of all ages, pediatric primary care, participatory research
Giovanna Pedroni	Institute of Public Health, Faculty of Biomedical Sciences, Università della Svizzera italiana, Lugano, Switzerland	Public Health; Bridging Research, Action, and Policy for Health Prevention and Promotion
Chantal Kuske (formerly Lüdi)	University Children's Hospital Zurich, Child Development Center, Pediatric Health Care Research, University of Zurich, Switzerland	Health Sciences, Public Health, Project management

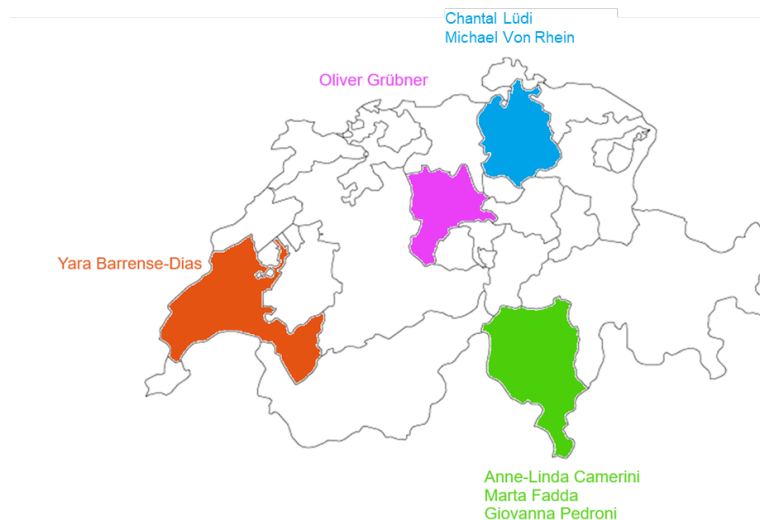


Figure 1. National collaboration project (highlighted: institutions of the core team members and workshop venues)

3. Methodology

This project relied on a participatory, mixed-methods approach. To meet O1, we contacted national insurance companies, political entities, and institutions to obtain and analyze available data on the incidence of SRC in Switzerland. Furthermore, we conducted a pre-registered systematic literature review and meta-analysis of current health communication strategies aimed at SRC prevention among adolescents and their caregivers. To meet O2, we contacted experts, including young people in the French part, parents and coaches from various fields and conducted both semi-structured individual interviews and workshops (one workshop per language region, for an example, see *Figure 2*). Participants came from all three main language regions of Switzerland. To meet O3, we extended the scope of the workshops to develop recommendations for communication strategies aimed at SRC prevention based on the results obtained through O1 and O2.



Figure 2. Example set-up of workshop with different stakeholders

1. Results and deliverables

Systematic evidence collection

Concerning O1, we contacted four insurance companies (e.g., SWICA) and institutions (e.g., BASPO). We found that data on SRC incidence among children and adolescents in Switzerland is scarce: hospitals collect diagnostic data, but the cause is not registered and only a very small proportion of suspected mTBIs get professional diagnosis. Next, we conducted a pre-registered systematic review and meta-analysis (PROSPERO CRD42023485725) and identified 22 studies evaluating interventions aimed at SRC prevention targeting adolescents and/or their caregivers. Reviewed interventions primarily stem from Canada and the US and proved to be effective in improving awareness and knowledge of SRC, SRC symptoms reporting behavior, and, to a lesser extent, changing attitudes towards SRC. Furthermore, the included studies were short-term, and the effects generally did not depend on intervention and target population characteristics. We presented the results of the systematic review and meta-analysis at the *10th Congress of the European Academy of Neurology 2024*, the *Swiss Public Health Conference 2024*, and submitted a manuscript for open access publication to *Public Health Reviews*.

Establishment of an interdisciplinary network

To meet O2, we conducted 12 interviews with pediatricians, neurologists, sports physicians, coaches, parents, athletes, communication science experts. Furthermore, we conducted three workshops (June 2024: Winterthur, German; September 2024: Lausanne, French; October 2024: Lugano, Italian), inviting experts and parents to share their experiences and discuss solutions for a future strategy to improve SRC monitoring and prevention/management. We found significant variation in knowledge and opinions about SRC. While medical professionals demonstrated a high level of awareness, parents and young athletes exhibited gaps in understanding. Current communication strategies were found to be inconsistent and lack a standardized approach. Experts agreed that there is a serious lack of SRC prevention through communication strategies. Such strategies are urgently needed and require sport-specific approaches. Moreover, experts agreed that, rather than focusing solely on primary prevention, it would be more effective to promote proper management to prevent the worsening of SRC outcomes. Finally, experts reported that an interdisciplinary and participatory approach is needed to ensure the effectiveness of communication measures. They underlined the need to sustain future campaigns or education interventions to maintain their positive effects.

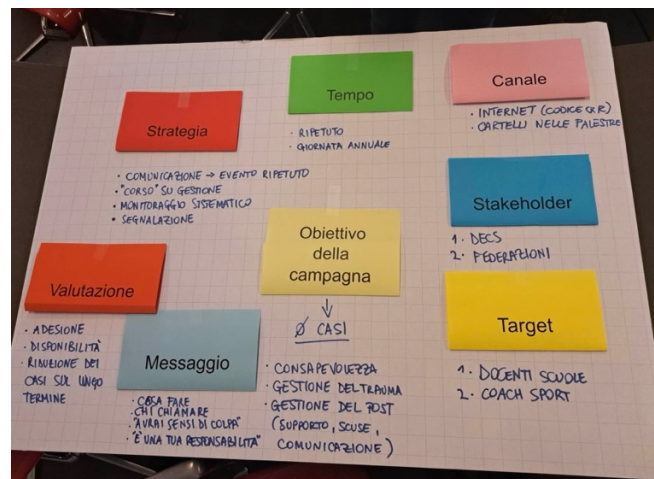


Figure 3. Example output from a workshop (SRC prevention and management campaign)

We have presented the outcomes of the multi-stakeholder approach at the *Swiss Public Health Conference 2024* and the *DGPuK Conference Health Communication 2024*. We are currently summarizing the results in a manuscript, which we plan to submit to *Swiss Medical Weekly* by the end of February 2025.

Development of recommendations for designing, implementing and evaluating communication measures

To effectively communicate the project's progress and engage all stakeholders, we developed a flyer summarizing the project to provide an update for everyone involved. The flyer was written in simple, non-scientific language in German, Italian and French to ensure accessibility and understanding. It provided a concise overview of the research gap, the objectives of the project and the methods used for data collection. It also summarized the main findings from the interviews and workshops conducted during the project.

The third page of the flyer was dedicated to practical examples, illustrating how the findings could be used in practice. These examples were directly derived from the workshop results, ensuring their relevance and applicability. Furthermore, the flyer included an outline of the project's future and outlook.



PROJEKT: MILDE SPORTBEDINGTE KOPFVERLETZUNG ZUKUNFT UND EMPFEHLUNG



Praktisches Beispiel aus dem Workshop - Kampagne

- Interessengruppen:** Schulbehörden und Sportverbände
- Zielgruppen:** Schulsportlehrer und Sporttrainer
- Zielsetzungen:** Erweiterung des Wissens über msK, Verbesserung des Managements von Gehirnerschütterungen, Verringerung der Prävalenz und Inzidenz
- Strategie:** Obligatorischer Kurs, der im Laufe der Zeit wiederholt wird
- Kanal:** Website, Poster



Figure 4. Example information flyer for the participants

The flyer was distributed either by post or E-Mail to all participants of the interviews and workshops, ensuring that everyone who contributed to the project was kept informed and engaged.

We would like to thank everyone who contributed to the project and SSPH+ for their funding. Without the invaluable expertise, support and commitment of all involved, this project would not have been possible.

4. Scientific output

Pedroni, G. Lüdi, C., von Rhein, M., Gruebner, O., Barrense-Dias, Y. Goeggel Simonetti, B., Fadda, M. †, & Camerini, A. L.† (2024) Prevention and management of sports-related mild traumatic brain injury in children and adolescents: A mixed-methods multi-stakeholder approach in Switzerland, *DGPuK Conference Health Communication 2024*, 20th to 22nd November 2024, Lucerne, Switzerland (Oral presentation, † shared last authorship)

Lüdi, C., Pedroni, G., Fadda, M., von Rhein, M., Gruebner, O., Barrense-Dias, Y., & Camerini, A. L. (2024) Promoting awareness and prevention of sports-related concussion in Swiss adolescents: A multidisciplinary approach, *Swiss Public Health Conference 2024*, 3rd to 4th September 2024, Fribourg (Oral presentation)

Pedroni, G., Fadda, M., Lüdi, C., von Rhein, M., Gruebner, O., Barrense-Dias, Y., & Camerini, A. L. (2024) Sports-related mTBI prevention and management in children and adolescents: A systematic review, *Swiss Public Health Conference 2024*, 3rd to 4th September 2024, Fribourg (Poster presentation)

Pedroni, G., Fadda, M., Lüdi, C., von Rhein, M., Gruebner, O., Barrense-Dias, Y., & Camerini, A. L. (2024) Sports-related mTBI prevention and management in children and adolescents: A systematic review, *10th Congress of the European Academy of Neurology*, 29th June to 2nd July 2024, Helsinki, virtual (Poster presentation)

Scientific output submitted or in preparation

Pedroni, G. Lüdi, C., von Rhein, M., Gruebner, O., Barrense-Dias, Y. Goeggel Simonetti, B., Fadda, M. †, & Camerini, A. L.† (2024), *Mitigating Sports-Related Concussions in Adolescent Athletes: A Systematic Review and Meta-Analysis of Communication and Education Interventions* († shared last authorship, submitted)

Fadda, M., Pedroni, G., Lüdi, C., von Rhein, M., Gruebner, O., Barrense-Dias, Y., & Camerini, A. L. (2024) Protecting Young Athletes: Tackling Sports-Related Brain Injuries Through a Swiss Multi-Stakeholder Approach (in preparation)

5. Financial report

Contributions of the PIs were financed with matched funding from their host universities that are members of the SSPH+ network.

Category of Expenses	Short specification				Amount in CHF
Expenses for Workshops incl. travel costs, catering etc.					
WS1 (Winterthur)					631.-
WS2 (Lausanne)					496.-
WS3 (Lugano)					535.-
Final closing meeting (Zurich)					800.-
Gifts and final info upon project finalization to participants					500.-
Salaries (incl. social security, etc.)	Staff name	Function	Person-hours	Amount in CHF	
	Marta Fadda	Co-Lead, 14 months USI	10%	matching funds	17'821.-
	Oliver Gruebner	Co-Lead, 14 months UZH, UL	10%	matching funds	
	Anne-Linda Camerini	Co-Lead, 14 months USI	10%	matching funds	
	Michael von Rhein	Co-Lead, 14 months UZH	10%	matching funds	
	Chantal Lüdi	Research assistant UZH, 12 months	10%	8'328.-	
	Giovanna Pedroni	Junior researcher USI, 12 months	10%	9'493.-	
Publication costs	CHF 2'000 (still to come)				2'000.-
Total costs					22'783.-

6. References

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7. Michaud TL, Estabrooks PA, You W, Ern J, Scoggins D, Gonzales K, et al. Effectiveness of incentives to improve the reach of health promotion programs- a systematic review and meta-analysis. *Prev Med.* 2022 Sep;162:107141.
8. Sassi F, Belloni A. Fiscal incentives, behavior change and health promotion: what place in the health-in-all-policies toolkit? *Health Promot Int.* 2014 Jun;29 Suppl 1:i103-112.