Does road safety have any lessons for workplace health and safety?

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Abstract

Work health and safety (WHS) and road safety are distinctive perspectives of public health but they share much in common. Both have evolved from a former focus on individual responsibility to embracing system-wide, integrated approaches. Both now talk of incidents rather than accidents. Both are now characterised by proactive rather than reactive responses and their broad countermeasure approaches share many similarities. However, there are various aspects of WHS policy and practice that could be examined in relation to the road safety experience, particularly how compliance and deterrence approaches work best in WHS; the use of rewards and incentives; better attention to young worker safety; improved collection, analysis and usage of WHS data; and optimal use of WHS auditing and inspection programs. The aim of such examinations should be to gauge if current WHS policies and practices are appropriately balanced in light of the road safety experience.

Keywords

Introduction

Both work health and safety (WHS) and road safety, along with such fields as epidemiology, environmental health, community safety and health economics, are distinct yet interlinked organised efforts by society under the collective term 'public health'. An early, but now almost universally accepted definition of health is "…a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" [1, pg100]. This definition

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is applicable to both WHS and road safety. For example, safety-oriented culture and systems that promote wellness are currently advocated in both WHS and road safety strategies over and above simply focussing on reducing incidents that can result in injury and death [2, 3].

Besides such commonalities, there are some strong contrasts between the two; so much so that in the last five years there have been emergent views that WHS has much to teach road safety. In 2009, a trio of eminent road safety professionals asserted that WHS had some important lessons for work-related road safety, if not for road safety generally [4]. A chief lesson was for a road safety management system that is not so much reactively driven by injury incidents, but proactively with a systemic approach that anticipates hazards and injury incidents before they occur. Since then, a more proactive approach in road safety is being realised through adoption of the new ISO 39001 [5] international road safety management standard.

A few other papers have been published with specific lessons from WHS for road safety, for example in relation to safety culture [6]. In their recent seminal book, Johnston, Muir and Howard [7] opined that WHS is 'light years ahead of traffic safety' (p.164) in its focus on safe design, safe operations and safety cultures because the lessons learned in WHS have not been studied systematically by the transport sector. Johnston et al. attribute this lag to institutional 'silo' thinking by the transport sector. It should not escape comment, however, that silo thinking is present in both WHS and road safety, with a pertinent if ironic instance being that road crashes are the single largest cause of work-related death and disability, yet the study of road crashes is often institutionally separated from mainstream WHS [8]. To whatever extent the silo metaphor is a valid one for WHS and road safety, is there room for a dismantling of silo thought in both domains by additionally considering a contribution in the opposite direction? In other words, are there any lessons *road safety could offer WHS*?

This paper is essentially a selective review of qualitative literature that compares broad countermeasure philosophies and developments in the two fields with the intention of identifying areas where WHS policy and practice could be reviewed based on successful approaches in road safety.

Commonalities between WHS and road safety

In reviewing the literature, several areas of commonality between WHS and road safety were identified, including shared problems or issues. These parallels provide a supportive background context when subsequently examining potential lessons from road safety for WHS.

From the early 1970's, among several reforms, WHS thinking shifted towards placing prime responsibility for safety risks on those who create the risks rather than on individuals who become victim to them [9]. However, these reforms did not encourage or enable employers to look for still more effective solutions [10]. In road safety at about the same time, Haddon's matrix helped shift the focus of countermeasures from an exclusive emphasis on human behaviour before a crash to broader countermeasures involving vehicles and the road environment both during and after a crash [11]. However, while the matrix provided a systematic approach, like the 1970's WHS reforms, it did not allow for considering influential factors at systemic levels [12] (such as the effect of fuel prices on crashes).

In the last twenty years, both WHS and road safety have transitioned from reactive to proactive perspectives. Reactively viewing WHS or road safety incidents as unfortunate random events has given way to seeking evidence not just if a particular risk was poorly managed but proactively how the management of the risks can be improved [13]. The advantage of this is that risk management approaches that facilitate anticipation of safety hazards before they arise lead to achieving the best safety records [7].

WHS and road safety share a preference for using the terms 'incident', 'collision' or 'crash' rather than 'accident'. 'Accident' implies a lack of attributable fault or arising from unknown causes [14]. It tends to shift responsibility away from those involved, implying a reduced need to examine a variety of potentially influential factors.

A prevailing view in work systems and sites is that WHS offences are never seriously considered as criminal; with prosecution only pursued as a last resort. Non-compliance by employers with their WHS legal obligations has become accepted as normal or to be expected [15]. Similar views exist in road safety – while creeping over a speed limit is illegal, there is often a popular consensus that it is not dangerous and certainly not criminal, as distinct from extreme road behaviour, which is typically portrayed as criminal [16].

The ISO 39001 road safety standard [5] and the Australian WHS strategy [2] both call for the consideration of safety issues in infrastructure design, the use of personal safety equipment and the importance of journey/task planning. Indeed, many road safety approaches in ISO 39001 and the National Road Safety Strategy [3] reveal parallel recognition in Safe Work Australia's [17] hierarchy of control for risks at work, as illustrated in Table 1.

Table 1. Risk control comparison for WHS and road safety

Safe Work Australia – Hierarchy of Risk Control	National Road Safety Strategy (NRSS) ISO 39001 (ISO)
Eliminate exposure of the user to the hazard	Safe journey planning (including reducing the need for a trip (ISO) Use of appropriate roads for the vehicle (ISO)
Substitute the hazard to the user for one with something safer	Separation of traffic streams according to vehicle type (ISO & NRSS)
Isolate the hazard from people	Use of vehicles with safer designs (ISO & NRSS).
Reduce the risks through engineering (and technological) controls	Road design, treatments and safe speeds (ISO & NRSS) Land use planning (NRSS) Electronic Stability Control and Advanced Emergency Braking Systems in new vehicles (NRSS)
Reduce exposure to the hazard using administrative controls	Appropriate driver authorisation for class of vehicle (ISO) Removal of unfit drivers & riders (ISO) Graduated Licensing Scheme for new drivers (NRSS)
Use of personal protective equipment	Seatbelts, helmets, lights (ISO &NRSS)

The hierarchy is a sequence of descending effectiveness – from most effective at the top and least effective at the base. Notably, road safety has traditionally relied on the bottom two least effective controls [7]. In particular, in the context of the hierarchy, a focus on individual and behavioural responses in the bottom two controls can be easily seen as inconsistent with modern road safety and workplace safety management.

Finally, it is worth noting that, despite their common aims, both ISO 39001 [5] and comparable WHS standards for safety management systems (such as AS/NZS 4801 [18] and ISO 45001 [19] from 2016) will not influence all organisations in addressing safety issues, unless those organisations are seeking accreditation in their implementation of a Safe System. As AS/NZS 4801 states, for example, its standards are merely voluntary tools for organisations "…to use as little or as much as they choose." [18, pg. vi]

What lessons can road safety offer WHS?

That both WHS and road safety share so many commonalities in policy and practice should be conducive to the effective application of solutions from road safety to a range of WHS issues.

In both WHS and road safety, information needs to be given to individuals about the consequences of breaking safety rules, particularly in relation to penalties and possible death and injury. This information should be

accompanied by forms of deterrence known to dissuade individuals from engaging in the unsafe actions. People are principally deterred by their perceptions of the likelihood of being detected committing an offence as well as by their knowledge of the applicable penalty. The resultant deterrence applies both to an individual offender specifically, as well as acting on a population or group generally [7, 20].

An expert WHS opinion of road safety is that it has become an important public policy issue through emphasising compliance by amplifying the deterrent effects of enforcement activity [21]. In this view, if WHS were to adopt a similar high public profile approach for dealing with non-compliance, it would afford a strategic opportunity for overcoming the ambivalence with which WHS offences are often perceived, as well as achieving significant reductions in work-related death and injury [21]. It may also help achieve a better understanding of how specific WHS enforcement activities can best deter unsafe actions in the workplace [21, 22]. In road safety, it is known that securing deterrence relies on ongoing high-intensity enforcement activity, in both visible and covert operations as well as mobile and static operations, and involving a high likelihood of detection and the certainty of a penalty or punishment, with a range of penalties available. An authoritative review of road safety measures advises a strategic mix across these approaches to maximise enforcement effectiveness [23]. Such a mix of high-intensity enforcement activities contributes significantly to the WHS expert view of road safety as having a high public profile.

Both new workers and new road users are subject to educative and other informative or persuasive approaches relating to safety. These approaches occur in both formal and informal contexts and both groups can expect to be subject to ongoing educational initiatives from time to time. Following an incident such as an at-fault road crash or detected traffic law infringement, a road user is invariably subject to a penalty such as a fine, demerit points or licence disqualification and sometimes an educational targeted intervention as well. By contrast, in WHS, initial interventions in response to incidents and detected non-compliances are characterised by a heavy reliance on targeted and general educative or other low-level persuasive approaches, with penalties largely reserved as follow-up interventions for any further non-compliance. As Safe Work Australia notes, this may be because certain initial approaches work better for some companies than for others. For example large businesses may respond best to strong persuasive approaches involving the company's public reputation (such as with adverse publicity orders), whereas informational and lower-level persuasive approaches are often better suited to small businesses [24]. Nonetheless, based on road safety's high public profile for enforcement practice, there may be a case for WHS to consider whether reported failures to comply (whether or not incident related) would be better served by applying punitive measures rather than educational interventions alone.

A Cochrane Collaboration expert review of WHS enforcement tools has noted that rewards and incentives, typically as annual WHS award schemes, are commonly employed by governments [25], including Australian WHS authorities. Safe Work Australia's examination of four studies of company reward schemes concluded that reward schemes can be effective in the workplace although more research is needed [24]. However, it needs to be asked not just if a reward or incentive produced a desired result, but whether safety improvement would have occurred had no reward been offered. Also, if the reward had been of a different size or nature, would the improvement have occurred more quickly, or could the improvement have been an even better one? [26]. It could also be argued that companies win awards because they have good safety records, but companies are not made safer simply because they win awards. There is also experimental evidence that offering rewards and inducements can be counterproductive, such as when they reduce someone's intrinsic motivation to perform a task [27] such that people pay more attention to an external reward for an activity than to their inherent enjoyment and satisfaction from performing the activity (i.e. intrinsic motivation). Once rewards are no longer offered, interest in the activity and intrinsic motivation to perform it often wane, such that extrinsic rewards must be continually offered, and perhaps increased in size, in order to sustain the activity [28]. (Interestingly, repeated applications of penalties

may likewise create dependencies that maladaptively serve to decrease intrinsic motivation to perform a desired behaviour.) With decreasing intrinsic motivation, a company may display apathy towards WHS requirements in anticipation a reward or inducement may be offered. Thus, not only can poor WHS compliance be unnoticed, it may be inadvertently rewarded.

Reward schemes are used sparingly in road safety. Extrinsic rewards exist, for example as no-claim bonuses in the motor insurance industry and driver licence fee discounts for accumulating offence-free driving periods. Such schemes have not so far been shown to improve driver safety records. They can be costly and administratively complex to run and it could be said they simply reward drivers who drive infrequently or for shorter distances, thereby more likely being offence-free. An Australian review [29] into best practice road safety initiatives by companies and businesses concluded that incentive/reward schemes (such as free licence renewals and/or insurance premiums) may be effective among employees who drive in their work. However, some of the programs in that review experienced negative effects such as increased crashes after the incentives were provided. In Denmark, a trial of intelligent speed adaptation (ISA) technology offered drivers substantial rewards if they voluntarily slowed down when an ISA device issued warnings about their vehicle's speed in relation to the speed limit. However, the rewards failed to curtail speeding behaviour over time [30]. In view of such studies, the use of rewards and incentives in WHS could be adjusted in favour of applying them to circumstances where they have been demonstrated to increase intrinsic motivation to work safely.

Another area that WHS could profitably explore relates to injury prevention for young workers. In 2009-2010, Australian workers aged 15-24 were injured at nearly twice the rate of other worker ages [31]. A high proportion of these injuries resulted from being hit or being cut by an object. This suggests that the employers/supervisors may have committed WHS violations relating to the adequacy of their young worker supervision. Young adults also feature significantly in road tolls. Graduated licensing schemes (GLS) commonly impose driving restrictions that are successively lifted or relaxed as a novice driver gains experience. The restrictions (e.g. upper speed limits, no night driving) are relevant to known common factors influencing young driver crashes. Evaluations of GLSs have repeatedly shown they reduce young driver deaths and injuries [32]. Within WHS contexts, it should be possible to determine in which industries young workers are most likely to be injured and consider adopting or strengthening stepped acclimatisation to work in those industries, such that work restrictions placed on a young worker early in their job would be successively lifted or relaxed as the worker becomes more adept. Such a graduated approach

for young workers would ideally be standardised within any one industry, and could apply to novice workers of any age. It should also place due emphasis on the employer/supervisor's role, for example not just in conducting a required risk assessment on the new employee as part of their induction, but more particularly in terms of what risks might be rendered more hazardous for a novice worker due to their inexperience. Such information could indicate what types of training courses, supervision or graduated work controls might be advisable for the young worker.

A study involving in-depth analyses of over 600 fatal and non-fatal road serious crashes found that relatively few of these crashes were the consequence of intentionally bad behaviours. Rather, the vast bulk of the crashes should be more accurately interpreted as failings of the broader road system, including those errors of human fallibility that the road system compensates for [33]. Within WHS, there are also desires to more fully recognise the contributions made by the work system itself that result in death and injury rather than interpreting them as due to intentional or deliberate acts of safety rule violation. Safe Work Australia [24] notes that there are few studies of WHS rule violations in workplaces and even fewer of these investigate the causes of the violations [21]. One reason WHS violation causes are rarely studied in detail is a common misperception that work violations are acts committed by intentionally 'bad' employees and that more fundamental or systemic WHS failings are frequently overlooked in investigations [34]. This is concerning as some industries report up to 70% of workplace accidents as being due to rule violations [34], although it is not immediately clear what proportions of these violations are due to wilful, extreme acts compared to work system errors and errors of human fallibility.

While not all violations lead to harm and nor are all violations detected, there is still a need to recognise that commonality in violations can make the WHS system unsafe, just as system failings can contribute to increased opportunities for individual violations [15]. If an analysis of violation patterns reveals changes are needed for a WHS system, the violations should not necessarily be considered as 'wrong' actions committed by individual employees, but rather, where appropriate, classified as indicators of malaise or shortcomings in the system. This suggests a need to look more widely at a system-level when exploring causes of WHS violations. Moreover, WHS systems need to be sufficiently robust to allow feedback loops that inform the system constructively and to learn from system failures [34, 35]. Robust feedback loops for improving WHS systems flourish if the systems create and maintain an environment where people can report mistakes without necessarily having to fear blame [36]. This may be pertinent advice particularly in the field of work-related driving because, as earlier noted, road crashes are the single largest cause

of work-related death and disability. Under Australian WHS legislation vehicles are included in the definition of a workplace. Hence, promotion of sound feedback systems in work-related driving contexts may encourage more system-wide perspectives of the safety problem and help dispel propensities to blame the driver or viewing incidents as solely due to wilfully bad driving.

Several WHS analysts have criticised current WHS incident data recording and analysis for its limited ability to contribute to WHS policy formation and action. For example, improvements are needed in recording data on work-related vehicle incidents, work-related exposures to carcinogens, and older worker injuries, so that their risk management can be more evidence-based [37]. There is also a need for a set of core elements in WHS data collected across Australian jurisdictions [38]. Additionally, WHS incident data tend to focus on incident frequency rather than severity, and in any case may be unrepresentative of the true picture of WHS performance due to it sourcing data from workplace insurance claims, which tend to exclude motor vehicle crashes and injuries [39]. These expert views indicate an urgent need to advance WHS data collection capability to a level it can more productively contribute to WHS policy development.

Road safety has seen several improvements in its data collection that better inform road safety policy formulation. It is not just data accuracy in road safety and consistent approaches across jurisdictions that have been key focuses, as an international review of road crash reporting practices noted the use of various data sources in complementary fashion including, forensic science registers, emergency services records, insurance claim data, and electronic linking of databases across health agencies for a sounder understanding of road crashes [40]. A best practice road safety data collection approach [41] now adopted in nine European countries [42] involves many different types of data:

- the social costs of road crashes, including medical costs, production loss, quality of life costs, material costs and settlement costs;

- data related to safety performance indicators such as mean traffic speeds, seatbelt wearing rates, traffic volumes and distances travelled;

- performance measures related to safety programs and initiatives, and;

- indicators of safety structures and culture (for example psycho-social data).

Data collection models showing such a diversity of performance indicators offer much potential to enrich WHS data collection approaches. For example, cost data for businesses of *failures* in WHS policies and procedures

can be very much more than an industry sector's own estimation of its costs in administering WHS policies and procedures [43]. Within Australia, various case studies show that companies that implement preventative road safety measures for their employees tend to not perceive these measures as cost imposts, but simply as good business that affords increased efficiency and reduced operating costs among other benefits [44]. An alternative approach for WHS to consider when assigning monetary value on life could be to use willingness-to-pay calculations based on surveys of what individuals are willing to pay for reduced levels of risk. Australia's Bureau of Infrastructure, Transport and Regional Economics considers willingness-to-pay approaches are being used increasingly in road safety cost analyses to support policy development as they are widely regarded in road safety and other circles as a superior methodology [45].

Workplace inspections and auditing are valued for the reductions they bring in claim costs and for their specific and general deterrence effects [24]. But case studies of WHS management systems in Denmark found that among the chief limitations of WHS audits are that they focus on easy to access safety issues, and reduce auditable items into standardised cause-effect constructs that are objectively measurable and which can result in a preference for standardised solutions to complex safety problems [46; see also 4]. Moreover, WHS audit and inspection programs are often targeted at industries or employers that have demonstrated substantial regulatory non-compliances [47]. Unfortunately, as noted in a best practice review of WHS compliance, this brings a danger of focussing on a small number of large WHS risks to the exclusion of under-enforcement of a large number of low WHS risks [22]. Reflecting such wisdom, and based on robust research on the crash-reduction potential [48] yet despite its unpopularity [7], Australian road safety authorities now tend to focus enforcement initiatives on speeding behaviour by paying better attention to both common 'low-level' speeding as well as to the relatively fewer incidents of excessive speed.

The Danish review of WHS management systems also found that too narrowly-focussed WHS inspections or audits can deny the dynamic psycho-social relations in workplaces, and discourage innovation, flexibility and personal judgment in solving WHS issues [46; see also 4]. In road safety, the psycho-social construct of shared ownership of road safety problems and solutions is often associated with better safety outcomes [49]. An intention towards a sense of shared ownership appears in Australia's National Road Safety Strategy [3] and in current jurisdictional road safety strategies.

TruckSafe, the national alternative compliance approach in the heavy vehicle transport industry, recognises the importance of a shared ownership of safety because

government regulators cannot assure heavy vehicle safety simply by enforcing one size fits all road rules and regulations [4]. The essential element of TruckSafe is that, under the National Heavy Vehicle Accreditation Scheme (NHVAS), it can allow workplace accredited yet mutually negotiated choice in adopting either a fixed driving hours fatigue management system or a more flexible hours advanced fatigue management system. TruckSafe is permitted to conduct NHVAS audits as part of its own audits, but it does not take the prime responsibility for the permitted flexibility in fatigue management provision. (Moreover, TruckSafe provides no benefits other than public acknowledgement of a company's safety management.) A review of WHS auditing practices noted that allowing some negotiated tailoring in how audits are conducted builds shared ownership of safety at the same time as reducing some of the disadvantages often experienced in WHS auditing [50]. However, alternative approaches in WHS audits can create ambiguity, which can undermine intended protections and accountability, allowing firms to get away with the minimum level of conduct possible, thus providing inadequate protection to consumers and others [51]. This suggests that alternative approaches may not be appropriate in all WHS situations.

Conclusion

Several areas where WHS policy and practice could be examined in relation to the road safety experience were identified: WHS enforcement activity could be enhanced by being accorded a higher public profile and some instances of WHS non-compliance might be better served by focussing on punitive rather than educational interventions. Grounds were given for examining the effective use of WHS rewards and incentives and in improving the safety acclimatisation of young workers. More systems-oriented perspectives and better feedback loops in approaches to reduce WHS violations are needed, particularly for work-related road safety. WHS data collection capability could be improved to enable it to more productively contribute to WHS policy development. The scope of WHS auditing could become more inclusive in addressing complex safety issues compared to simpler ones, and more inclusive in attending to larger numbers of low-level risks in addition to the fewer incidents of high-level risk. There may also be opportunities for negotiated tailoring of how audits of WHS compliance are conducted. Ideally, the aim of such examinations should be to gauge if current WHS policies and practices are appropriately balanced. If an imbalance is found, it may be of some benefit to undertake further examination in light of the road safety experience. The identified commonalities between WHS and road safety should facilitate this process.

While there has been some prior work exploring lessons WHS could offer road safety, this paper has explored the

reverse possibility — that there are lessons road safety can offer WHS. It may be, however, that the more appropriate question regarding links between WHS and road safety should not be what can one learn from the other, but *what can each learn from each other?* This would surely be a move towards achieving the degree of 'cooperation and coordination' envisioned by Johnston et al. [7] in their 'six vital steps towards zero' deaths and injury in road safety - a vision that is equally applicable to WHS.

Acknowledgements

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