"Tell them what they want to hear and get back to work": Insights into the utility of current occupational health assessments from the perspectives of train drivers

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ABSTRACT

Australian train drivers undergo periodic health assessments as part of a nationally standardised approach to reducing sudden incapacitation risk, given the demonstrated potential for occupational and public harm. These assessments occur pre-placement, then every 5 years to age 50, then every 2 years to age 60, and then every year. Despite some reported benefits to rail workforce health indicators since implementation, research suggests the assessments are not operating as effectively as they might. For example, the prevalence of obesity in drivers is higher than in the general population and continues to increase. To improve this, there is a need to understand the experiences of drivers undergoing workplace health assessments. The aims of this study were to examine train drivers' perceptions and experiences of the assessments, understand how these experiences shape their engagement with the process, and to generate recommendations for improvement from a systems thinking perspective. A qualitative design was used, involving semi-structured interviews within five focus groups of train drivers ($n = 29$) held across four Australian rail organisations. Questions addressed drivers' backgrounds, their understanding of the National Standard, experiences of and attitudes towards health assessments, lifestyle risk factors, and personal approach to health and wellbeing. Transcript data were subjected to thematic analysis. Five factors were identified: drivers' unmet information needs, perceived low reliability and validity of assessment, need for psychological wellbeing assessment and support, maladaptive threat avoidance strategies, and focus on short-term outcomes and compliance. The global theme was reactive organisational culture. Findings suggest that driver engagement with health assessment can be improved by proactively addressing the identified factors in occupational health initiatives and preventative interventions to tackle the burgeoning problem of train driver health impairment.

1. Introduction

The importance of train driver health for safety is evident in rail incidents that have arisen from health-related factors. In Australia, the 2003 Waterfall train derailment occurred after the driver collapsed from a cardiac event at the helm, leading to many deaths and injuries (Hocking, 2006). Waterfall was a disastrous accident; among the factors implicated, the inquiry targeted health

management policy, and identified a requirement for better, more informed occupational health assessment processes recognising the specific risks in this transport sector. A year after the Waterfall derailment, a National Standard for Health Assessment of Rail Safety Workers (National Transport Commission, 2004, 2012, 2017a) (herein referred to as 'the Standard') was introduced, requiring periodic individual health assessment for rail safety workers at pre-placement, then every 5 years to the age of 50, then every 2 years to the age of 60, and then on an annual basis. Health assessments are conducted by Allied Health Professionals (AHPs), selected by the rail transport operator on the basis of their compliance with specified selection criteria.

A broad range of rail safety workers are subject to the health assessments within the Standard, determined by a risk management approach that considers the extent to which the worker is fit for duty; that is, the extent to which physical or psychological health could contribute to a serious incident on the rail network (e.g. collision, derailment). For example, single-operator train drivers are categorised as Category 1 Safety Critical Workers, based on rail work considered to require high levels of task attentiveness where sudden incapacity or collapse (e.g. from a heart attack or blackout) is likely to directly affect public or rail network safety. Signallers are categorised as lower tier Category 2 Safety Critical Workers, indicating that while their tasks also require them to be attentive, the nature of their duties, or fail-safe mechanisms in the system (in this case, signal control), ensures that sudden incapacity would have a lesser effect on public or rail network safety. Finally, track workers are classified as Non-Safety Critical Workers, so-called because despite working in and around the track and moving trains (a personally unsafe environment), their actions or inactions are deemed to have little impact on public or rail network safety.

While the Standard does not explicitly define health, it considers the health and fitness of workers in relation to their ability to perform rail safety duties. The periodic health assessment[1] of train drivers within the Standard (National Transport Commission, 2004, 2012, 2017a) includes a self-reported health questionnaire consisting of a medical conditions history and the Epworth Sleepiness Scale (ESS, Johns, 1991); 10-item Alcohol Use Disorders Identification Test (Babor et al., 2001); 10-item K10 psychological distress scale assessing anxiety and depression (Kessler et al., 2002); and single-item questions on sleeping patterns, smoking status, illicit drug use, experiences of difficulty completing tasks and involvement in accidents or near-misses (Y/N). Clinical assessments should involve hearing, vision and musculoskeletal capacity testing. Clinical cardiovascular examination should include blood pressure, pulse rate, heart sounds, resting ECG, and calculation of overall cardiac risk level score (calculated from age, sex, smoking status, blood pressure, fasting cholesterol and diabetic status). Diabetes is assessed via history or HbA1c testing. Body Mass Index (BMI, kg/m^2), blood pressure reading and presence of diabetes should be considered alongside the ESS score to assess risk of sleep disorders.[2] Guidelines for categorisation as 'fit' (unconditional/conditional/subject to review/subject to job modification) or 'unfit' (temporarily/permanently) following the above assessments are presented in the Standard.

The Standard has been revised twice (in 2012 and 2017) since its introduction in 2004, but evidence for its effectiveness remains mixed. For example, a file review of health records comparing the prevalence of health conditions in RailCorp drivers (based in New South Wales) between 2004/5 and 2009/10 reported that, during this period, the proportion of drivers with systolic blood pressure ≥140 mmHg and total cholesterol ≥5.5 mmol/L had decreased, as had rates of self-reported smoking (Mina and Casolin, 2012). However, the same study reported an increased prevalence of obesity, pre-diabetes and diabetes, and no improvement in overall cardiac risk score. Later analysis of data relating to obstructive sleep apnoea prevalence demonstrated that sleep apnoea in the workforce was more widespread than originally reported, showing an increase from 2% in 2009 to 7% following the introduction of revised assessment procedures in 2012 (Colquhoun and Casolin, 2015). Given that: (1) the rates of obesity in drivers exceeds that of the Australian general population and is increasing (Chapman and Naweed, 2015; Mina and Casolin, 2007, 2012); (2) a strong relationship exists between obesity, sleep apnoea and metabolic syndrome (Jennum and Riha, 2009); and (3) the lack of evidence to demonstrate improvement to overall cardiac risk, it is clear that further work is needed.

Furthermore, train driving is classified as one of the highest "at risk" occupations for stress and work-related mental disorders (Read et al., 2012; Safe Work Australia, 2015), and in line with transport occupations more generally, is increasingly recognised as detrimental to general health and wellbeing (Apostolopoulos et al., 2016; Naweed et al., 2017a; Naweed et al., 2017b). Other countries facing similar concerns have identified the need for more consistent industry-wide medical programs (e.g., the US, Federal Railroad Administration, 2005; Weikel, 2014), prompting the development of large-scale health and wellbeing roadmaps and related policy (e.g., the UK, Rail Safety Standards Board, 2016). Similarly, a more comprehensive whole-of-workplace approach is likely to be beneficial in the Australian context.

1.1. Health assessments within the national standard for health assessment of rail safety workers: A systems thinking perspective

As described, the focus of the Standard is to monitor and manage risk in relation to the health and fitness of workers, defending against injury, incapacitation, death, and environmental or property damage (e.g., from collision, derailment). In addition to the formal revisions, in December 2017, a white paper was distributed for public consultation asking whether rail health assessments

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[1] Health assessments are described colloquially as "medicals" by train drivers and other industry professionals. In line with the Standard, we refer to them as health assessments in this paper, apart from direct quotes from participants where we retain the word "medicals" to preserve the discourse.

[2] The Standard also features other tests such as neurological examinations (e.g. seizures/dementia) when rail safety workers "*have had an injury or illness affecting mental processes to help gauge recovery and suitability for work*" (National Transport Commission, 2017a, p. 69). Drug and alcohol screening is not routinely included in the periodic assessment. Psychosocial factors are not assessed. Following the periodic health assessment, additional testing or referral may occur if a potentially significant problem is suspected.

should be expanded, and whether some criteria, such as the BMI, should be changed, particularly with respect to obstructive sleep apnoea screening (National Transport Commission, 2017b). Although the importance of assessments for reducing health-related impaired decision-making and sudden driver-incapacitation is clear, train drivers' own subjective experiences of engaging with assessments, or the contribution to driver wellbeing/psychosocial dimensions, is not. To inform policy and provide the best outcomes for rail safety, the development and ongoing revision of the Standard has undergone consultation with the medical community, consumer health groups, transport departments, industry groups and associations, and unions and regulators. This has included rail transport operators and their employees; however, little consultation appears to have been undertaken with the rail workers themselves. While the direct end-users of the assessments within the Standard comprise doctors and AHPs, the content of the Standard has broad membership that covers multiple layers of the complex and distributed interactive sociotechnical system that is rail (Wilson, 2014; Wilson et al., 2007), creating different interpretations for governance. The rail workers on which the assessments are performed, in this case train drivers, may view and interact with the assessment in meaningfully different ways to the organisations that require its use. This has important implications, as train drivers are not only a focus of the Standard, but the object of the corresponding assessment. Although the existing health assessment for Category 1 safety critical workers contains some objective clinical measures, the examination also relies on brief, self-reported conditions and behaviours (e.g. smoking status, alcohol consumption, sleep and psychological distress). In order to ensure the accuracy of the assessment, positive driver engagement is required.

The mixed evidence for the impact of the Standard further lends support to a systems thinking view, where complexity is the defining characteristic of the system, and where additional risks may emerge opportunistically from the very systems put in place to prevent them (Dekker, 2011; Goh et al., 2010; Naweed et al., 2015). From this perspective, inadequate input into the Standard and/or consideration of how system actors could come to view and engage with the Standard may influence behaviour and work in ways that are complex and unpredictable. Practices Migration theory (Rasmussen, 1997), for example, purports that all systems are affected by different pressures and adaptive processes, which migrate them towards situations of higher risk. This idea also resonates with normalisation of deviancy theory (Vaughan, 1997) where maladaptive practices and deviant behaviours come to be the norm. This may occur over an extended period and, in the absence of catastrophic results or substantive incidents (i.e. another Waterfall-like disaster), significant problems go unnoticed until it is too late. To interpret quantitatively derived reviews of the Standard and appropriately contextualise its efficacy, research that gathers the worker's perspective of the issue is critical.

1.2. Aims and objectives

The primary aim of this study was to examine Australian train drivers'[3] perceptions and experiences of the health assessments as featured within the Standard, and understand how these experiences influenced their engagement with the process from a systems thinking perspective. The secondary aim was to generate recommendations for how this knowledge could be used to improve the role of assessments in tackling the problem of train driver health. The ways in which drivers engage with the health assessment process has clear implications for the real-world effectiveness of policy outcomes; yet to date, their views have been largely overlooked. This study was guided by the overarching research question: *How useful are current occupational health assessments for tackling the long-term health issues of train drivers?*

2. Method

2.1. Study design and recruitment

This study adopted a qualitative exploratory research design, an approach that has been used effectively in the context of substantive transport research (e.g., Filtness and Naweed, 2017; Hafner et al., 2017; Lo et al., 2013; Nielsen et al., 2015; Vaezipour et al., 2017).

Four rail organisations (one freight operator, three metropolitan passenger operators) were contacted across Australia, following interest expressed by contacts at a national rail safety work group. Each organisation was provided with information describing the study and a template recruitment email to issue to their drivers, advising that feedback would remain confidential and anonymous, with the only inclusion criteria being a current train driving role. All four rail organisations supported the study and a total of five focus groups were held across Australia (New South Wales = 2, from the same organisation; Victoria = 2, each from a different organisation; and South Australia = 1, from one organisation). Participants were employed as train drivers, either in a full-time capacity where it was their only role (*n* = 19), or in part-time capacity, where an additional role (e.g. Driver Trainer, Assessor), meant that driving activities occurred less frequently (e.g. three days per week) (*n* = 10). In both cases, periodic health assessment was the same.

2.2. Participants

In total, 29 train drivers (26 (89%) male, M_{age} = 46.5 years, *SD* = 11.75) were recruited to participate in the study. In terms of driving experience, two broad groups of participants were involved, according to industry definitions: *accomplished*, where experience

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[3] While the Standard covers many types of rail safety workers, this paper focuses on train drivers as Category 1 safety critical workers, aligned most closely with the stated aim of the Standard (i.e. *"treating the risk of serious incidents"* [National Transport Commission, 2017a] p.28).

was between 1 and 10 years (14 participants; M_{exp} = 6.91; SD = 7.95); and *expert*, where experience was over 10 years (15 participants; M_{exp} = 24.40; SD = 12.05). No *novice* drivers (between 6 and 12 months experience) took part. All participants had undergone at least one health assessment with most undergoing three or more over their career (M = 3.51; SD = 2.29).

2.3. Procedure

After consent was given, two moderators conducted each focus group with the stated purpose of capturing the participants' 'understanding of the role of periodic health assessments in the rail context.' Discussion length varied based on the size of the group and ranged from 80 min to over 2 h. All focus groups were voice recorded.

Following ice-breaker questions collecting demographics and employment history, focal interview topics included: (1) Experiences with the Standard and associated assessments (awareness and understanding; experience of assessments; attitudes towards assessments); and (2) perceptions of health and wellbeing (lifestyle risk factors/diet/exercise; personal approach to health and wellbeing). During the discussion of the Standard and the place of assessments within it, a bound copy of the Standard was shown and passed around. Both open-ended and closed questions were used to capture individual perspectives.

After discussion of personal approaches to health management and health-risk mitigation, and how these approaches related to management of health and wellbeing within the broader context, participants discussed what they felt could be modified to benefit themselves and their organisations. The interview guide was refined to account for new information provided in each successive focus group. Voice recordings were transcribed, and focus groups proceeded until no new conceptual information was elicited (i.e. saturation) (Guest et al., 2006; Morgan, 1997). Institutional ethical clearance was obtained from the human research ethics committee of Central Queensland University (Approval number: *H15/03-039*).

2.4. Data analysis

Focus group transcripts were analysed using inductive thematic analysis to identify and systematise extraction of primary/organising themes and basic/subthemes (see Braun and Clarke, 2006; Saldana, 2009). Coding was performed by two researchers using NVivo (v. 10, QSR International) as follows: (1) transcripts were first read closely with individual and group narrative units coded to establish broad context; (2) basic/subthemes were then iteratively coded as meaningful units describing particular experiences, processes, or concepts that recurred across participants and focus groups; (3) data, codes, and themes were constantly compared in an increasingly hierarchical manner as coding progressed to describe these concepts in their simplest form (e.g., Wasserman et al., 2009); (4) basic/subthemes were next discussed between coders for consistency, referring to a third researcher for consensus; and lastly (5) basic/subthemes were grouped into primary/organising themes for the study. In this latter stage, researchers embedded primary/organising and basic/subthemes into a thematic network to visualise relationships between all themes, and to capture a global/central theme throughout all findings, expressed as a principal metaphor for discussion (Attride-Stirling, 2001).

3. Results

Five themes were identified from the analysis: (1) unmet information needs of drivers regarding the Standard and personal health; (2) drivers' perceptions of low reliability and validity of assessments; (3) need for expanded psychological wellbeing consideration within health assessments; (4) maladaptive threat avoidance strategies used to manage feelings of personal threat engendered by assessments; and (5) focus on short-term outcomes and compliance. Each theme is depicted in relation to the health assessments within the Standard and illustrated throughout using direct numbered quotes referenced to Tables (e.g. Table 1, Q1 = Table 1, Quote 1). The overarching theme of the findings was the drivers' perception of a 'reactive organisational culture', and is presented alongside the thematic network.

Table 1
Illustrative quotes for unmet information needs.

No.	Illustrative quotes	ID tag
1:	You look at some blokes, and you can't figure out how they get through medicals. [They] can't fit through the back door of the cab, so how are they passing their medicals?[a]	F2-Pt5
2:	You think, that bloke can't be too healthy, but they get through their medicals. [There's] still an issue waiting to happen there for a few of them.	F4-Pt6
3:	What do they test for? Glucose, cholesterol, and that's all. They don't test us for any signs of lung cancer or anything like that [and should] because we're near the diesel all the time.	F3-Pt8
4:	We had a driver that did the medical, was very happy, thought he'd come out fit and healthy, he had leukaemia, he was dead within a year – they didn't pick up leukaemia. How could they miss it?	F3-Pt3
5:	[Drivers are] dying of heart attacks, getting strokes, people getting cancer, um because our environmental situation we work in, ah but then again, the government wouldn't recognise that because that would be incriminating themselves if they did something [about it]. Um so a lot of our problems are caused because we have a brick wall that we're butting our heads on.	F3-Pt8

Note: ID Tag format: Focus Group [#]-Participant [#].
[a] Train drivers describe health assessments as medicals and the terms are used interchangeably.

3.1. Unmet information needs

Nearly every participant in the study was unclear about the reasons for the Standard and why it was introduced. None of the participants had experienced a sudden incapacitation event personally, though at least one member of each focus group had heard of the Waterfall rail disaster. While every participant knew that an assessment was required, they expressed *unmet information needs* relating to the purpose, focus, and practical application of the process, meaning that they had a limited understanding of what the assessment was looking for and what was expected of them. In the absence of such information, participants questioned the validity of the health assessment criteria and outcomes (Table 1, Q1-2). While participants were aware that health assessments focused on, and indeed, were able to pick up indicators related to cardiac issues and sudden incapacitation, some felt that they did not measure certain chronic health-risk indicators that they perceived to be of equal or greater concern (Table 1, Q3-4). This reflected a gap in communication and a potential misunderstanding about what the assessment was intended to do.

The role of assessments in identifying sudden-incapacitation risk from cardiac and metabolic factors was embedded in a host of contextual concerns, such as perceived organisational liability concerns (Table 1, Q5). Participants therefore felt that occupational assessments needed to capture a broader spectrum of health risks, and desired a more proactive and preventative health intervention mechanism than a periodic tool that only monitored particular aspects of health status and wellbeing.

3.2. Perceived low reliability and validity of the assessment process

Experiences of health assessment were significantly shaped by drivers' *perceived low reliability and validity of the assessment process*. Many participants thought that the BMI metric was imprecise, and offered this as a reason for discounting the validity of health assessments more generally (Table 2, Q1-2). Limitations of the BMI metric have indeed been highlighted in terms of underestimation of adiposity (Tanamas et al., 2014). However, participants communicated how BMI was being used to monitor health in what they considered to be an arbitrary way. In addition, some chose not to act on BMI-derived health markers at all (Table 2, Q3). The value of workplace health assessments was also questioned, for example, in contrast to private healthcare consultation (Table 2, Q4). Some drivers reported that external healthcare sources had provided conflicting information to that received at work, which had the effect of eroding the perceived credibility of workplace assessments (Table 2, Q5).

Cholesterol measurement was also thought to be a flawed indicator of cardiovascular risk (Table 2, Q6). Total cholesterol levels as a useful indicator of cardiovascular risk has been publicly debated, leading to an emphasis of other markers (The Emerging Risk Factors, 2012). It was evident that some participants had encountered this debate, therefore the use of what they saw as an outdated approach ostensibly reduced their trust in the accuracy of the assessment overall. Taken together, this theme revealed a need for organisations to be more transparent about the reasons for each test undertaken in terms of direct communication with drivers. This would also go some way to alleviating the impression that assessments are something being 'performed on' the drivers rather than in consultation with them. Clear explanations for the assessments that participants were instructed to undertake were lacking; consequently, they relied on their own knowledge and personal standards for interpretation, which varied considerably and which impacted their perceptions of reliability and validity of assessments overall.

Table 2
Illustrative quotes for perceived low reliability and validity of the assessment process.

No.	Illustrative quotes	ID tag
1:	Features of [BMI] give you an idea of where you're at, but they are flawed … it's very impersonal, it's generalised across the entire population where everyone's different.	F1-Pt2
2:	Yeah [BMI] is ridiculous it can't work. Cause if you're short and quite muscly then…	F2-Pt3
3:	[BMI] is only a good measure if it's acted upon, if it's outside the range, otherwise if it's just data collection for data-collection's sake.	F4-Pt6
4:	[For] a health professional you go to your local doctor… You'd be in a lot of trouble if you relied on your work medical as your only guide to [your health].	F3-Pt4
5:	At my last [assessment] [the AHP] said 'oh your cholesterol's 5.8'. I said ah 3 days ago I had a full blood test done, said I was 4.9. Isn't that strange how it can change in 3 days?' [The AHP] goes 'oh don't worry about that one'. He wasn't concerned about a proper blood test that was done under proper fasting.	F3-Pt8
6:	…cholesterol isn't a contributing factor [for a heart attack], the contributing factor is when you have refined carbohydrates they create sort of problems in the arteries and then the cholesterol is what they use, the body uses it to patch up, this just for argument's sake, those holes in the walls…it's like saying every time you see a fire, you have a fire fighter there on the scene putting it out you go 'oh gee fire fighters must have, must cause fires.'	F5-Pt4

Note: ID Tag format: Focus Group [#]-Participant [#].

3.3. Need for psychological wellbeing assessment and support

Participants felt strongly that psychological wellbeing should be prioritised in their occupation (Table 3, Q1-3), such that the *need for psychological wellbeing assessment and support* within health assessments was a key theme. The interconnection of physical and mental wellbeing was considered an important part of a holistic approach to health (Table 3, Q4). Participants had access to some support services, such as Employee Assistance Programs (EAPs), which were implemented to assist employees with personal and/or work-related problems. Participants felt that EAPs were useful, with many aware of how the program worked and the frequency of

sessions per year. Initiatives such as the annual 'RUOK days' and other externally-mediated events were considered infrequent and somewhat superficial but were valued non-the-less (Table 3, Q5). The general view, however, was that wellbeing was not being proactively supported by the organisation (Table 3, Q6) and greater outreach was needed alongside acceptance of individual responsibility (Table 3, Q7).

Other than the short K-10 psychological survey (e.g., anxiety/depression checklists, National Transport Commission, 2012, p.6, p.46), the Standard does not integrate psychological wellbeing into assessments. Because of this, drivers did not feel that psychological health was featured proactively enough within the organisations, and thought more recognition should be made about the link between mind–body health (Table 3, Q4). Stress has clear associations with both mental distraction and cardiac risk, and participants felt that mental issues were a big contributor to the safety risk arising from sudden incapacitation. Therefore, drivers suggested the role of psychological health alongside physical health could be more explicitly considered within assessments, in order to determine more informed criteria for psychological wellbeing standards and safeguard wellbeing.

Table 3
Illustrative quotes for the need for psychological wellbeing assessment and support.

No.	Illustrative quotes	ID tag
1:	I just find it personally very demanding … [as] there's a constant, maybe low-level, anxiety attached to the job.	F3-Pt2
2:	I put emotional wellbeing, maintaining a balance, with[in] that discipline of work… You don't have time with family or friends [and] can become really isolated by being in this job.	F3-Pt1
3:	No one ever asks 'are you mentally okay?' [Assessments should] also focus on the mental side of things … [as] where we see incidents happen in our industry, it's not necessarily because the person is not [physically] fit for duty … it's that their mind hasn't been with the job, or they're emotionally unstable, and that's what I believe is the biggest issue we have [sic].	F5-Pt4
4:	It's your physical and mental state … it's a combination of both.	F2-Pt2
5:	I mean, something's better than nothing.	F2-Pt5
6:	We've got a health and wellbeing officer just been appointed around 6 months ago and still nobody knows what [the officer] does.	F4-Pt3
7:	I suppose it's sort of really up to the individual to [contact support services], but it would be a lot easier for someone to say 'this is what we offer'. You've got a definitive [answer], you know?	F2-Pt1

Note: ID Tag format: Focus Group [#]-Participant [#].

3.4. Maladaptive threat avoidance strategies

In all focus groups, assessments were viewed as a punitive monitoring tool with significant potential to trigger averse organisational responses. Assessments were effectively perceived as a threat, which formed a recurrent theme of using *maladaptive threat avoidance strategies* as a way to deal with, and exert some influence over, the threat. The perceived threat was to job security (Table 4, Q1), and was tied in with a lack of personal context for assessors/AHPs (Table 4, Q2-3). The AHPs performing the assessments and fulfilling the assessor role were generally distrusted and their relationship with train drivers was considered combative (Table 4, Q4). The self-reported health information collected in the assessments was viewed by participants as something that could and would be used against them; metaphorically speaking, a rope that they could hang themselves with. Accurate health and lifestyle information was consequently omitted, or disclosed selectively (Table 4, Q5-6).

The general perception of threat and subsequent disengagement with the process was fuelled not only by their own experiences of the assessment, but also by the experiences of others (Table 4, Q7-8). This attitude and way of interacting with assessments was therefore a feature of the culture and an established social norm. From a systems perspective, it appeared to characterise a positive

Table 4
Illustrative quotes for maladaptive threat avoidance strategies.

No.	Illustrative quotes	ID tag
1:	You do find the medical a bit of a threat, because if you do have a problem … basically your job's put on hold … [and] it could mean that you're no longer driving. So, it's sort of held against you…	F3-Pt5
2:	AHPs don't know how we live our lifestyles, not like your [own] doctor does—my doctor knows everything about all the sicknesses I've had for the last ten years. [So] there's the threat that you could lose your job if they make the wrong decision. That's the only thing that I think about.	F3-Pt8
3:	Let's say that I went to my doctor and…my cholesterol was high or something. They would sit down and have that genuine discussion as a health professional, 'look let's see what's going wrong, how do we fix it?' The assessor, if you're outside that number range they don't give a shit why, they don't care…it's just like, we'll notify your employer, you're outside the range.	F1-Pt4
4:	Policy states that you have to see [the Organisation's] doctor. But, do we stick by that? Not always because if we did I think we'd be again in World War 3.	F5-Pt4
5:	You don't mention you're a smoker, when they ask you, you lie through your teeth and say 'no I'm not a smoker.' I haven't had an issue in a medical since.	F1-Pt4
6:	You wouldn't go in [the medical] and offer information.	F3-Pt4
7:	[A driver I know] said he had [ticked] sleep problems on his [medical assessment] form—now this guy is very fit, active guy and because he's ticked the box for sleep problems he got stood down for up to three weeks. [He was] forced into the sleep centre … and that [news spread] around the whole area. And [drivers] go, 'oh well, we won't be [reporting] that.'	F4-Pt1
8:	If you hear someone puts down he has one drink a week and he gets stood down, you'll say 'well I don't drink at all', it's as simple as that.	F4-Pt5

Note: ID Tag format: Focus Group [#]-Participant [#].

feedback loop where health-risk salience increased assessment threat. Thus, while omitting information from assessments alleviated anxiety and served as a coping mechanism and protective measure, it had the effect of prolonging the health concern and reasons for viewing assessments as a threat in the first place. This theme therefore highlights a way of engaging with assessments where participants felt they had to lie to occupational health professionals to protect themselves. This was largely due to perceptions that assessments endanger the livelihoods of drivers, and the lack of trust in AHPs versus the participants' own doctors.

3.5. Focus on short-term outcomes and compliance

Participants indicated that they reacted to assessments by reducing or temporarily ceasing behaviours they recognised as harmful leading up to the assessment (Table 5, Q1-2). Moreover, there was an established practice of "training" for assessments (Table 5, Q3). This formed a recurrent theme around *focusing on short-term outcomes and compliance*. Much like the avoidance strategies described in the previous theme, these behaviours were also maladaptive in that they returned to normal immediately after the assessment was over and had the effect of introducing additional risks for physical and psychological health and wellbeing (Table 5, Q4-6). There were reports of train drivers who had obstructive sleep apnoea diagnosed outside the organisation or AHPs' knowledge and managed it by purchasing their own Continuous Positive Airway Pressure (CPAP) machines (Table 5, Q7). This was an example of an attempt to manage health risk at an individual level in response to a non-mature organisational culture, which also implied the existence of significant health-related issues that organisations were not readily aware of, suggesting a critical failure in the function of the Standard as a monitoring tool.

The general attitude was that health assessments were a depersonalised 'tick and flick' process with little real emphasis on things that really matter (Table 5, Q8-9). Many participants' beliefs about the usefulness of assessments were compounded by impressions that they did not occur frequently enough to accurately monitor overall driver health in relation to safety risk (Table 5, Q10). Thus, the perception was that the risk of sudden incapacitation while driving a train was ever present and created a notion that the Standard had not reduced it in a meaningful way.

Table 5
Illustrative quotes for reacting to short-term safety risk.

No.	Illustrative quotes	ID tag
1:	I'm a coke and cigarette man…leading into medicals I… don't drink caffeine as much, don't smoke for the day or two leading into it… If they know I'm a smoker straight away they're onto you… I haven't had an issue in a medical since.	F2-Pt4
2:	A couple of months out of [the assessment], so 'oh crikey, go on a crash diet' and then once it's out of the way [drivers] go 'ahhhh'.	F1-Pt2
3:	They're training for their medical assessment…It's just for that 6 weeks leading up to it…and then honestly, you see them the day after the medical and their attitude is completely different. They're no longer worried about the medical cause they've gotten through, they've got the tick.	F4-Pt3
4:	[After the medical], you turn into a bag of shit again.	F4-Pt5
5:	[One driver] struggled with his weight and yeah basically for the week leading up to the medical he'd just eat vegetables only and then look like the walking dead just to drop 10 kilos to hop on those scales. [Another driver] here makes his own wine, very good, so of course it's a very cultural thing for him to have wine every day. So, three or four days beforehand he doesn't touch it. Straight after the medical he's drowned himself in it – he calls in sick the next day.	F3-Pt3
6:	Those guys you see that lose the 10, 15 kilos prior to their medical seem to put 20 to 30 back on after it, it's true.	F5-Pt4
7:	Well the bloke I know who got his own CPAP or whatever you call it, I bet he doesn't put on the form when he does his medical that he doesn't sleep well. Bet you he doesn't.	F4-Pt4
8:	There is not enough emphasis put on health and diet for this safety critical job … I walked out of my medical thinking 'wow, was that it?'	F5-Pt8
9:	It's often said, 'tell them what they want to hear and get back to work'.	F5-Pt4
10:	I think once every five years is [going] too far. [You] could start the job tomorrow and in five years' time put on 75 kg.	F5-Pt1

Note: ID Tag format: Focus Group [#]-Participant [#].

3.6. Reactive organisational culture

Fig. 1 brings together an overview of the findings as a thematic network, illustrating main categories and subcategories. Based on the observed relationships, the overarching theme was *reactive organisational culture*. The Standard and its corresponding assessments were perceived to be all about the organisation, and geared toward protection for the organisation rather than support for drivers, or any tangible efforts geared towards preventive health. This led to feelings of mistrust and threat, and the perception that there was no genuine, long-term commitment to driver health and wellbeing. The implication was that the attempts being made to address safety-risks were lacking, and that organisations—and the broader rail system as a whole—was reacting to immediate short-term risks at the expense of long-term prevention. This means that drivers are acting within the same culture set by the organisation.

4. Discussion

4.1. Train driver health impairment from a systems perspective

This exploratory study examined train drivers' perceptions and experiences of health assessments as featured within the Standard from a systems thinking perspective. Impact evaluations of the Standard have identified a number of objective effects of its
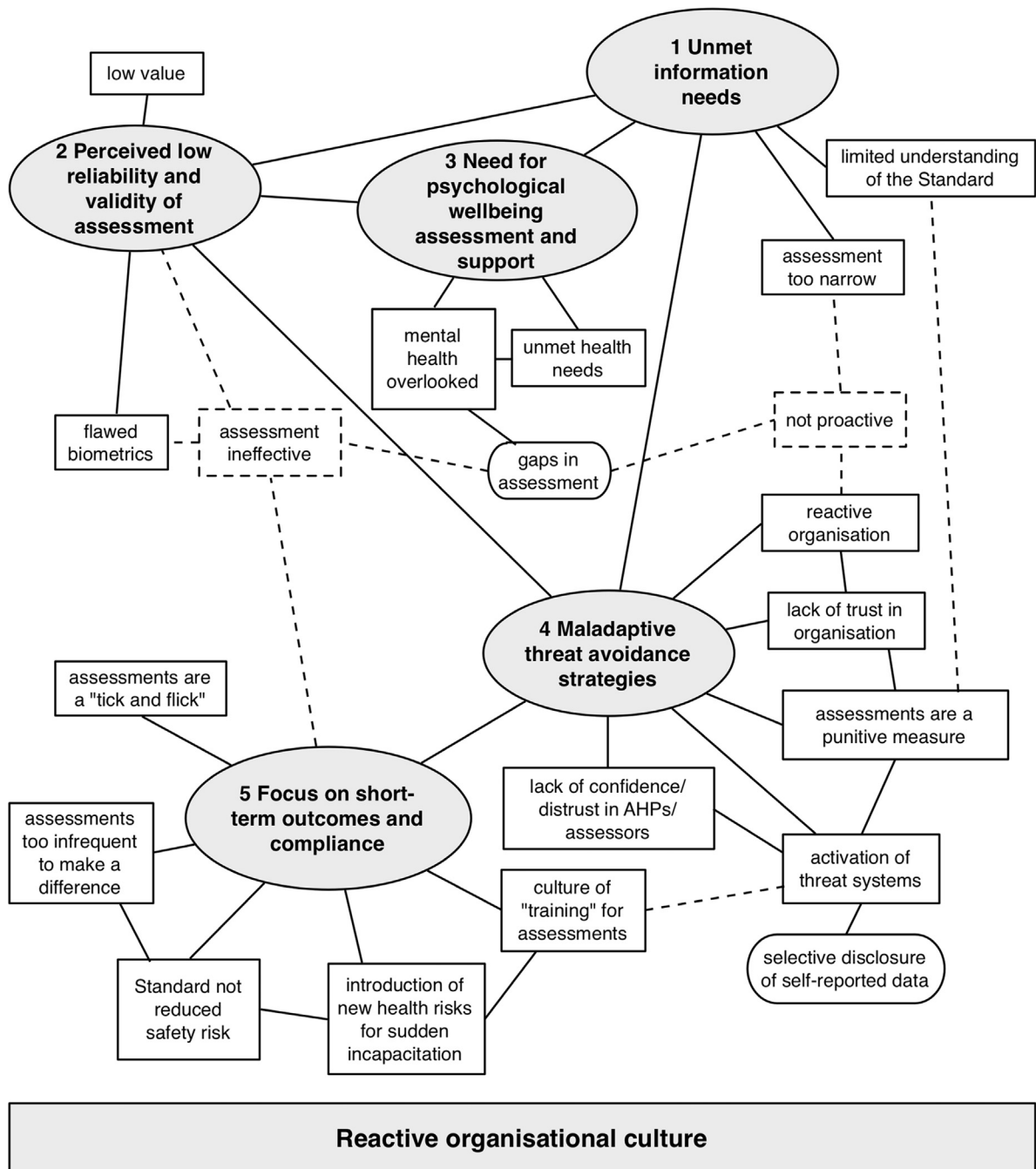
Fig. 1. Thematic network of findings showing five main themes (in ellipses) and overarching theme (large rectangle at bottom of the network). Note: dashed strokes illustrate sub-categorical links between themes.

assessments (Mina and Casolin, 2007, 2012), but other areas show mixed and somewhat counterintuitive outcomes. This study addressed the subjective experience of undergoing assessment, in order to lend important context to help explain some of the findings in these evaluations. For this reason, the primary aim was to understand how these experiences influenced how drivers engage with the assessment. As shown in Fig. 1, five main themes were highlighted.

The Standard was initially designed as a monitoring tool, but the findings of this study suggest its current application assumes dual roles of both monitoring and intervention. While the Standard is featured as an active control within rail safety risk registers, the absence of clear corresponding individual-level support, and information or strategies for change make it unsuitable for effective and sustainable intervention. Misappropriating the Standard in this manner therefore appears to have had the effect of eclipsing or replacing other local health and wellness initiatives. The findings related to threat avoidance suggest that both high (active/strategic)

and low (passive) efforts for avoiding health information are evident in drivers (Johnson, 2014). From a systems thinking point of view, these findings lend support for normalisation of deviancy (Vaughan, 1997), which in the absence of catastrophic results has become the social norm. This appears to have occurred at the driver level, but also at the wider system-level (i.e. organisation/industry) where it has effectively exceeded its own rules for elementary safety. The findings of the study suggest that train drivers have not been consulted and/or consulted with adequately in the development and application of the Standard.

The overarching theme placed the findings beyond driver engagement with assessments to a reactive organisational culture, where drivers are acting within and as a response to the culture set by the organisation. This also suggests that the Standard and corresponding assessments are: currently focused at the individual-level only; are not viewed as a system issue; and that improvement ultimately requires growth and maturity in culture and risk-management policy. An important point raised in the findings was the drivers' notion that the Standard has not actually reduced safety risk. This is an empirical point that warrants further discussion. On the one hand, it is difficult not to accept some reduction in baseline safety risk, simply by virtue of the benefits of having a health assessment. On the other hand, it remains unclear exactly how much risk may also have been introduced as a function of the Standard, in relation to new concerns that have implications for drivers' perceptions of threat, and long-term implications for sustainable preventive measures. The question of whether or not safety risk has been effectively reduced could be viewed through the lens of the risk compensation/homeostasis theory (Wilde, 1998). From this perspective, the Australian rail industry may have become more careful at the point at which the Standard was first introduced, but has since grown less careful as it has felt more protected on the issue.

4.2. Tackling train driver health impairment

The secondary aim of this study was to explore how the findings may be used to improve the role of assessments in tackling the problem of train driver health. Towards meeting this aim, the five themes can be reinterpreted as contextual factors that may beneficially inform health assessment engagement. Broadly speaking, these would be to: (1) meet drivers' information needs and engage drivers in a proactive consultation to participate in their own health; (2) improve the validity and reliability of assessments and/or take steps to ensure assessments are not being perceived as invalid or unreliable by educating drivers on how they are being used; (3) provide clear support for the psychological wellbeing of drivers and acknowledge that mental and physical health are interconnected; (4) understand the underlying motivations for maladaptive threat avoidance attitudes and behaviour; and (5) focus beyond the individual-level to look at the interdependencies of cooperatively managing health as a systems issue.

A recent Australian government review identified health literacy as both an individual quality and organisational resource that should be grown and managed (Hill and Sofra, 2017). In the current study, participants expressed a desire for more contextual information about the purpose, focus, and practical application of assessments, essentially requesting active rather than passive participation. Given this, rail organisations are likely to benefit from designing health education initiatives that first seek to understand what health information is relevant and desired. They can then aim to meet this by stating the scope and limitations of health assessment information, managing assessment expectations, and improving train drivers' overall health literacy. Based on their experiences, participants also questioned the reliability and validity of occupational health assessments. This was a common perspective, particularly in the way BMI is used as a health marker, which is now under the spotlight in a recent white paper (National Transport Commission, 2017b). This perspective was also common when contrasting workplace health assessment against private healthcare consultations. Engagement with health management information may therefore be enhanced by increasing the ability to personalise content to the individual's context and situation (e.g., proactive consultation), and by minimising assumptions about how health factors into their personal and occupational identities (Robinson and Robertson, 2014).

Increasing the focus on psychological assessment and support resources is one potential leverage point for improving driver engagement. This may be addressed though a collaborative design of psychological wellbeing standards and resources that satisfy both organisational and drivers' needs. This can also draw on existing work, family, and heath intervention models (Kossek et al., 2014) to foster an organisational culture of mental and physical wellbeing. Such outreach and design approaches may help to increase drivers' perceptions of the relevance of assessments, as they will more closely align organisational and personal health needs and standards. It is worth noting that an elevated score on the only psychological measure in the health assessment may result in being immediately classed as Temporarily Unfit for Duty (National Transport Commission, 2017a, pp. 65 and 131). Therefore, it is highly unlikely that drivers undergoing distress would be willing to answer these items accurately due to the potential employment and/or financial consequences.

A key message arising from these findings is that drivers will continue to feel threatened unless strategic efforts are focused on creating a supportive and open culture, concerning both immediate risk and ongoing health conditions. This is imperative for co-operative and effective engagement with assessments and health promotion. Both direct and vicarious experiences of assessment threat require intervention at the organisational level to reduce negative associations with confronting health and lifestyle risk factors more generally. This means that rail organisations in Australia, and potentially other contexts with similar issues, need to become less reactive, grow beyond reacting to safety risk as a short-term issue, and mature proactively into organisations that view health and fitness in terms of long-term prevention. One way of achieving this is to benchmark the current performance and maturity level using a tool such as the Risk Management Maturity Model (UK Office of Rail and Road, 2017), which could then be used to develop strategies for change that target culture, health, safety and assessment management, and risk control.

4.3. Limitations and future directions

This study is the first to examine train drivers' subjective engagement with compulsory health assessment, and supports and extends previous work highlighting the complex nature of barriers to positive health within the rail occupational context (Naweed et al., 2017a; Naweed et al., 2017b). However, some limitations in the study should be noted. Although the percentage of male participants was representative of the Australian train driver population, the sample size was relatively small. This may limit the generalisability of findings, particularly for older cohorts, and to passenger rail contexts. To help overcome this, the diversity of the sample (different states, freight/passenger organisations, full/part time workers) and use of a focus group format yielded rich data and more data points for consensus within results.

In relation to future work, there is a pressing need to address driver engagement with assessment processes through the findings, particularly given the dearth of health intervention research in rail safety (Chapman and Naweed, 2015). The current re-examination of the Standard and open calls for consultation by Australia's National Transport Commission make the applied potential for this research very timely, particularly from a policy and practice perspective. Beyond asserting the importance of the specific themes arising from this research, the findings clearly demonstrate that individual-level subjective factors can significantly influence the application and outcome of assessment, particularly when couched within reactive cultures. This highlights a future need for detailed examination of these five factors and of health concerns within larger representative train driver populations. It would also be beneficial for future research to include the health practitioner/AHP perspective of health assessments; for example, it would be interesting to know if they are aware of driver threat avoidance behaviours, and of particular relevance from a systems perspective, whether they themselves feel constrained or limited by the Standard. Building on the quantitative reviews of the impact of the Standard and this qualitative study, future research could also adopt more formal epidemiological methods such as large-scale quantitative surveys. Ultimately, organisational shifting from reactive to preventative health interventions that incorporate these influential factors is the next step forward for improving workforce health and public safety through a more individualised and participatory approach for proactively managing train driver health. Furthermore, it is possible that the five-yearly increments between health assessments up to the age of fifty may be too infrequent to pick up timely health changes, which may contribute to poor outcomes. Further research should address this possibility.

In relation to the implications for future policy and further revisions to the Standard, the current research highlights a range of factors that present real-world barriers to effective outcomes, and a current lack of understanding about what workers want and need to facilitate improved responses within the supporting infrastructure. A clear issue with the current approach is the sole focus on identification and management of 'problem' individual employees who already present risk, in the absence of clear communication or whole-of-workplace, targeted support for primary prevention and wellbeing. While the Standard specifies that the AHP should fully explain the purpose of the assessment and inform and counsel the worker regarding the results, our data suggest that this is not happening. Good practice in relation to training, worker support and cooperative cultures appears to be lacking in the context of health assessments for drivers. Inclusion of co-produced policy, improved education and training and better facilitated help-seeking pathways, potentially that reward drivers for ongoing efforts, are likely to be of value. In order to evoke real, sustainable change, future revisions to the Standard must seek not to further identify and expose the workers who deny or hide existing symptoms, but aim to understand and address the issues that contribute directly to the climate of threat around the process.

5. Conclusions

Barriers to maintaining good health converge over multiple levels of influence, and consideration needs to be given to the issue from a systems perspective in order to improve the chances for long-term success. It is our assertion that the current Standard and health assessment will remain poorly equipped to generate effective, sustainable change without the addition of targeted primary prevention approaches to: (1) engage drivers, (2) offer them the tools for success, and (3) create an open culture of mutual support. What is clear from these findings is that any attempt to ramp up monitoring processes without close attention to participatory intervention alongside drivers is likely to increase perceptions of division. Although there is a paucity of research in rail, strategies that have shown to be effective in the transportation sector more broadly include peer mentoring and personalised feedback for health; incentivising participation, and increased provision of healthy on-site food choices (Chapman and Naweed, 2015). Such programs are likely to result in sizeable return on investment, but only with genuine commitment to a mature sustainable model. These challenges locate the issue of preventive health as a pivotal strategic research priority for rail, as well as a key socioeconomic objective for policy makers.

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