Coastal & Waterside Saunas – Minimising Risk

Introduction

In this document, Professor Mike Tipton from Portsmouth University sets out the physiological effects of combining cold water immersion with sauna use, and the RNLI provides water safety advice, in particular on cold water shock and waterside activity.

Context:

Across Britain and Ireland, there has been a boom in the popularity of outdoor saunas. Specific figures are difficult to ascertain but a surfeit of newspaper articles[1] and the rapidly increasing membership of sauna operators registered with the British Sauna Society[2] support anecdotal observations from national water safety organisations, Harbour Authorities, Local Authorities and members of the National Water Safety Forum, that indicate a significant rise in the popularity of outdoor saunas. The locations of outdoor saunas vary from mobile facilities including coastal, inland waterside and festival venues, to more permanent urban and rural facilities. Originating from Scandinavian, Baltic and Nordic practices, the "experience" of sauna bathing, traditionally[3] combines hot sauna bathing (SB) with cold water immersion (CWI).

Associated with the rise in the popularity of SB/CWI, is a greater awareness of the need for appropriate assessment and management of the associated novel and unique risks. As popularity increases, concurrently so does risk unless such risks are appropriately managed. Rescue organisations have reported incidents where personnel have responded to coastal/open water sauna-users caught in rip currents or unable to exit the water safely due to waves or steep banks. There is also an increased theoretical risk of physiological problems on leaving a sauna after combined SB/CWI.

According to Professor Tipton, whilst research has been commissioned to explore the many anecdotal benefits to mental and physical wellbeing, both SB and CWI represent separate and significant thermal stresses to the body, and both activities have resulted in injuries. For SB, the most common injuries are slips, falls, dizziness and syncope (fainting) – these problems are probably related (Kaiser et al, 2023). For CWI, the most serious problems are drowning, cardiovascular events and local and general hypothermia (Tipton et al, 2022). Furthermore, in coastal and open water locations, there are the additional water safety risks posed by currents, wave strength and exit/entry conditions.

As a result of these risks, safety advice is provided, independently, for both activities (e.g. for saunas[4] and CWI[5] and open water swimming[6]). Less consideration has been given to the challenges presented by combining SB and CWI, although this activity is occurring with increasing frequency. This paper addresses this area.

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[1] Sauna in the news — British Sauna Society

[2] www.britishsaunasociety.org.uk reports the growth of authentic public saunas across the UK from 45 in January 2023 to 160 in January 2025.

[3] Aachen Sauna Definition | International Sauna Association - ISA

[4] https://www.healthline.com/health/how-to-use-a-sauna

[5] https://thebluetits.co/pages/dont-be-a-tit-be-a-bluetit-swim-safety-resources

[6] https://rnli.org/safety/choose-your-activity/open-water-swimming#section-anchor-link---before-you-go

Physiological effects of combining SB with CWI as explained by Professor Tipton:

The individual physiological challenges presented by SB and CWI remain when the two are combined. In addition, SB will raise body temperatures before CWI, but there is little evidence that this alters the cold shock response to immersion (gasping, increase in heart rate and ventilation, Windle et al, 1994). The increased body temperature creates a larger temperature gradient between the body and water, this results in faster body temperature cooling until body temperature falls to approximate the level that would have been seen without a preceding sauna (Taylor et al, 2014). CWI before SB results in people entering a sauna with lowered body temperatures, particularly skin temperature. This reduction in body heat content can result in individuals spending a longer time in a sauna before reaching the critical body temperature that causes them discomfort and drives them to leave. Fluid loss due to sweating may be greater with the longer time spent in a sauna, but this has not been confirmed.

The largest additional challenge caused by combining SB with CWI, in whichever order they are undertaken, is the reduction in circulating blood volume (hypovolaemia) and increased blood viscosity. It is well-recognised that the sweating evoked by SB can lead to dehydration and hypovolaemia. Less well known is the hypovolaemia resulting from CWI. CWI leads to the body shutting down blood flow to the skin (cutaneous vasoconstriction) as part of the defence against heat loss: the circulation is withdrawn beneath the body's layer of insulating subcutaneous fat. This is compounded by the "hydrostatic squeeze" of the water when immersed. The resulting increase in central blood volume and pressure is sensed by the body, and hormones are released which act on the kidney to reduce blood volume by producing urine from blood plasma. This "cold-induced diuresis"[7] can result in the production of over 0.5 L of urine in a short period of time. The hypovolaemia caused by the shift of blood plasma from the circulation to the bladder is an appropriate adjustment to CWI, but can contribute to the problems experienced when exiting the water, or when the body rewarms (for example during SB) and the skin circulation re-opens whilst there is insufficient blood volume to maintain blood pressure. "Circum-rescue collapse" and "Rewarming collapse" has been recognised for many years (Golden et al, 1991).

So, both CWI and SB can, by different mechanisms, result in hypovolaemia and low blood pressure (hypotension) in the heat. Blood pressure is particularly compromised when standing still (no leg muscle contractions to assist the return of blood to the heart) and brain blood pressure can be reduced to a level where an individual faints. It can also occur in the heat when those who are hypovolaemic stand-up resulting in a further transient drop in blood pressure (orthostatic or postural hypotension,[8] Schlader et al, 2016). Such episodes generally recover almost immediately when the individual collapses as brain blood pressure and flow is restored because the head is now at the same level as the heart. The prime hazard from such faints for otherwise fit and healthy individuals is from falling e.g. falling into water or impact with hard surfaces.

Regular movement, even small leg movements whilst seated, or stood in one place are effective in reducing the incidence of fainting by reducing blood-pooling in the legs. The risk of suffering a faint is greatest when first using SB; the risk of suffering such an episode declines after a period of acclimatisation, but can increase again if dehydrated. Repeated cycles of CWI and SB can lead to increased dehydration and increased likelihood of hypovolaemia-induced fainting. More serious

[7] https://theconversation.com/why-do-i-need-to-pee-more-in-the-cold-184236
[8] https://www.mayoclinic.org/diseases-conditions/orthostatic-hypotension/symptoms-causes/syc-20352548

outcomes are possible if the person involved already has a compromised cardiovascular system due to illness, disease or other conditions.

Advice For Sauna Participants:

The mechanisms described above are likely to be the cause of the larger number of anecdotal accounts of light-headedness and fainting in those combining CWI and SB. Professor Tipton stresses that there are things that can be done to reduce the likelihood and impact of these adverse incidences, they include:

- Make sure you are fit and healthy enough to undertake the twin challenges of SB and CWI. If in any doubt, get a medical check-up before undertaking this combined activity.
- At risk groups include: small children, the elderly, pregnant women, those with existing conditions, those with acute illnesses, heat-sensitive and cold-sensitive individuals.
- Avoid alcohol in the hours leading up to SB.
- It is hypothesised that you only need a minute or so in cold water to obtain the proposed benefits. Avoid going into cold water for more than 10 minutes.
- First-time sauna users should spend a maximum of 5 to 10 minutes in a sauna. As they get used to the heat (heat acclimate), they can slowly increase the time, but to no more than 10-15 minutes.
- Recognise the symptoms of heat illness and dehydration: thirst, headache, light-headedness, dizziness, disturbed/tunnel vision, rapid heart rate, nausea, loss of co-ordination, weakness and fatigue, cramps.
- Recognise the periods of increased risk e.g. when changing posture in the heat. Avoid standing up quickly and then standing still – keep contracting your leg muscles. Change posture incrementally and be careful leaving the sauna. Minimise the hazards that could cause injury if an individual faints.
- It is not possible to prevent sweating or cold-induced diuresis, but it will help if you make sure you start any session hydrated and stay hydrated.
- Familiarise yourself with the safety advice surrounding CWI, avoiding the gasp response and cold-water shock by acclimatising slowly.
- Avoid facial submersion with prolonged breath holds when entering the water.
- If entering coastal/open water, check the conditions and familiarise yourself with RNLI's water safety advice.[9]
    - Know how to call for help and have the means for doing so.
    - Don't go alone, always go with a buddy and if possible, only bathe in an area supervised by personnel with appropriate qualifications.
    - Stop and think, when entering the water have a plan on how you are going to exit safely and what to do if you or someone with you gets into difficulty.
    - Stay within your depth and in close proximity to the shore.

Additional Considerations for Sauna Operators:

Sauna operators should be clear whether they are encouraging their clients to combine their SB with CWI and consequently, whether they are encouraging clients to enter coastal/open water. When promoting use of the sea/open water or events such as "sauna and swim", the operators

[9] www.rnli.org.uk/safety

may be accepting liability for the swim/CWI element as well as the SB element. Such activity should be appropriately risk assessed from medical, physiological and water safety aspects by the relevant experts.

Operators should account for the physiological challenges presented by CWI and SB both in isolation and when combined in traditional practice, taking the necessary precautions to minimise the risks to their clients. Such precautions should include, but are not limited to, appropriate levels of qualified/ experienced supervision, access to drinking water, first-aid training, access to an Automated External Defibrillator (AED) and a safety briefing to the client. The safety briefing should include the precautions mentioned above[10]. Furthermore, mobile saunas are frequently located in remote areas, which by their very nature presents a range of risks requiring mitigation. Sauna operators should consider access routes for emergency services, including reliable means of contact and communication (e.g. mobile phone signal, landline).

When operating in or near coastal/open-water environments, the associated hazards are extensive and dynamic and may not correspond favourably with the set session times of sauna bookings or events. Conditions can change quickly with tidal flow, currents, sea/river state, depth, sea/riverbed topography, wind/weather conditions and water quality, all presenting considerable risks that require experience and knowledge to accurately assess and respond to. Operators should consider supervision for both SB and CWI elements by appropriately qualified and experienced personnel able to carry out a critical analysis of the conditions. A number of recognised industry level qualifications (e.g. Beach or Open-Water Lifeguard) are available that can assist individuals in effectively assessing the dynamic nature of risk in open water environments (e.g. Beach or Open-Water Lifeguard). Access to appropriate rescue equipment[11] should also be considered along with the knowledge and skill to use the equipment safely. Acknowledging that cold water often forms part of the sauna bathing experience, sauna operators should provide an alternative to immersion in open water, such as a cold shower, bath, bucket or similar for when sea or river conditions are hazardous.

In all instances of managing risk, consideration should be paid to understanding all factors that could be considered necessary under the operator's duty of care. Since saunas are often located on land through a lease arrangement, this may also include liaising with landowners. The complexity of landownership, particularly around beaches and waterways, means that combined SB and CW activity may require liaison with more than one landowner.

Figure 1: Quick reference of some of the suggested actions

Considerations For Participants	Considerations For Operators
• Get a medical check-up before undertaking combined SB/CWI activity. • Maintain hydration levels and avoid alcohol. • Acclimatise slowly to each extreme temperature range, avoiding prolonged cold-water immersion over 10 minutes and sauna bathing for over 10-15 minutes.	• Understand and adhere to the rationales behind the advice for participants[12]. • Brief all participants and have access to participant information (relevant pre-existing medical conditions and emergency contact details). • Provide access to safe drinking water.

[10] Paragraph 10 page 2 (Advice for Sauna Participants).
[11] www.nationalwatersafety.org.uk/adviceresources/coastal-public-rescue-equipment
[12] Paragraph 10 page 2 (Advice for Sauna Participants)

• Familiarise yourself with the symptoms of heat illness and the body's response to cold water shock. • Enter the water slowly and in a controlled fashion and leave the sauna carefully. • Maintain movement and change posture incrementally when using the sauna. • Choose a sauna that offers appropriate qualified supervision for both SB and CWI elements and stay within the supervised area. • Analyse the conditions and your ability before entering the water. If in doubt don't participate. • Stay within your depth and avoid facial submersion with breath holds. • Have a means to call for help and if in difficulty, exit the water if you can or float on your back.	• Monitor the conditions and be prepared to cancel/provide shore-based alternatives to CWI such as bath/shower/bucket. • Consider appropriate, qualified supervision for both SB and CWI activity. • Check safe entry/exit points for both SB and CWI locations. • Provide first aid presence trained in CPR and AED use. • Ensure reliable means of contacting emergency support and appropriate access. • Ensure relevant training in environmental and risk assessment/management, for the location and activities offered.

Associated Reading:

https://www.healthline.com/health/how-to-use-a-sauna

https://thebluetits.co/pages/dont-be-a-tit-be-a-bluetit-swim-safety-resources

https://rnli.org/safety

https://rnli.org/safety/choose-your-activity/open-water-swimming#section-anchor-link---before-you-go

https://www.gov.uk/government/publications/managing-beach-safety

https://www.nationalwatersafety.org.uk/adviceresources/coastal-public-rescue-equipment

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