

## Chapter 2 – METHODS

by

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### **ABSTRACT**

*Not all health behaviours are equally prevalent, impactful, or controllable. For this reason, comprehensive health promotion and disease control efforts that target health risk behaviours need to begin with a careful assessment of their public health priority. RTG-164 identified a list of 13 health risk behaviours of potential interest and then rated these against ten explicitly-weighted criteria. The impact of the behaviour on operational effectiveness, the strength of evidence of an association with deployment, and the relevance of the psychology of risk were the most heavily-weighted criteria, based on public health considerations and RTG-164's Terms of Reference. Three behaviours were identified as being the highest priority: Tobacco use, risky alcohol use, and risky driving behaviours. Sleep/rest behaviours (for the management of fatigue) and suicidal behaviours were judged to be important, but extensive work in these areas by NATO and other groups made these a lower priority for RTG-164.*

### **2.1 IDENTIFICATION OF HEALTH RISK BEHAVIOURS FOR RTG-164'S WORK**

The RTG's first substantive task was to identify a limited number of behaviours to explore in depth. We recognized that the number of potential health-related behaviours to consider was large, and, our group being a small one, we had limited resources to commit to the work. We believed *a priori* that it was likely that some behaviours would be far more important than others.

### **2.2 LIST OF POTENTIAL HEALTH RISK BEHAVIOURS**

The RTG began this task by brainstorming a long list of potential health behaviours:

- Tobacco use;
- Risky alcohol use;
- Risky driving behaviours;
- Sleep/rest behaviours (for management of fatigue);
- Risky behaviours other than those related to motor vehicles (e.g., falls);
- Stimulant use;
- Hygiene (e.g., hand-washing);
- Exercise;
- Malaria prevention/arthropod protection behaviours;
- Immunization uptake;
- Risky sexual behaviour;
- Risky eating habits; and
- Use of illicit drugs.

Suicide was discussed as a health risk behaviour of potential interest, but the RTG chose not to look into it further given the activities of another NATO HFM RTG on this topic.

## **2.3 PRIORITIZATION OF HEALTH RISK BEHAVIOURS**

This list was judged by the RTG to be too long to tackle given its limited membership. In addition, many behaviours on the preliminary list consisted of a series of complex behaviours. For example, malaria prevention could consist of taking prophylactic medication, applying repellent, using bed nets, etc. Each of these could raise very different issues. For these reasons, the RTG identified a list of considerations that it would use to identify a more limited number of health risk behaviours of highest priority for its attention. Some of these considerations were judged to be more important than others for the RTG's purposes. The considerations identified are described in the sub-sections below, followed by the RTG's ranking of their relative importance.

### **2.3.1 Strongest Considerations**

#### **2.3.1.1 Impact on Operational Effectiveness**

The direct impact of the behaviour on operational effectiveness is an essential consideration. Indeed, it is generally the most important consideration for military organizations. The RTG understood threats to readiness to deploy (e.g., from behaviour-related health problems) as having an impact on operational effectiveness. The impact on operations effectiveness considered here were more direct ones (e.g., incapacitation with malaria while deployed) over a short time horizon.

#### **2.3.1.2 Strength of Existing Evidence of a Relationship to Operational Deployments**

Many of the health risk behaviours of potential interest have no known relationship to operational deployments while others have good evidence of at least a statistical association. The RTG judged that it made the most sense to focus on those health risk behaviours for which there was the best evidence of an association.

#### **2.3.1.3 Relevance of the Psychology of Risk to the Health Risk Behaviour**

The central role of the psychology of risk in is highlighted in the Terms of Reference of RTG-164, hence it was judged to be an important factor. In addition, it was a factor that was judged to have potentially broader applicability to health risk behaviours other than those upon which the RTG chose to focus.

### **2.3.2 Intermediate Considerations**

#### **2.3.2.1 Overall Public Health Impact**

The overall impact on public health was meant to capture the strength of the effect of the behaviour on diseases and injuries and the severity of those consequences in terms of functioning.

#### **2.3.2.2 Impact on Individual Well-Being**

Some health behaviours (or their consequences, such as obesity) also have an effect on well-being independent of diagnosable illnesses or injuries. This factor was meant to capture such impacts.

#### **2.3.2.3 Impact on Non-operational Effectiveness**

The direct and indirect impact of health behaviours on work performance in the non-deployed environment is also an important consideration. It was judged to a less important consideration than operational effectiveness.

#### **2.3.2.4 Ability to Influence the Behaviour at the Individual Level**

Focusing on health risk behaviours makes sense mainly if there is something that can be done to prevent or change them. Individuals can modify their health risk behaviour on their own or in response to individual or environmental interventions. Individual-level interventions can also act to prevent the initial acquisition of health risk behaviour (e.g., smoking). When the target behaviour cannot be changed immediately, harm reduction strategies (e.g., needle exchange programs for injection drug users) may be effective at mitigating the adverse health impact of some behaviours.

#### **2.3.2.5 Ability to Influence the Behaviour at the Environmental Level**

Environmental interventions are of particular interest to military organizations because they can control many aspects of their member's environment. For example, the US Marine Corps prohibits tobacco use during basic training. Military organizations can influence what their members eat, when they sleep, how much they pay for alcohol, where they can and can't go, etc.

### **2.3.3 Weaker Considerations**

#### **2.3.3.1 Out-of-Pocket Cost to the Individual**

Some health risk behaviours are expensive and hence can have a negative effect on family finances. Smoking is of course a relevant example. The RTG wanted to capture these effects as a consideration in prioritizing health risk behaviours, but this was judged to be a weaker consideration.

#### **2.3.3.2 Impact on Overall Long-Term Health Care Costs**

Health care costs are of interest to military organizations. However, most serious behaviour-related illnesses (such as smoking-related cancer and heart disease) tend to affect people largely after they have left military service. The health care costs associated with these illnesses are however typically borne by society as a whole, hence should be of at least some interest to military organizations.

## **2.4 RESULTS OF PRIORITIZATION**

The RTG consulted standard public health resources and the deployment health literature to rate each health risk behaviour (or group of behaviours, e.g., risky driving behaviours) with respect to each consideration detailed above.

As detailed in Table 2-1, four potential behaviours appeared to be most worthy of the attention of the group:

- Risky drinking;
- Tobacco use;
- Risky driving; and
- Sleep/rest behaviours (for management of fatigue).

## METHODS

Table 2-1: Risk Behaviour Prioritization Matrix.

Behaviour	Stronger Factors to Consider for this RTG [a]			Intermediate Factors					Weaker Factors		Overall Priority
	Operational Effectiveness Impact	Evidence of Relationship to Deployment [b]	Relevance to Psychology of Risk [c]	Public Health Impact [d]	Well-Being Impact	Non-Operational Effectiveness Impact	Ability to Influence: Personal Level [e]	Ability to Influence: Environmental Level [f]	Cost to Individual (Out of Pocket) [g]	Impact on Health Care Costs [h]	
Tobacco Use	Low	High	Possible	High	Mixed [i]	Low	Moderate to High [j]	High	High	Mixed	High
Alcohol Consumption	Varies [k]	High	Possible	High [l]	Mixed [m]	Moderate	Moderate	High	High	High	High
Risky Driving	Low [n]	High	Possible	High	Low [o]	Low	? [p]	High	Moderate	Low to Moderate?	High
Sleep/Rest (Fatigue Management)	High [q]	High [r]	Low	Low to Moderate [s]	Moderate	Moderate	Moderate to High [t]	High	Low	Low to Moderate	Moderate to High [v]
Safety (Other than motor vehicle – e.g., falls – to includes sports)	Moderate – High [w]	Moderate (On deployment); Afterwards = ?	Possible	Moderate	Mixed [x]	Moderate to High	Low?	High	Low [y]	High	Moderate [z]
Stimulant Use	Potentially High	Potentially High	Possible	Low to Moderate	Mixed	Moderate	High	High	Low	Low to Moderate	Moderate [aa]
Hygiene	Moderate	High	Possible	Low	Low to Moderate	Low	?	Moderate	Low	Low	Low to Moderate
Exercise	Mixed [bb]	Mixed	Possible	Low to Moderate	Mixed [cc]	Mixed	Low	High	Low to Moderate (Varies by activity)	Mixed	Low to Moderate
Malaria/Arthropod Protection	Varies, but can be substantial	Varies, but can be substantial	Possible	Low	Low	Low	?	High	Low	Low	Low to High [dd]

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Immunization Uptake	Low, but catastrophes [ee] are possible	High because tied to deployment	Possible	Low, but catastrophes are possible	Low	Low	Moderate	High	Low	Low	Low
Risky Sexual Behaviour	Low	High (evidence that sexual activity is different while deployed)	Possible	Low [ff]	Mixed	Low	Moderate	?	Low	Moderate	Low
Eating Habits	Low	Moderate (may be different on deployment)	Low	Moderate	Mixed	Low	Low	Moderate	Mixed	Moderate	Low
Use of Illicit Drugs	Generally Low [gg]	Moderate with Vietnam – low otherwise	Possible	Low to Moderate	High	Moderate	Low	Moderate	Moderate to High	Moderate	Low

**Notes for Table 2-1**

- [a] We identified these factors as being the most important to consider because they are directly tied to the Technical Activity Proposal we submitted. We judged operational effectiveness to be a more urgent concern than the overall public health impact because the latter may occur long after separation from service.
- [b] This includes evidence that the deployment cycle influences the behaviour as well as evidence that the behaviour has special significance while deployed (e.g., malaria precautions).

## METHODS

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### Notes for Table 2-1 (cont'd)

- [c] This factor was evaluated on largely theoretical grounds, and it proved to not distinguish much among the behaviours.
- [d] For high income countries.
- [e] Individual-level interventions means those designed to influence the behaviour of the individual through education, persuasion, or intervention. This would include things such as educational programming, brief advice from a physician, one-on-one counselling, medications, etc.
- [f] Environmental interventions are often more effective than individual interventions to change health-related behaviour (or its consequences). For example, changes in laws and enforcement of drink driving laws have lessened the number of alcohol-related accidents. Similarly, mandatory airbags have decreased the fatality rate for those accidents that do occur. The price of alcohol and tobacco (which are in part related to regulations) do influence the level of consumption.
- [g] Relative to other health risk behaviours.
- [h] The cost to the health care system is an important consideration, particularly given that the military generally pays for its own health care costs and given that other governmental agencies may pay for health care costs for veterans. We downplayed this as a factor for several reasons: First, rigorous research into it would be required, and no one in the group has the expertise to critically appraise the relevant methodologies used. Second, costs (health care and otherwise) have a complicated relationship with health behaviours because they may actually save money by resulting in premature death from acute illnesses, obviating the costs for chronic care at the end of life. Finally, we felt that these would be captured to some extent by the public health impact.
- [i] Smokers do report well-being benefits.
- [j] There is evidence for individual-level interventions such as smoking cessation programs, taking medications to help with quitting, etc. But the fraction of people using these is relatively small (though growing) and the success rate per quit attempt is relatively low (though growing).
- [k] Varies depending on access to alcohol and policies surrounding its use.
- [l] Moderate drinking is associated with health benefits in terms of a lower risk of cardiovascular disease. But these are overshadowed by negative health effects of alcohol, particularly for heavy drinkers.
- [m] For most high-risk drinkers (those without an overt alcohol use disorder), drinking improves well-being.
- [n] Transport accidents are an important cause of non-battle death/injury. It is difficult to assess what fraction of these is due to risky driving as opposed to other factors. We judged the impact to be low because the number of individuals involved is low relative to other threats to operational effectiveness.
- [o] Well-being impact is low overall because the number of affected individual is low, in relative terms.
- [p] With the exception of legal proscriptions against driving for dangerous drivers, the RTG was unfamiliar with any individual-level interventions that directly influence risky driving behaviour.
- [q] Particularly in war-fighting.
- [r] Self-reported sleep problems and fatigue are commonly reported problems on deployment, and there is a demonstrable effect of fatigue and sleep deprivation on performance.
- [s] Fatigue/sleepiness is a major contributor to motor vehicle accidents, being second behind second only to alcohol as a contributory factor in crashes resulting fatalities or serious injuries.
- [t] High for stimulants and hypnotics (because people are likely to take them if they are prescribed to them, assuming they are effective and well-tolerated). Low for sleep-related behaviours on deployment because this is more dependent on environmental factors than on individual choices. Low to moderate for sleep problems in garrison (there is evidence that cognitive behavioural strategies are effective for primary sleep disorders); effective therapy for mental health problems effectively restores sleep when due to mental health problems.
- [u] In theory, sleep and rest can be modified through environmental interventions. For example, situating sleeping areas away from noisy areas (e.g., heliports, runways) is possible in theory, but in practice it is very difficult because of other overriding considerations such as security.

- [v] While this is an overall moderate to high priority, we elected not to include it in our work for several reasons: First, the stimulant issue is likely to be addressed by another NATO group dealing with advanced technologies for performance enhancement. Second, a previous NATO group dealt with fatigue management, and there are already many publications on that topic. Finally, it did not fit conceptually with the other behaviours we are targeting.
- [w] Injuries (many sports-related) are an important cause of lost time on deployments, as well as repatriations.
- [x] Physical activity is associated with enhanced well-being for most people, but it is a major contributor to injuries, which can impair well-being.
- [y] Some sports are expensive, but most are not.
- [z] Physical fitness issues are covered by another RTG. Other safety-related behaviours are multiple and public health threat is less than for driving.
- [aa] We dealt with this separately in this table but later decided to collapse it into the topic on sleep/rest/fatigue management because it is just a potential strategy to address fatigue/ sleepiness.
- [bb] Physical activity has a complex relationship with readiness: It enhanced fitness (promoting readiness) while at the same time it is a major risk factor for injuries.
- [cc] Physical activity is associated with enhanced well-being for most people, but it is a major contributor to injuries, which can impair well-being.
- [dd] This depends on the nature of the operation. For operations in hyperendemic areas, the priority is very high as the attack rate without protection is as high as 50% over a few weeks; this can completely paralyze an operation. As it happens, the bulk of those deployed on current operations for the Nations that are part of this group are to areas with relatively low risk. For this reasons, we accorded it low priority.
- [ee] The only vaccine for which this has been a big issue is the anthrax vaccine because it has been optional at times. The impact is hard to judge because the probability of a major anthrax attack is presumably very small (but impossible to quantify) and the effectiveness of the vaccine in such circumstances is also uncertain.
- [ff] While sexually transmitted infections are relatively common, their public health impact is relatively low in high-income countries.
- [gg] This depends on the conflict in question.

The RTG elected to drop sleep/rest behaviours because there has already been extensive work in this area, and other NATO groups are actively working in this area. Some behaviours that had initially attracted our interest did not advance into the top tier in our ranking. For example, we thought that risky sexual behaviour would emerge as an important issue, but it didn't, largely because the risk of sexually transmitted infections is low in absolute terms and because most have relatively little impact on operational effectiveness. Malaria prophylaxis and arthropod precautions are crucial in some deployments but are less important in the current operations in Southwest Asia, so these were not considered further.

The RTG recognizes that many of its rankings/ratings are open to question, although informal sensitivity analysis of the priority accorded to the different considerations discussed above did not meaningfully change the conclusion. Additional time and effort in this preliminary step certainly would have enhanced its scientific rigor. But doing so would have interfered with the actual work of the RTG, namely the review of the literature on the association of deployment with health behaviours and the execution of research projects in this important area.

## 2.5 LITERATURE SEARCH STRATEGY

Having settled on the three key health behaviours of interest, literature searches were completed in US Defense Technology Information Center (DTIC), PubMed/Medline, and PsycInfo between June 2008

## METHODS

and January 2009. Further searches for unpublished studies were carried out by hand searching technical reports and contacting colleagues in the research area of interest. The primary keywords used to search are displayed in Table 2-2. Additional terms not immediately related to the three health behaviours of primary interest were included for validation purposes.

**Table 2-2: Literature Search Keywords.**

<b>Categories</b>	<b>Keywords</b>
Psychology of Risk	Sensation Seeking
	Impulsivity
	Risk Propensity
	Risk Taking
Health Behaviours	Smoking, Tobacco, Nicotine
	Health Behaviours, Addiction, Substance Abuse
	Risky Driving
	Alcohol
Military Operations/Deployment	Sleep Deprivation
	Fatigue
	Heat Stress
	Combat Stress/Combat Experiences
	Readiness, Duty
	Deployment Stress