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# **Understanding the Machine Operator's Experience of Stress**

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## **EXECUTIVE SUMMARY**

The Health and Safety in the Workplace Act, 2015, contains a clear expectation that a person conducting a business or undertaking (PCBU) has a responsibility to ensure, as far as is reasonably practicable, the mental health of those who work within the forest and its associated operations. However, with the Act only providing limited guidance as to what constitutes “mental health” and with limited feedback loops, forest managers could be forgiven for not being clear about the nature of the problem and how they may have an impact. The objective of this research, therefore, was to explore how machine operators working within logging crews construct and act on stress within their work life. The goal was to support industry’s understanding of the psychosocial conditions that impact their workplaces.

What the research found was that, amongst the participant operators, fatigue and interpersonal conflict were the most reported forms of stress. Furthermore, they were reported to arise from the use of working hours to overcome obstacles to achieving throughput and uplift targets, building their personal standing within the crew and the logging fraternity in general, being paid through downturns and providing for family. When those expectations were met and hours were acceptable, the participants also talked about the positive impact work had on their sense of self and their family. What has been shown is that building a healthy workplace requires more than just developing skills the operator can bring to their work but requires considering health impacts throughout the design of the whole supply chain.

## INTRODUCTION

The Health and Safety in the Workplace Act, 2015, provides some guidance as to what could be included within mental health but also includes a ‘catch-all’ that could encompass a wide range of sources of harm. The definition of a hazard includes any behaviour that has the potential to harm, “whether or not that behaviour results from physical or mental fatigue, drugs, alcohol, traumatic shock, or *another temporary condition that affects a person’s behaviour*”. The feedback loops that could inform managers of any harm are somewhat lacking. Within the expected annual physical health checks of workers, there is no consistent assessment process promoted by the industry (Forest Industry Safety Council, 2018) and it is difficult to account for any pre-existing distress (that is not a diagnosable condition) within the generally available incident investigation methods (Leka, Van Wassenhove, & Jain, 2015). In response to this lack of information, the Independent Forestry Safety Panel (Adams, Armstrong, & Cosman, 2014), WorkSafe’s subsequent review of the implementation of the recommendations by that panel (Lovelock & Houghton, 2017) and the National Health and Safety Attitude’s and Behaviour’s Survey (Nielsen, 2015) have all concluded that there is insufficient research into the nature and causes of work-related stress within the forest industry.

Stress is a subjective process where the meanings an individual attribute to an event and their ability to cope with that event determine the stress experience (Cooper & Dewe, 2004). Understanding stress, therefore, means not just capturing the situations associated with the experience of stress but also the impacts of social and institutional issues such as power, control, and ethics on both stressors and approaches to coping. In the forest industry, policy, plans and contracts are set by people who may not necessarily live in the same communities as those who work for them, they may not have the same life histories and they can come from different cultures. They are trying to control what is happening within an operating environment that is uncertain and described with imperfect information. Any approach to this research, therefore, must be grounded in the everyday work experiences of those people who operate machines and be able to capture the explanatory potential of the context and how it shapes behaviour (Dewe & Cooper, 2012).

Psychosocial conditions arise from the interactions between one’s physical and mental capabilities and the social environments they occupy (Woodward, 2015). Machine operators have been targeted because mechanisation is the central plank in the logging industry’s strategy for eliminating harm. With an emphasis on what is happening outside of the logging crew that impacts conditions within the logging crew, the intention is to provide managers with information that will assist in designing workplaces and processes that eliminate risks. It is also intended to consider the psychosocial risks arising in social settings outside the workplace altogether, particularly those that are adjacent to the workplace (family and community).

The objective of this research is to explore how machine operators working within logging crews construct and act on stress within their work life to help fill this gap in the industry’s understanding of the psychosocial conditions that impact their workplaces.

# METHODS

## 1. Data Generation

Data was generated through a semi-structured intensive interview. The aim was to gather in-depth information about the events, activities, processes, and relationships that operators use to construct their experience of stress and coping. That meant having a conversation aimed at reviewing critical incidents the participants identified as stressful: what happened, what was at stake, who was involved and what was the result. Aspects of the operator experience that contribute to wellbeing were also canvassed through questions on how they got into logging and what they enjoyed about it. Sampling aimed to cover the contextual factors the literature suggested could be associated with the experience of stress in the workplace. Those factors were: 1. Length of the working day; 2. Work security; and 3. The type and location of machines within the logging operation. To cover the potential variation in these factors participants were recruited from the Central North Island, Poverty Bay / East Coast and Otago / Southland. In all, 27 participants were interviewed.

## 2. Analysis

The aim of analysis in a qualitative study is to interpret and make sense of the narrative data captured through the interview so that explanations can be built directly from the data. The process of analysis starts with breaking the transcripts down into references that represent recurring experiences, phrases, explanations, characteristics and actions (Birks & Mills, 2015). In this case, the analysis was looking for references that seemed relevant to the process of stress. This meant looking for events that generated either a sense of wellness or a sense of stress and then any responses to that experience. References with consistent meaning were then grouped in a code and given a label that represents that meaning. As an example, Table 1 contains the references for the code “loving logging”.

**Table 1: References contributing to the code “Loving Logging”**

- “I just love logging. I love forestry work. I am as happy on a saw as I am in a machine.”
- “Ah, the outdoors. Yeah, working with good people too. Yep. No, I'm not an office person, eh.”
- “Yeah, it's you just like it. Because it's production orientated, I suppose you can sort of see what you're doing.”
- “I just physically love the forestry, you know , and it's been in my blood right from my grandfather and my father.”
- “I like it that it's practical. I like it that it's hands-on”
- “Yeah, I don't know, I've always liked it. Big machinery.”
- “Once you're up, out of bed and out at the bush, it's quite a beautiful place to be. You know?”
- “Yeah, a bit of adrenaline here and there, yeah, for sure. That's what I really do like about it, and what keeps me coming back.”
- “Yeah, I do love it. I love the outdoors, and all the machinery and challenges and all that kind of stuff.”

Themes can be identified by looking for relationships between the codes. Those relationships give the group of codes a property along with dimensions. Properties can be thought of as the characteristics of a theme that give it definition and meaning while dimensions set out the range of conditions under which that theme arises, is maintained and changes (Birks & Mills, 2015). The references are re-assembled into a framework of concepts that start to provide some explanation for the process by which stress and wellbeing is generated within an operator's life. Figure 1 details the codes that make up the theme "Identifying as a logger".

- identifying as a logger
  - Always wanting to go logging
  - Avoiding boredom
  - Being challenged
  - Being challenged by problems
  - being hard
  - Choosing to learn on the job
  - earning your stripes on the ground
  - Feeling proud of achievements
  - feeling up when throughput flows
  - getting in the zone
  - Looking to produce
  - loving logging
  - Taking pride in the machine
  - valuing training
  - working long hours as a means to an end

**Figure 1: The codes contained within the themes “Identifying as a logger”**

## FINDING

The references collected point to a process which can be considered a pathway to stressful and "well-ful" outcomes amongst operators (see figure 2). Each step on the pathway is covered within this section.



Figure 2: The process of stress and wellbeing for operators working in a logging crew

## 1. What is valued: Identifying as an operator

The norms of the identity of “logging machine operator” reflect what is valued by the participants. The process of constructing any form of stress starts with an assessment by the participant that what is valued is threatened by some event or conversely, is potentially enhanced by the event (Lazarus, 2001, as cited in Dewe & Cooper, 2012). The references in the “loving logging” code (see table 1) show that being a logger is a visceral experience, something that contributes to identity and provides a sense of belonging. The participants described how they love the hard work, the big gear, the sense of risk and challenge, the outdoors environment they work in and the people they work with. That identity was expressed through a hardened attitude and lack of patience with those who couldn’t “match up”. For example:

*“Yeah. It really depends on the nature of the person to start with. You've got to be strong minded. I think just have a goal, and keep pushing towards it, and it's going to be hard. No one's going to give it to you on a plate.”; and*

*“Oh, some guys, you just rock up to their place and you're waiting and waiting, then they come out onto the driveway to be picked up. I'm, if you can't do that, don't bother coming.”*

Belonging to the fraternity and the status within it is earnt through hard work and demonstrated capability:

*“Just turn up every day, put your head down and get into it, and then the rewards will come. And don't let anyone shit on you. Yeah. That's about it. ... You'll get days where you just feel like giving up, or might even go for longer than days, but just keep going and then it'll get better eventually.”*

For some of the participants operating was what they had always wanted to do based on their family members and friends involved in the business. For others it was what was available to them based on where they lived and their experience of school. For all, working as an operator offered them a good opportunity to achieve socialised expectations: having work and supporting a family.

As one participant said: “*It’s an honest day’s work*”.

A source of stress observed amongst participants was found in the ways in which the norms of the identity are changing because of mechanisation. For one group of participants the right to operate a machine had been earned through starting work on the ground doing silvicultural work, quality control or cutting to length on the skid or breaking out for the hauler.

*“I’ll tell you another thing that gets me really frustrated is when... So when I started, I started with the old boys and I started when logging was different. It was all about get down there, break your back, do it and don’t complain about it. And that’s where I started. And you had to put time and effort into getting into even looking at a machine. And one thing that frustrates me now is because there is lack of experience around, and all the old boys, they’re gone, retired, passed away and all of that... And you see one guy who’s never done a days’ ... hasn’t got a single bit of dirt under his nails, and he’s in the machine”*

For another group, those who did not have either the opportunity or an interest in working on the ground and who had been employed as a machine operator, status within the crew was about demonstrated capability, particularly the capability to operate effectively across the range of machines within the crew. While there appeared to be some acceptance by the first group that the opportunity to start on the ground is getting less, there was tension between the two groups that was distinct from the usual initiation processes used to determine who is “eligible” to belong to the fraternity. Consequently, there appeared to be agreement amongst some of the younger participants that the industry was a hard place to be.

*“I’ve found like when I first got into forestry, that was the hardest part, was the hardest thing to sort of overcome was the older guys or the guy not necessarily too much older. Like 10, 15 years older than yourself, but just being that you had no experience, you mean nothing to anyone?”*

## 2. How values are expressed in the logging workplace

Within the construct of identity, norms are actioned through the practices that can be observed amongst the fraternity. Within this group of participants, what they were trying to achieve within the logging operation and why was quite consistent between themselves. Both the daily uplift target and log throughput seemed to be equally important and representative of different things. For some, making the daily log uplift target was important because of its role in the contractor’s piece rate contract with the forest owner and, therefore, its contribution to being paid. Others were more focused on the target as a matter of pride.

*“I think it’s just in my nature because the name of the game is to pull wood. And you just get drummed into your head, pull wood, pull wood, pull wood, because those logs pay for everything, you’re buggered without it. And after a while, you just got it drummed into your head. Got to get it done, got to get it done.”*

In the absence of target as a key driver (either because it was not known, or it was not sufficiently challenging), log throughput was more of a driver. Throughput flowing smoothly appeared to be associated with a sense of capability amongst the participants and being in the bottleneck with crew mates left waiting for you to complete your tasks was something of an embarrassment. Any respect earned for production performance (a function of both capability and hours worked) and work experience transferred into position within the crew’s informal hierarchy. Position within the hierarchy determined who had a say over the way work was organised. For some, recognition through qualifications, could also be used to establish or defend a position within that hierarchy. Finally, earning money appeared to be quite highly valued, not for its relationship with status, but because of its consumption potential for the family.

Similarly, adherence to identity norms could be seen in what was considered important within the family. Providing for the family, as indicated by paying the bills particularly for housing and living in places with suitable schooling for children and work for partners, was both a source of concern and pride.

*"We work to feed our families and to do the best that you can do and save money to buy things you want to buy and stuff like that."*

As was having time to be involved in family life.

*"Yep, 3:30. So, I get home about 5:00. But I have been coaching my two younger boys for the last, oh, about three or four years."*

### **3. Obstacles: Psychosocial stressors**

Any situation that threatens something that is valued is likely to be a stressor. The findings point to several environmental conditions that threaten what is valued within the identity of "logging machine operator".

- Obstacles to throughput and achieving target**

Given the place of throughput and target within the identity and the place of a concrete challenge within what is loved about logging, it is to be expected that anything that got in the way of making target or acted as a constraint on throughput was often the answer to the question about stressful events. Participants references indicated several key obstacles: insufficient machine capacity; misalignment between machines and / or ground workers; machine breakdowns; working short staffed; operator capabilities; access to trucks; bad weather; insufficient skid storage or operating area for the logging cut plan and number of machines required; and anything that got in the way of the availability of operators, e.g., the commuting distance and comfort breaks.

*"I've got it structured for the day and I know where I need to be. And what pisses me off is when something along that line interrupts that little bit of a structure, I guess."*

- Obstacles to income security**

Income insecurity is a risk to family wellbeing particularly when that wellbeing is dependent on ongoing costs such as the mortgage or rent and, for children, access to education. The participants referred to three sources of risk to their income: the log market, ongoing access to wood for harvesting and their own safety.

*"But, as I said, those times when, you know, when people are telling ya, you could be shut down that's when the old stress levels start to climb"*

- Obstacles to having input into workplace decision making**

Not having a say over how things are done within the workplace conflicts with the desire for recognition of capability and disrupts an operator's ability to cope with whatever events are causing stress. While some operators spoke positively about the efforts their crew made to ensure there was opportunity for crew members to voice their opinions and have an impact on how the crew organised themselves, others provided references that pointed to two distinct hierarchies at play within their crews: the formal structure of crew boss, foreman and, sometimes, 2IC, and the informal structure based around length and type of logging experience and longevity within that crew.

*"A few of the crew are just like, "Why are we doing it like this? It's slow, it's shit. We should do it like this." But you're doing it in that way because the foremen or the boss is saying, "Do it that way."*

- **Obstacles to a satisfying life outside work**

The psychosocial factor that was mentioned most by participating operators was the length of the working day away from home. While some participants were working 12-14 hour days on a regular basis, that did not necessarily mean those who were working less were any happier with the hours. Conversely, there were participants who were quite happy with the long days because they were in the position to do so or needed that to achieve another objective. That suggests that it is not the hours per se that is the problem but the impact of those hours which was reflected in complaints about the impact on family time.

*"So really, you're only getting like a two or three-hour window with your family. So, I guess towards the end of the week, if it's been a big week, it's harder not to get ratty, become a little bit shorter. My wife's really good, like she can see when you're buggered and just says, "Off to bed"."*

Similarly, those that are working acceptable hours (10-11 hours away from home per day) value the extra time with family that gives them, especially with the early start.

*"So [the kids are] at kindy. ... She drops them off and I'll pick them up and cook tea and do all that stuff. And she finishes at 5:30. ... It's good. I do enjoy it. ... They're neat kids. They just grow."*

While the problem is expressed as the time spent at work, it is the impact on life outside of work that appears to be the stressor.

The importance of providing for the family also contributed to the time spent at work. Most operators were on hourly rate contracts so long hours increased their ability to pay the bills. Furthermore, having access to housing and providing opportunities for the partner and their children were reasons given for the location choices that resulted in long commute times or living away from the family home for work.

*"But yeah, we literally just did that because we had no kids and just getting paid quite well and get in and make a pig of yourself and get that house deposit and all the rest of it."*

Furthermore, for someone whose pace of work is controlled by the pace of the machine, hours have become something of a proxy for working hard and can be admired within the fraternity.

*"Yeah. If you've got any involvement in the job and you've got a bit of pride in the job, you know that what needs to be done for the day and how much has to be pulled that day, so if you're down, you're always trying to do that bit extra and make sure we are getting it."*

#### 4. Impacts on operators

Although some of the references quoted above refer to anxiety and pride as impacts felt by operators because of exposure to the psychosocial conditions, the four felt experiences that featured most were at either end of two spectrums: fatigue vs energised; and conflict vs harmony.

Given the enthusiasm participants had for actively relaxing (football, hunting, fishing, firewood, motor-cross, cars, DIY, boxing, gym etc.) there was almost an air of surprise about the tiring nature of operating a machine.

*"Here, it's more mechanized and it's better for the industry, but I think the operators are more buggered. I go home more tired now than what I did when I was physically on the ground, busting my arse."*

That experience was repeated across all machine types, albeit the reasons for the fatigue differed between the machines. For the loader operators it was the combination of being on site for the "earlies" and the mental challenge of organising the skid storage in the face of complicated cut plans

and erratic uplift. For the processor operators it was the level of concentration required over relatively long periods of time, the level of surveillance and, where there was a lot of other machinery on the skid, worrying about working safely with all that interaction. For the harvesters/feller bunchers (tethered or not) it was the level of concentration required to manoeuvre the machine without tipping over and, on steep slopes, getting back up the slope. For the prime movers (hauler, skidder, forwarder) it was about keeping the wood flowing between the harvester and the skid. Mechanisation has moved the effort required from the physical to the mental. As machine capability has increased, each process has become more complex and, therefore, mentally demanding. At the other end of the fatigue / energised spectrum there was clear enthusiasm for the potential enjoyment of operating.

*"And making shit happen is what I enjoy. When we're smashing it and we're going good. Or when we're not and we've got to figure out how to fix the problems sort of stuff"*

*"Yeah, I think, yeah, every day's a challenge, even when days are going really well there's always a new challenge, you know. It keeps me, I dunno, it keeps me focused, it keeps me, you know, I don't know what word I'm looking for, but that's what I enjoy about the job. I don't get bored in it."*

Working within a crew that works well together is highly valued because of the difference it makes for achieving targets and a good flow.

*"Yeah, yeah. It's just a good crew to work with. Got some good fellows around me, so makes it a whole lot easier."*

When constraints appear, that harmony can start to break down:

*"... when somebody starts digging out one pile and then all my fucken logs fall into a big heapy mess, Jesus that just irritates the shit out of me, man. My blood pressure goes through the roof."*

Similarly, in the home environment, family may be highly valued but the impact of fatigue and time away from home can make sustaining harmonious family relationships difficult.

*"And then my kids started to not even talk to me because I was always mad and angry. "Oh, I've got to do this." And I was always pushing them aside to do my job."*

This is especially true if dealing with challenging family circumstances. When asked the question "what was the most stressful event you have ever dealt with?" the answer was invariably something within the family such as the death of a family member, caring for children with special needs or a break down in the primary relationship. In that situation, being able to give the situation the energy and attention it needed invariably came down to the ability of the crew to continue producing at the required level without that operator on the job. To the credit of their employers, most of the operators interviewed could point to a time when they were able to juggle work around their family needs.

## 5. Resources: obstacles vs. enablers

Just as stress and wellbeing are two ends of the same spectrum, the resources of the whole supply chain are also two ends of a spectrum: 'obstacles' to the logging crew uplift being achieved within acceptable hours or 'enablers' of that uplift within the time allowed.

Where those resources are obstacles, operators are working long days or into the weekend as a sign that the other resources available within the whole supply chain are not at a level of capacity or capability to complete uplift within the acceptable working day. Operators are either starting early or staying late to match the productive capacity of other parts of the crew, or they are aligning their working hours to match the capacity of other parts of the supply chain (such as trucking or port

operating hours), or they are scheduling their maintenance or training outside of the crew's production time.

*"Yeah, some of these operators really don't even sleep. They do their mad hours, and bloody at work loading trucks at half past 12. And then they get home at half past four in the afternoon, and back up again, so they're only getting three and a half, four hours sleep, that's if they are sleeping."*

*"Basically, it's the production pressure, because it hinders a lot of things, training being one of them, maintenance even, down to machinery maintenance."*

Conversely, those operators able to keep their hours down to something acceptable for the week had sufficient machine, operator, and skid capacity to take the actions required to achieve the uplift target within normal working hours, even if that meant rotating early or weekend load outs amongst a team of multi-skilled operators. That back up also allowed them to take breaks during the day, not just for some daily down time but also for any necessary family time. Doing that daily was also enabled by living within 30 minutes of the job site.

*"And I don't do any big hours anymore. Never work weekends. Haven't worked a weekend for as far as I can remember. Which to me is awesome. Oh yeah, home at 3:30 every day."*

## IMPLICATIONS

As employees (or sub-contractors) of contractors hired by forest owners or forest managers to provide a service, operators can be perceived as sitting at the bottom of the contract hierarchy. Their social position is such that they often have little power over the resources (refer Figure 2). These resources are material to the process of stress and wellbeing. The only resource they have some control over is their willingness to work longer hours, if required, to make the daily uplift target or in the way they use the time they have available.

The implication is that, if change is required to achieve healthier outcomes within the operator workforce, then that change needs to happen within the places that do control access to those resources. That is, the forest owner / manager; the contractor; and the community overcoming the lack of resources that lead to the two main stressors (fatigue and conflict) could require action in the following three areas: target and throughput; income security; and, life outside work.

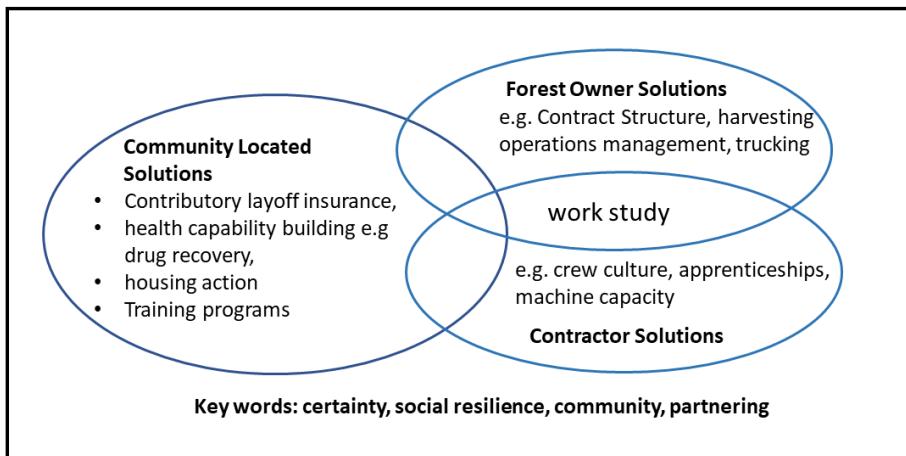
### 1. Target and Throughput

The key is to overcome the need for long hours by utilising other resources to ensure targets are met and throughput flows. Spending some time amongst forest owners and crews that were achieving their targets within a reasonable working day identified three key areas of action.

- Work study to create a level of resilience

Those contractors who are providing a healthy workplace are working in a supply chain with sufficient machine, truck, and skid (operating surface and storage) capacity to overcome bottlenecks across the majority of their operating conditions. There is a level of redundancy built into the harvesting system from the construction of the skid and roads to the supply chain capacity (logging, trucking and ports). Where that is not happening now, there is evidence of conflict getting in the way of supply chain operation.

Work study has been suggested (Figure 3) as a means of providing the data required to understand what the system may need to achieve that level of resilience rather than just rely on the outcomes of the contract negotiation process which is more about who and what is available.



**Figure 3: Solutions Map for enhancing wellbeing within operators in logging crews.**

- Redundancy in the supply chain used for recruitment and staff development

Those forest owners and contractors that are working in a more resilient way have used the redundancy inherent in that supply chain to focus on operator recruitment, development, and retention. They have used the spare capacity to provide apprenticeships or used breaks and time off within their primary operator group to provide inexperienced operators with the chance to develop skills through separate shifts and rotation. The potential for those actions is built into the daily rate and target. They have then built crew culture around skills and capability and the opportunity to have input into the way the crew works. Rather than experience being recognised through an informal hierarchy where operators are competing for status, they have recognised experience through older operators mentoring younger operators. One 40+ year veteran logging contractor, now operating a fully mechanised crew, spoke about those changes in expressing the pride he felt:

*"in working with the most professional group of loggers I have ever worked with".*

He captured what is happening within the logger identity through mechanisation. The identity is moving from the "Bushman" to the "Professional Logger" and like all professions that requires the development of a body of knowledge that is accessed through training, and is acknowledged through allowing input to decision making and providing the rewards for making that effort.

- Hours of work

Long hours are entrenched because operators receive considerable material benefits to working those hours (higher income and higher standing within the fraternity). Changing that will mean ensuring operators can replace those benefits. Those who are no longer working long days and weeks earn sufficient income to meet their family's needs within the 45-50 hours that has been described as representing a healthy working week (Pega *et al.*, 2021). Their standing within the crew is based more on their capability and contribution rather than length of time in the job.

## 2. Income Security

Operators need a sense that one of the benefits of their efforts will be a secure income. Forest owners / managers can meet part of that need through longer term contracts and being open about

their long-term harvest intentions amongst their preferred contractors. However, lack of diversification of market channels often means that forest owners are as vulnerable to market volatility as their workforce, if not more so, due to the risk represented by losing their skilled workforce in a downturn. Particularly as operators have much more ability to transfer to other industries to maintain income than the more specialised motor-manual chainsaw operators have in the past.

A potential solution is a contributory social security scheme where a small proportion of weekly income could be deposited in an insurance plan to be used to provide a wage during market shutdowns. The current government have stated their intention to implement such a scheme in their latest policy announcements (Manch, 2021). A number of the participants spoke about their enjoyment of the COVID lockdown because their financial worries were covered, and they had unfettered time with their families. Such an approach to the problem of market volatility could become something of an industry strength rather than a weakness that market downturns currently represent.

### **3. Life outside work**

It is evident from the participants in this study that contractors are already providing significant support for the events outside work that cause stress through providing leave to operators to deal with those events. There is also evidence in the data collected of contractors supporting operators in their financial life through access to advances and support with banks on obtaining loans and mortgages.

However, there is also evidence of community problems causing operators and their families significant stress. As discussed above, access to housing, schooling and work for partners lead to decisions to commute much longer distances than is considered desirable or safe from a fatigue point of view.

Providing long term contracts with rates that recognise the challenges being faced in building a work force is a good starting contribution by forest owners and managers to enable contractors to confront those challenges in their specific location. However, there is also an opportunity for forest owners and managers, contractors, and operators to collaborate on contributing to a safe and healthy community in which operators and their families are happy to build a life. The industry already has some good examples of this collaborative approach to overcoming community challenges. They include programmes aimed at enabling living free from drugs and providing pathways into work for young people facing obstacles to employment. These programmes have been developed and supported by forest owners and contractors in partnership with their communities. Lack of community resources should not be seen as a barrier to building a healthy workplace and workforce. Rather, it is an opportunity to cement the industry's place within that community.

## CONCLUSION

The objective of this research was to explore how machine operators in logging crews working in the New Zealand logging industry constructed stress and wellbeing within their work life. The intention was to contribute to the industry's understanding of the psychosocial conditions that impact their workplaces and determine mental health. Machine operators were targeted because of the place mechanisation has in the logging industry's efforts to eliminate harm.

Twenty-seven operators across the Central North Island, Poverty Bay / East Coast and Otago / Southland were interviewed about the situations that created both stress and wellness in their lives. Those data were analysed using a thematic analysis approach aimed at building an explanation directly out of the participants' narrative to capture the subjective nature of the process of stress and wellbeing.

The key findings were that the most reported forms of stress (fatigue and conflict) arose, primarily, from the use of working hours to overcome any obstacles to achieving throughput and uplift targets, to build standing within the crew and logging fraternity, to improve pay, and provide for family.

Alternatively, when there were sufficient resources and those expectations could be met within acceptable hours, the participating operators talked about the positive impact work had on them and their family and vice versa. What has been demonstrated is that the construction of mental health requires more than an inherent set of skills and capabilities that improve the ability of operators to cope with stressful situations. It also requires the design of social environments (work and community) that target and enable healthy outcomes for people and their families.

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## REFERENCES

- Adams, G., Armstrong, H., & Cosman, M. (2014). *Final Report Independent Forestry Safety Review An agenda for change in the forestry sector*. Retrieved from New Zealand: [http://www.nzfoa.org.nz/images/stories/pdfs/safety/20141031finalreport\\_web2\\_311014.pdf](http://www.nzfoa.org.nz/images/stories/pdfs/safety/20141031finalreport_web2_311014.pdf)
- Birks, M., & Mills, J. (2015). *Grounded theory: A practical guide*: Sage.
- Cooper, C. L., & Dewe, P. J. (2004). *Stress: A brief history*. Oxford, United Kingdom: Blackwell Publishing.
- Dewe, P., & Cooper, C. (2012). *Well-being and work: Towards a balanced agenda*. Basingstoke: Palgrave MacMillan.
- Forest Industry Safety Council. (2018). *FISC's KYND Wellness Health Pilot*. Retrieved from Wellington: [https://www.fisc.org.nz/uploads/6/6/2/5/66257655/fisc\\_kynd\\_pilot\\_2018.pdf](https://www.fisc.org.nz/uploads/6/6/2/5/66257655/fisc_kynd_pilot_2018.pdf)

Health and Safety at Work Act 2015, NZ Government (2019).

Leka, S., Van Wassenhove, W., & Jain, A. (2015). Is psychosocial risk prevention possible? Deconstructing common presumptions. *Safety Science*, 71, 61-67. doi:10.1016/j.ssci.2014.03.014

Lovelock, K., & Houghton, R. (2017). *Health on the outside, sick on the inside. Work Related Health in Forestry*. Wellington, New Zealand: WorkSafe New Zealand Retrieved from <http://www.worksafe.govt.nz/worksafe/research/research-reports/2016-forestry-research/2016-forestry-research-documents/2016-Forestry-Research-Report-5.pdf>

Manch, T. (2021, 20/5/2021). Budget 2021: The winners and losers in a welfare-focused budget. *Stuff*. Retrieved from <https://www.stuff.co.nz/national/politics/125190608/budget-2021-the-winners-and-losers-in-a-welfarefocused-budget>

Nielsen. (2015). *Health and safety attitudes and behaviours in the New Zealand workforce: A study of workers and employers. 2014 Qualitative Research. Forestry report*. Wellington New Zealand.: (A report to Worksafe New Zealand) Retrieved from <http://www.worksafe.govt.nz/worksafe/research/research-reports/reports/attitudes-and-behaviours-survey-qualitative-forestry-report.pdf>

Pega, F., Náfrádi, B., Momen, N. C., Ujita, Y., Streicher, K. N., Prüss-Üstün, A. M., . . . Woodruff, T. J. (2021). Global, regional, and national burdens of ischemic heart disease and stroke attributable to exposure to long working hours for 194 countries, 2000–2016: A systematic analysis from the WHO/ILO Joint Estimates of the Work-related Burden of Disease and Injury. *Environment International*, 154. doi:10.1016/j.envint.2021.106595

Woodward, K. (2015). *Psychosocial studies: An introduction*. New York, NY, US: Taylor & Francis Group.