

Pre-Workout Supplements Interfere with Sleep and Recovery in Young People

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STORY AT-A-GLANCE

- › Young people who use pre-workout supplements face more than double the risk of sleeping five hours or less per night, a level of sleep loss that undermines mood, learning, and physical recovery
- › High-dose stimulants in pre-workout products keep your nervous system in a stressed, alert state, making it harder for your brain and body to shift into deep, restorative sleep
- › Short sleep doesn't just cause fatigue; it pushes your body to adapt to exhaustion rather than strength, slowing progress even when training effort stays high
- › Teens and young adults are especially vulnerable because their brains, nervous systems, and hearts are still developing, making stimulant exposure more disruptive
- › Better performance comes from protecting sleep, fueling workouts with food, and prioritizing recovery, not from relying on stimulants that interfere with nighttime repair

Walk into almost any gym or scroll through fitness content online and you'll see pre-workout supplements framed as a normal part of training, especially for teens and young adults trying to keep up with busy days. On the surface, that choice looks practical. These products are powders or ready-to-drink formulas taken before exercise that combine stimulants and performance-focused ingredients to increase alertness and perceived energy.

Train harder, get stronger, repeat. Yet there's a quiet conflict underneath that routine, one most people do not recognize until their sleep, mood, or recovery begins to unravel. Sleep is the phase where training pays off. It's when your brain resets, muscles repair, and learning consolidates. When that window shrinks night after night, performance gains stall and stress accumulates.

Over time, your body starts adapting to exhaustion rather than strength. What makes this issue easy to miss is how normalized stimulant use has become in fitness culture. Energy is treated as something you pour in, not something you protect. Motivated athletes and driven students alike mistake stimulation for readiness, only to lose the deep recovery that allows real improvement.

The problem isn't effort or discipline. It's a mismatch between how your nervous system is pushed during the day and what it needs at night. To see why this pattern shows up so consistently, it helps to step back and examine what large-scale data reveal about pre-workout supplement use and sleep behavior, and how those patterns reflect everyday choices rather than extreme cases.

Pre-Workout Supplement Use Doubles the Risk of Extreme Sleep Loss

A study published in the journal *Sleep Epidemiology* examined whether pre-workout supplement use affects how much sleep adolescents and young adults actually get each night.¹ Researchers analyzed data from Wave 2 of the Canadian Study of Adolescent Health Behaviors, which included 912 participants. The goal was to measure average sleep duration and see how it differed between people who used pre-workout supplements and those who did not.

Participants ranged from 16 to 30 years old and reflected a broad mix of genders, education levels, and backgrounds across Canada. About 22.2% reported using pre-workout supplements in the past year. Sleep was measured by asking participants how

many hours per night they slept on average over the previous two weeks, then grouping responses into categories such as five hours or less, six hours, seven hours, eight hours, or nine or more hours.

- **The most striking result centered on the shortest sleepers** — People who used pre-workout supplements had more than double the risk of sleeping five hours or less per night compared with those who slept eight hours, which served as the reference point.

Specifically, the relative risk ratio was 2.53, meaning severe sleep restriction was far more common among pre-workout users. This matters because five hours is not a slight shortfall. It represents a level of **sleep loss** that interferes with memory, emotional regulation, and physical recovery.

- **The association held even after accounting for mental health and training habits** — Researchers adjusted their analysis for age, gender, education, anxiety symptoms, depression symptoms, and whether participants engaged in weight training during the past 30 days. Even with those factors included, pre-workout supplement use remained strongly linked to very short sleep.

That tells you this pattern is not explained away by stress, mood issues, or training alone. The supplement itself stands out as a key variable.

- **Caffeine dose emerged as the central driver behind the sleep disruption** — Pre-workout supplements contain very high caffeine levels, ranging from roughly 91 to 387 milligrams (mg) per serving, with an average around 254 mg. That amount rivals or exceeds multiple cups of coffee taken at once. When you stack this on top of school, work, screens, and late-day workouts, the nervous system stays switched on long after your body wants to shut down.

Hormones That Guide Sleep Timing Also Get Pushed Out of Sync

The study described how caffeine delays your body's natural [melatonin](#) rhythm.

Melatonin is the hormone that signals nighttime and prepares your brain for sleep. When its release shifts later, falling asleep becomes harder and total sleep time shrinks. For you, this means the issue is not discipline or willpower. It's chemistry.

- **Your nervous system remains in a stressed, alert state** — Researchers also explained that caffeine activates the sympathetic nervous system, raising heart rate and blood pressure. This is the same system involved in fight-or-flight responses. That state clashes with the deep relaxation required for restorative sleep. When this cycle repeats night after night, short sleep becomes the norm rather than the exception.
- **Timing makes the problem worse for young people with packed schedules** — Adolescents and young adults often train in the afternoon or evening because of school and job demands. The researchers recommended avoiding caffeine-containing pre-workout supplements within 12 to 14 hours of bedtime. For most young people, that window is unrealistic. This explains why simply "trying to sleep earlier" fails when stimulant timing works against you.
- **Caffeine blocks sleep signals** — Caffeine works by blocking adenosine receptors in your brain. Adenosine is a chemical that builds up during the day and signals sleep pressure, meaning it tells your brain it's time to rest. When caffeine blocks that signal, the feeling of sleepiness gets delayed even when your body is exhausted.

Side Effects Explain Why Pre-Workout Supplements Backfire

An article published by Verywell Health, a consumer medical news outlet, reported on the most frequently observed side effects linked to popular pre-workout supplement ingredients.²

- **Jitters and restlessness were identified as early warning signs** — Many users report feeling shaky, restless, or unable to sit still after taking pre-workout products. These sensations are often due to stimulant ingredients such as caffeine

anhydrous, synephrine from bitter orange, and theacrine. These compounds increase adrenaline and overall nervous system activity. When your body stays in a revved-up state, it becomes harder to transition into calm focus or recovery later in the day.

- **Anxiety and irritability were linked to the same stimulant effects** — Ingredients like yohimbine, caffeine, and synephrine raise norepinephrine, a chemical involved in alertness and stress signaling. This shifts your brain into a heightened vigilance mode. People who already struggle with anxiety often report racing thoughts, tension, and irritability even at lower doses, which helps explain why some users feel overstimulated rather than energized.
- **Digestive upset is a frequent and disruptive complaint** — Nausea, bloating, and stomach cramps commonly occur when pre-workout supplements are taken on an empty stomach or in large doses.

Ingredients such as L-citrulline, arginine alpha-ketoglutarate, and high-dose niacin irritate the gastrointestinal tract. Niacin also causes **flushing**, or warmth and redness of the skin. Digestive disruption interferes with nutrient absorption and training consistency, undercutting the purpose of the supplement.

- **Heart-related symptoms signal more serious strain** — Elevated blood pressure and heart palpitations are concerning reactions associated with stimulant-heavy formulas.³ Palpitations feel like pounding or skipped beats and indicate increased cardiac stress. "High stim" products often rely on proprietary blends that don't clearly disclose stimulant amounts, making it harder for users to gauge exposure and risk.
- **Fluid loss amplified fatigue rather than preventing it** — Many pre-workout ingredients increase sweating and urination, contributing to dehydration. Stimulants act as diuretics, meaning they promote fluid loss. Dehydration shows up as headaches, muscle cramps, and early fatigue, creating a mismatch between the promise of energy and the body's actual physiological state.

The article specifically warned against "dry scooping," or consuming pre-workout powder without water, citing risks such as choking, irregular heartbeat, and caffeine overdose. It also stressed that combining pre-workout supplements with coffee or energy drinks multiplies stimulant exposure.

Teen Development Collides with Stimulant Marketing

An article published by Sportsfuel, a New Zealand-based sports nutrition brand, addressed the rising visibility and use of ready-to-drink pre-workout products among children and teenagers.⁴

The piece explains why stimulant-heavy beverages marketed for performance don't suit younger users due to practical risks tied to growth, daily functioning, and long-term health. Adolescents' bodies and brains are still in active development. Products designed for adult performance goals don't match the biological and emotional needs of minors.

- **Timing during development is a core concern** — Adolescence is a period when the brain, nervous system, and heart mature together. Adding strong stimulants during this stage places extra strain on systems that are still stabilizing. The body is learning how to regulate energy, mood, and recovery. Stimulant overload disrupts that learning process and increases the likelihood of ongoing regulation problems.

Ready-to-drink formats also make pre-workout supplements easy to consume casually and repeatedly. These products often contain a blend of stimulants, and teens often combine them with soda or energy drinks without realizing how much they're stacking.

- **Cardiovascular and emotional strain carry higher stakes for youth** — Stimulants temporarily raise heart rate and blood pressure, which poses greater concern for adolescents with undetected heart conditions. Mood swings and emotional sensitivity already increase during teenage years. Stimulants intensify irritability and emotional volatility, making daily regulation harder rather than easier.

- **Mental health sensitivity amplifies the impact** — Adolescence already carries heightened vulnerability to anxiety and mood instability. Stimulant exposure adds constant alertness to an already stressed system. This creates a reinforcing loop where calming down becomes harder over time. Teens also differ widely in stimulant sensitivity, making one-size dosing assumptions unreliable.
- **Lack of age-specific regulation shifts responsibility to families** — In New Zealand, dietary supplements fall under regulations that don't set age limits for pre-workout products. This gap leaves access driven by marketing rather than developmental guidance. Establishing clear household rules around stimulant drinks reduces daily decision fatigue and simplifies boundaries for teens.
- **Emphasize basic foundations over supplements** — Sportsfuel encouraged focusing on hydration, regular meals, and consistent training habits to support youth performance. This approach reframes progress around repeatable behaviors rather than chemical boosts. Tracking sleep, hydration, and recovery days provides clear feedback and builds confidence without relying on stimulants.

Simple Steps That Protect Sleep and Performance

If you train hard but wake up tired, the issue is not your discipline or motivation. It's a mismatch between stimulation and recovery. Your body improves during sleep, not during the workout itself. When stimulants push your nervous system late into the night, the repair phase never fully happens. The goal here is not to quit training. It's to remove the obstacles that block deep sleep while keeping your workouts effective and consistent.

1. **Avoid pre-workout supplements entirely, especially later in the day** — If you train after school or work, I recommend avoiding pre-workout supplements altogether. These products are designed to overstimulate your nervous system, and that stimulation routinely carries into the night. When you remove pre-workout supplements, your body is finally able to shift into recovery mode in the evening.

Sleep becomes deeper, mood steadies, and training adaptations improve without pushing your system into overdrive.

- 2. Use food and hydration as your baseline energy system** — Before training, eat a simple, balanced meal or snack that includes carbohydrates, protein, and fluids. This supports training output without driving nervous system overstimulation. Stop treating stimulants as a performance tool and start viewing them as a stress input.

Instead of budgeting or juggling sources, simplify the equation by removing unnecessary stimulants from your routine, including pre-workout supplements and energy drinks. When your energy comes from sleep, food, and consistent routines, fatigue no longer forces reactive decisions, and your nervous system regains a predictable rhythm.

- 3. Prioritize post-workout recovery with carbohydrates and protein** — Your muscles rebuild when you're in a rest-and-digest state, not in a fight-or-flight state, so think of your post-workout meal as the real start of recovery. Eating **carbohydrates after training** lowers cortisol, the stress hormone that rises with intense exercise, and signals your nervous system that it's safe to repair tissue.

Pair those carbs with **protein within two hours** after training, aiming for about 0.3 to 0.4 grams of protein per kilogram of body weight, which works out to roughly 20 to 40 grams for most adults. Within that protein dose, target around 2 to 3 grams of **leucine**, the amino acid that flips on muscle protein synthesis. When you fuel recovery properly, your body no longer needs stimulants to push through fatigue because repair and adaptation are actually happening.

- 4. Shift motivation toward recovery metrics** — If you enjoy tracking progress, I recommend scoring sleep hours, wake-up energy, and next-day training quality instead of chasing stimulation. Watching those numbers improve reinforces the payoff of better recovery and builds confidence that your body responds quickly when you remove the interference and make time for proper recovery.

5. Build training consistency by lowering intensity, not forcing output — Stop equating progress with maximum effort every session. Consistent training works best when intensity varies across the week instead of spiking daily. By alternating harder days with lighter, skill-focused or recovery-based sessions, your nervous system stays adaptable rather than strained.

If you're a teenager, this protects growth and emotional regulation. If you're an adult, it preserves joint health, mood stability, and long-term energy. Progress comes from repeatable training you can sustain, not from pushing your system into exhaustion and trying to recover later. When stimulation supports training but sabotages sleep, the fix is not more effort. It's better alignment. Once your nervous system gets the signal that nights are for recovery, performance follows naturally.

FAQs About Pre-Workout Supplements in Adolescence

Q: Why do pre-workout supplements interfere with sleep in young people?

A: Pre-workout supplements contain high doses of stimulants that keep the nervous system in an alert, stressed state long after training ends. This delays your brain's natural nighttime signals, shortens total sleep time, and prevents deep recovery, especially when workouts happen in the afternoon or evening.

Q: How much sleep loss is linked to pre-workout supplement use?

A: Large-scale data show that adolescents and young adults who use pre-workout supplements face more than double the risk of sleeping five hours or less per night compared with nonusers. That level of sleep loss disrupts memory, emotional regulation, and muscle repair.

Q: Why is short sleep a bigger problem than just feeling tired?

A: Chronic short sleep strains mental health, slows learning, weakens physical recovery, and pushes your body to adapt to exhaustion rather than strength. Over time, training progress stalls even when effort stays high.

Q: Why are teens and younger athletes at higher risk?

A: Adolescence is a period when the brain, nervous system, and heart are still developing. Stimulants place extra stress on systems that are still learning how to regulate energy, mood, and recovery, increasing the risk of long-term regulation problems.

Q: What supports performance without harming sleep?

A: Consistent training schedules, adequate sleep, hydration, and proper fueling do more for performance than stimulants. Eating carbohydrates and protein after workouts lowers stress hormones, supports muscle repair, and reduces the need to rely on artificial energy to get through training.

Sources and References

- ¹ [Sleep Epidemiology December 2025, Volume 5, 100124](#)
- ² [Verywell Health October 15, 2025](#)
- ³ [Circulation November 11, 2024](#)
- ⁴ [Sportsfuel September 12, 2023](#)