

NAC Executive Insights

Risk Tolerance in Safety

Key Points

- **Risk Tolerance**—the personal “set point” for acceptable risk—often limits the effectiveness of safety improvements.
- **Risk Compensation** (risk homeostasis) means that unless behavior changes, safety measures may only redistribute risk rather than reduce it.
- Industry data shows significant progress in TRIR but persistent fatalities—over **9,600 deaths in a decade**—point to **behavioral and cultural barriers**.
- **Perceived safety** can lead to increased risk-taking, as seen in examples from transportation, construction, and daily life.
- **Technical solutions alone are not enough**. We must also consider how people perceive and respond to risk. Safety interventions must be designed not only to reduce hazards but also to anticipate and address behavioral responses.
- Effective solutions require **behavioral design, cultural change, and rethinking our relationship with failure**.

Introduction

Over the past decade, the construction industry has seen measurable reductions in injury rates (TRIR) but no comparable reduction in fatalities. Data from CII shows TRIR steadily down but DART and fatalities remain stubbornly high. Since 2016 there has been no meaningful reduction in DART or fatality rates. The underlying problem seems to be that those traditional systems—training, monitoring, zero tolerance—work within the “safe conditions envelope,” but they don’t alter underlying risk-taking propensity.

Why Safer Doesn’t Always Mean Safer

Workplace injuries continue to occur. Why? One compelling explanation lies in a psychological phenomenon known as **Risk Compensation**—the idea that when people feel safer, they may unconsciously take more risks, potentially offsetting the benefits of safety interventions.

What Is Risk Compensation?

Risk Compensation, also referred to as *risk homeostasis*, describes how individuals adjust their behavior in response to perceived changes in risk. If people feel more protected, they may engage in riskier

actions to maintain a level of risk they're comfortable with. This paradox can undermine even the most well-intentioned safety measures.

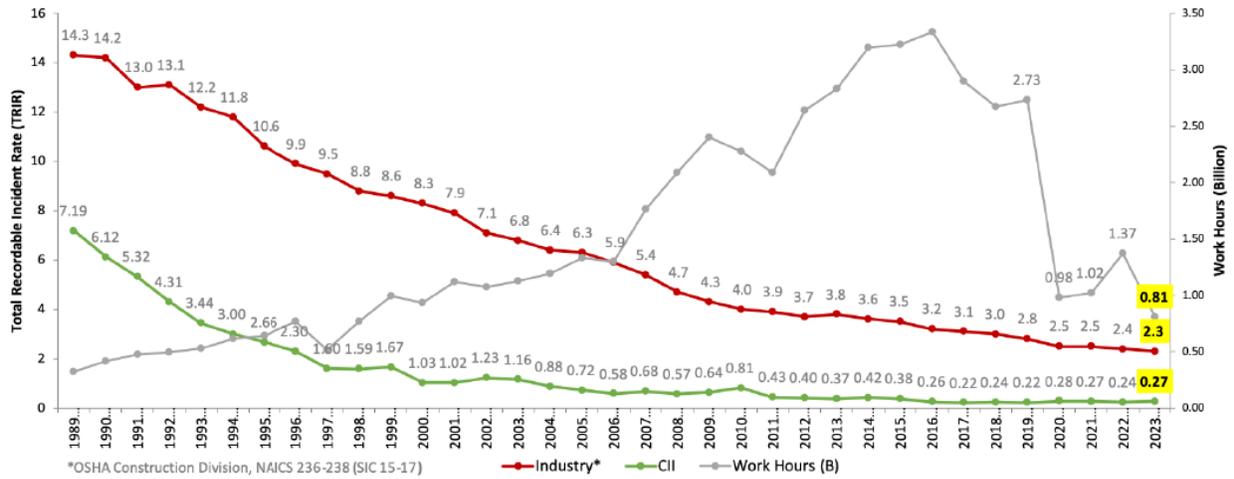


Figure 1. Total Recordable Incident Rate (TRIR) (CII 2025)

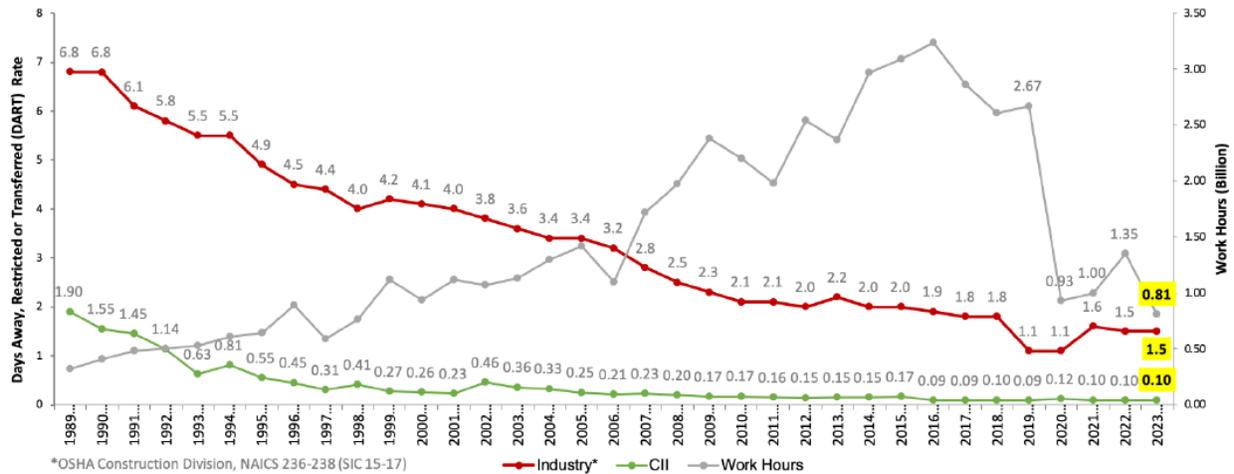


Figure 2. Days Away, Restricted or Transferred (DART) Rate (CII 2025)

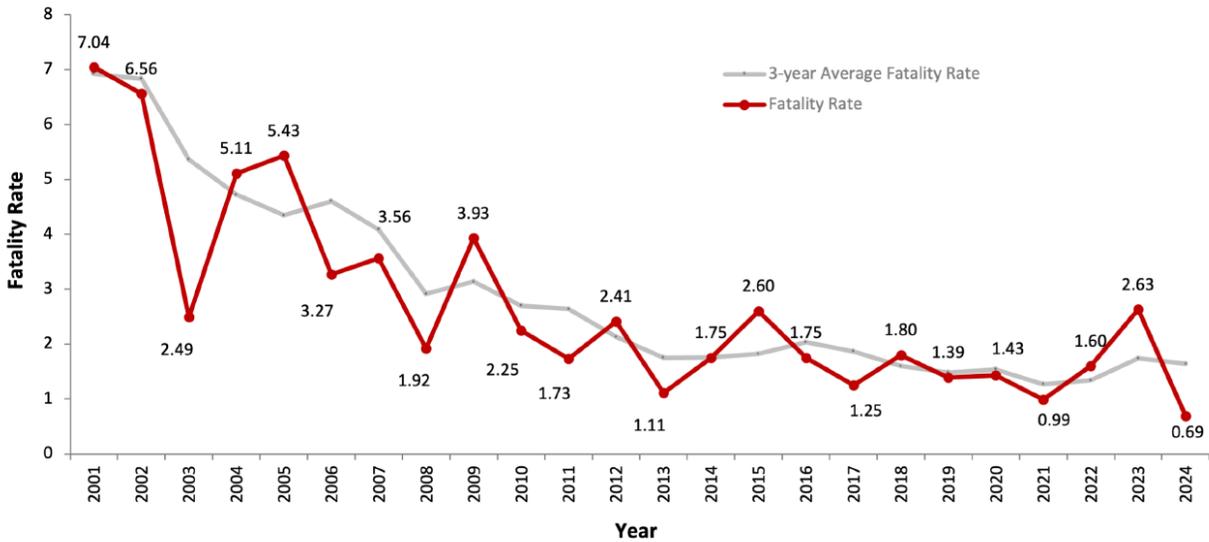


Figure 3. Fatality Rate (CII 2025)

In his 1995 book *Risk*, p.215, John Adams put it succinctly: “Interventions that do not alter people’s propensity to take risks will be frustrated by responses that re-establish the level of risk with which people were originally content.” In other words, unless we address the human tendency to seek a certain level of risk, safety improvements alone may not reduce overall harm.

The Thermostat Analogy

Think of risk tolerance like a thermostat in your home. Normally in our homes, the thermostat is set to 68°F in the winter. If the temperature rises above that, the cooling system kicks in. If it drops below, the heat turns on. The system constantly adjusts to maintain a comfortable level.

Now imagine that instead of temperature, this thermostat regulates the level of risk we’re comfortable with. Each person has a different setting, some are more risk-averse, others more risk-tolerant. But we all tend to adjust our behavior to stay within our personal comfort zone.

Here’s how it works:

- If we perceive our environment as **less risky** than our internal target, we may **increase** our risk-taking behavior to restore balance.
- If we perceive it as **riskier**, we tend to **pull back** and behave more cautiously.

This unconscious adjustment is the essence of Risk Compensation.

The “Risk Thermostat” in Action:

People tend to adjust behavior to maintain their comfort level with risk. This can be seen in examples from our daily lives:

- **Jaywalking** – when jaywalking, people can be seen to be extra careful about traffic and the person’s situation. However, the whole of the risks are nearly the same; crossing at controlled intersections involves much less observable risk awareness. Pedestrian fatalities occur most often in crosswalks; safety infrastructure alone is insufficient.
- **ABS brakes and modern cars** – In 1967 a new Corvette car had a stopping distance (60mph to 0) of 135 feet. Today, a modern Corvette stops in 95 feet. The modern car stops in 2/3 of the distance. What has happened? The recommended following distances have been reduced from three seconds to two. Better stopping distance results in following more closely, obviating the risk reduction of the improved stopping distance.
- **Seatbelt mandates** may have reduced fatalities, but also may have shifted risk-taking behaviors elsewhere, such as higher driving speeds or more aggressive cornering.
- **Helmets and protective gear** sometimes lead to more aggressive riding or biking. In some jurisdictions where helmet laws have been studied, fatalities increase after laws are enacted.
- **A case study in construction** – Consider the construction industry. When workers are provided with personal protective equipment (PPE), training, and safety systems, do they feel so protected that their perception of risk decreases—and their risk-taking behavior increases? One empirical study, entitled “The safer you feel, the less safely you might behave – but research suggests ways to counteract this tendency,” and summarized by *The Conversation*, (de la Garza, Geller, and Hasanzadeh, 2023) suggests the answer is yes. Researchers found that when construction workers felt more protected, they unconsciously took more risks—potentially offsetting the benefits of the safety measures. The study confirmed that **perceived safety can lead to increased risk-taking.**

Factors Driving Risk Tolerance

- **Perceived Control** – believing one can manage the hazard.
- **Familiarity** – repeated exposure reduces perceived danger.
- **Cultural Norms** – peer tolerance for shortcuts.
- **Incentives & Pressures** – production goals that indirectly reward risk.
- **Past Outcomes** – no prior incident reinforces “safe enough” mindset.
- **Bias Influence** – unconscious biases shape safety judgments.

These factors are largely formed from experiences. Drivers log tens of thousands of miles without having a rear-end collision. Following closely becomes a risk tolerance. Experience and familiarity can also **build skill**, enabling workers to take **managed risks** more effectively—if awareness remains high and safeguards are active.

Implications for Leaders

We cannot rely solely on hazard reduction—**risk perception must be managed** to avoid compensatory behaviors.

- **Systems and processes** can only go so far without addressing human behavior.
- **Blame and shame** approaches often discourage transparency and learning. Focus on incidents needs to be positive and learning-based.
- **Procedures are imperfect**—they must be reconciled with real work conditions.
- **Balance** procedure with judgement. Overly restrictive safety rules may reduce productivity and foster disengagement. Leaders must distinguish between **unnecessary hazards** and **controlled operational risks**.
- The challenge is to create a learning environment and focus on risk awareness and tolerance. **Controlled, managed processes work best when the “why” is clear.**

Recommended Actions

1. **Educate**
 - Introduce risk compensation concepts at all levels.
 - Share case studies, where perceived safety increased risk exposure.
 - Raise awareness of the internal “risk thermostat” and how it influences behavior.
 - Integrate behavioral insights into safety training, design, and policy.
2. **Integrate Behavioral Risk Analysis**
 - Evaluate potential behavior shifts before implementing new controls.
 - Include bias-awareness training to improve hazard recognition.
 - Design safety systems with human behavior in mind.
3. **Reframe Failure**
 - Replace “blame and shame” with “learn and improve.”
 - Treat mistakes as opportunities for systemic and behavioral improvement.
4. **Change Cultural Norms**
 - Promote a **culture of caring**, where everyone feels responsible for safety outcomes.
 - Use peer-to-peer interventions to influence daily decisions.

Bottom Line

The construction industry’s plateau in safety outcomes is not just a systems issue, it’s a **human adaptability challenge**. To revisit John Adams: “In the absence of reductions in people’s propensity to take risks, safety interventions will redistribute the burden of risk, not reduce it” (Adams 1995, p.215)

To move forward, leaders must:

- **Shift the risk thermostat** toward safer norms.
- **Design systems that anticipate behavioral adaptation.**
- **Foster a culture of caring** that values safety ownership as much as technical compliance.

The objective is not to eliminate all risk-taking, but to achieve **zero tolerance for unnecessary, unmanaged risk**.

References

- Adams, J. (1995). RISK. Routledge
- CII (2025). 2024 Safety Report, DPC2024-2, February 2025.
- de la Garza, J.M., E.S. Geller, Hasanzadeh, S. (2023). The safer you feel, the less safely you might behave – but research suggests ways to counteract this tendency. The Conversation. <https://theconversation.com/the-safer-you-feel-the-less-safely-you-might-behave-but-research-suggests-ways-to-counteract-this-tendency-190527>
- Wilde, G.J. (1982). The theory of risk homeostasis: Implications for safety and health. Risk Analysis, Vol. 2, Issue 4, pp: 209–225. <https://doi.org/10.1111/j.1539-6924.1982.tb01384.x>

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