Implications of the Safe System Approach for young driver safety

Professor Barry Watson

Developing New Approaches to Prevent Young Driver Crashes: 11 May 2018
Overview

• Historical changes in the way we manage road user behaviour to achieve our safety goals
• The emergence of system-based, strategic approaches to road safety
• The principles of the Safe System Approach
• What are the implications of the approach for improving young driver safety?
• Priorities for the future
Australia’s long-term road safety performance

Figure 1: Annual number of road crash deaths in Australia, 1925 – 2017

Source: Australian Automobile Association, 2018
Period 1: The over-reliance on road user safety countermeasures

“For the first 50 years of motorization in the United States, Australia, and Europe, the almost exclusive emphasis was on trying to prevent crashes by changing the behaviour of individual drivers. This delayed for decades the recognition and application of possible prevention measures in other components of the causal chain leading to injury.” (Williams, 2000, p.1)
Crash causes

- Rarely a single cause of a crash, but a ‘causal chain’ of events involving:
  - road user behaviours (90%)
  - road conditions (30%)
  - vehicular defects or failures (10%)

Source: Shinar, 1978
Early approaches to improving road safety

- Strong reliance on enforcement, due to the focus on driver (moral) failure
- Relied heavily on broad-based advertising campaigns, exhorting drivers to be more courteous and cautious
- The “promotion of road safety was a crusade, marked by failure, fervour and a certain tone of desperation” (p.9)
- Driver training was rudimentary, with a strong focus on car control
- Driver licence testing was primarily for administrative purposes

Source: Clark, 1999
The limited effectiveness of behavioural countermeasures

“While the predominance of ‘human errors” as causes of accidents should serve as a humbling experience, it does not imply that the practical way to eliminate most accidents is to ‘fix’ the driver. On the contrary, it appears that of the three major highway traffic components - the driver, the vehicle, and the roadway environment - the driver is the most difficult to change or improve.”
(Shinar, 1978, p.126)
Challenges involved in modifying road user behaviour (1)

• A very wide range of factors impact on the behaviour of road users including:
  ➢ Psychological and physiological conditions
  ➢ Social background
  ➢ Past experiences including habits
  ➢ Situational factors including the behaviour of other road users
  ➢ Current state and immediate goals
Challenges involved in modifying road user behaviour (2)

- People drive as they live
  - Many studies have confirmed a strong association between on-road behaviour and general behaviour
  - Risky on-road behaviours often cluster together

- Road users are resistant to change
  - Recidivist drink driving and speeding offenders are over-represented in offences and crashes
  - Without sustained high levels of enforcement, the deterrent effect of campaigns can be short-lived

Sources: Evans, 1994; Shinar, 1978; Watson et al, 2015a,b
Australia’s long-term road safety performance

Figure 1: Annual number of road crash deaths in Australia, 1925 – 2017

Source: Australian Automobile Association, 2018
Period 2: The scientific approach to road safety

• From the mid to the late 1960s there was a growing awareness in many countries of the need to take a scientific approach to road safety
• Ralph Nader publicised poor vehicle safety
• The USA’s National Highway Safety Bureau was established, allowing William Haddon to adopt an epidemiological approach focusing:
  ➢ less on modifying or improving behaviour
  ➢ more on loss reduction, particularly vehicle crash worthiness
  ➢ on road safety as a public health issue

Sources: Trinca et al, 1988; Clark, 1999
## The Haddon Matrix

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<thead>
<tr>
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<th>Pre-crash Stage</th>
<th>Crash Stage</th>
<th>Post-crash Stage</th>
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<tr>
<td><strong>Road user</strong></td>
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<td><strong>Vehicle</strong></td>
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<td><strong>Road Environment</strong></td>
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# Road safety Interventions: at a glance

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<tr>
<td><strong>Road user</strong></td>
<td>• Traffic law enforcement e.g. RBT, speed cameras&lt;br&gt;• Public education&lt;br&gt;• Graduated driver licensing (GDL)</td>
<td>• Secondary safety e.g. occupant protection – seat belts, restraints, airbags&lt;br&gt;• Helmets</td>
<td>• Good emergency services&lt;br&gt;• Improved trauma management and rehabilitation systems</td>
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<tr>
<td><strong>Vehicle</strong></td>
<td>• Primary safety e.g. braking systems&lt;br&gt;• Vehicle Design Rules&lt;br&gt;• New Car Assessment Program</td>
<td>• Secondary safety e.g. occupant protection – seat belts, restraints, airbags&lt;br&gt;• Helmets</td>
<td>• Design improvements to allow access by emergency services&lt;br&gt;• ITS crash reporting systems</td>
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<tr>
<td><strong>Road Environment</strong></td>
<td>• Good road design &amp; maintenance standards&lt;br&gt;• Crash ‘blackspot’ programs&lt;br&gt;• Road safety auditing</td>
<td>• Separation of traffic e.g. divided roads&lt;br&gt;• Roadside barriers&lt;br&gt;• Removal of hazardous roadside objects</td>
<td>• Emergency lanes</td>
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Behavioural countermeasures: Success stories

- Wearing a seat-belt reduces the risk of a fatal injury by:
  - Up to 50% for front seat occupants
  - Up to 75% for rear seat occupants

- The correct use of a motorcycle helmet can result in a 40% reduction to the risk of death, and 70% reduction to the risk of severe injury.

- Enforcing drink-driving laws can reduce road deaths by 20% and the number of fatal crashes by 30%.

Source: WHO Global Status Report on Road Safety, 2013
Percentage of drivers and riders killed with BAC of .05 or more in Australia: 1980-2015
(where BAC is known*)

Year | Percentage
--- | ---
1981 | 44%
1984 | 40%
1987 | 37%
1990 | 39%
1993 | 35%
1996 | 34%
1999 | 32%
2002 | 29%
2005 | 28%
2008 | 31%
2011 | 25%
2014 | 22%

Sources: ATSB and BITRE

* See explanation on Notes view
The need to be realistic about human capabilities and responsibility

- From the 1990s, there was a growing awareness in many countries that:
  - Humans inevitably make mistakes
  - The historical tendency to blame road users for crashes had hampered prevention efforts
  - Road system operators needed to take more responsibility for the safety of the system
  - A more holistic, systems-based approach was required to achieve major reductions in road crash fatalities and injuries
Australia’s long-term road safety performance

Figure 1: Annual number of road crash deaths in Australia, 1925 – 2017

Source: Australian Automobile Association, 2018
Period 3: The adoption of system-based, strategic perspectives

• The Netherlands adopted the ‘Sustainable Safety’ approach in 1996

• The long-term goal was to create a sustainably-safe traffic system that:
  – limits the chances of crashes occurring
  – reduces the chances of serious injury in the event of a crash

• The aim is to optimise the interaction between road users, vehicles and the road system

Source: van Schagen & Janssen, 2000
The adoption of system-based, strategic perspectives (2)

- Sweden adopted ‘Vision Zero’ in 1997
- The objective is to create a road system which allows for human error, without leading to serious injury
- The long-term goal is that no one will be killed or seriously injured on Sweden’s road system
- The aim is not to prevent all crashes, but better minimise the harmful outcomes of crashes
- At an ethical and political level, the road system should be as safe as other transport systems

Sources: Tingvall, 1998; Vagverket, 2001
The adoption of system-based, strategic perspectives

- Drawing on elements of *Sustainable Safety* and *Vision Zero*, the Safe System Approach emerged out of Australia in mid-2000s.
- It was further refined, then adopted by:
  - Global road safety community in the 2011 *Decade of Action Global Plan*.
  - Many national, state and city level jurisdictions.

Source: ITF/OECD, 2016
Principles of the Safe System Approach

• Humans inevitably make mistakes that can result in road crashes

• The human body has physical limits, in terms of the forces it can tolerate

• The responsibility for the safety of the system needs to be shared by all those involved in the design, building and management of the system, as well as road users

• A holistic approach is required to managing the system to build in redundancy and thereby optimise the safety of road users

Source: ITF/OECD, 2016
The ITF/OECD’s vision of the Safe System
Another view of the Safe System

SAFE ROADS

SAFE VEHICLES

SAFE INTERACTIONS
- Exposure control
- Separation of users
- Safe Speeds

SAFE ROAD USERS

Source: Watson, 2015
Implications of the Safety System Approach for Young Drivers

SAFE ROADS
-Licence-based road access

SAFE ROAD USERS
-Driver education & training

SAFE INTERACTIONS
-Exposure control
-Separation of users
-Safe Speeds

SAFE VEHICLES
-Vehicle choice
-Vehicle-based restrictions
-Smart vehicle support systems

Graduated driver licensing
Traffic law enforcement
Driver testing
Putting the Safe System Approach into practice

- Challenges remain in operationalizing the approach:
  - Many traditionalists fail to accept the philosophy underpinning the approach
  - Most examples of good safe system practices come from high income countries
  - There is an assumption that additional funding is required
  - The approach is not sufficiently informed by developments in systems-based theory and practice
    ➢ it needs to take into account the broader socio-technical context (see Scott-Parker et al, 2015)
A broader systems-based perspective

SAFE INTERACTIONS
- Exposure control
- Separation of users
- Safe Speeds

Socio-cultural context

SAFE ROADS

SAFE VEHICLES

Vehicle taxation policies

Insurance policies

SAFE ROAD USERS

Adolescent mental health programs

Employment programs

Alcohol & drug use policies

Youth justice programs

Parent support programs
Conclusion

• While many behavioural countermeasures have proven successful (such as GDL), their overall effectiveness remains limited.

• A system-based approach is required to better manage road users and reduce their contribution to road crashes.

• This requires the better integration of road user, vehicle and road environment countermeasures to engineer a more ‘human proof’ system.

• Young drivers remain over-represented in crashes and should be a target for more comprehensive measures.

• To optimise success, a broad systems-based perspective is required that also considers the social, organisational and cultural context.