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**To:** [sb882](#)  
**Subject:** Fwd: Proposal for Integrating Neuroscience, Neuroepigenetics, and Evidence-Based Resilience Training into SB 882 Recommendations  
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## Good morning, SB882 Advisory Council,

I submit this proposal for consideration as you finalize recommendations for and after today's meeting.

I have attended previous Council meetings and have carefully reviewed the preliminary report. I write now as a seasoned disability rights advocate with more than 20 years of experience working directly with the SB 882 population—individuals with mental illness and intellectual or developmental disabilities.

My professional background includes service as an intern in an outpatient clinic for the mentally ill, direct care work in a sub-acute locked facility as a sub-acute counselor and suicide interventionist, as well as a marriage and family therapist intern. I served as program and case manager for a behavior management program and diversion program serving Regional Center clients, and as a Regional Center service coordinator. I have served as an advisory board member for a trauma-informed care study at Gateways Hospital and Mental Health Center. Additionally, I served in the armed forces, where I trained with and supported military police as a member of an auxiliary security force. This combination of clinical, advocacy, and military law enforcement experience has given me a unique perspective on the intersection of neuroscience, trauma, and policing that I believe can meaningfully contribute to the Council's final recommendations.

### Executive Summary

The preliminary report correctly identifies a lack of reliable data on interactions between law enforcement and the SB 882 population, the need for more effective training, and the importance of crisis response models. However, the report does not fully incorporate a growing body of neuroscience, neuroepigenetics, and neuroplasticity research that offers empirically validated solutions to these very challenges. I urge the Council to consider integrating this research into your final recommendations.

### The Neuroscience Framework: What the Research Shows

Recent advances in neuroscience and epigenetics provide a biological foundation for understanding both civilian behavior during crises and officer responses under stress. This research is not theoretical—it has been translated into field-tested programs with measurable outcomes.

#### 1. Epigenetics and Trauma-Informed Policing

Epigenetics research demonstrates that adverse experiences cause measurable biological changes that affect behavior. A 2025 study published in the *Journal of Psychiatric Research* examined military police officers and found that occupational stress was significantly associated with DNA methylation of the BDNF gene—a key factor in brain health and stress response. Specifically, officers under stress showed significantly higher methylation levels at multiple CpG sites in the BDNF exon IV promoter region, a region that includes the binding site for the transcription factor CREB.<sup>1</sup> For law enforcement, this means:

- Understanding the biological basis of behavior: When officers understand that erratic, agitated, or apparently aggressive behavior may stem from trauma-induced neurological adaptations, they can respond with greater empathy and more effective de-escalation strategies.
- The plasticity of recovery: Research confirms that the brain retains its capacity for change throughout life. Individuals in crisis can respond to calming environments and skilled intervention, as the stress response can be reversed through targeted approaches.

#### 2. The Authority of Dr. Michael Merzenich and Neuroplasticity Research

The scientific foundation for this proposal rests on the work of Dr. Michael Merzenich, a member of the National Academy of Sciences, recipient of the Kavli Prize in Neuroscience, and professor emeritus at the University of California, San Francisco. Dr. Merzenich is widely recognized as the "father of neuroplasticity" for his pioneering research demonstrating the brain's capacity to reorganize itself throughout life.<sup>2</sup>

In his public writings, Dr. Merzenich has directly addressed the relevance of neuroplasticity to the criminal justice system. He has written extensively about how childhood trauma, abuse, and chronic stress create "internal scars" that shape brain development and behavior.<sup>3</sup> Critically, he has argued that our current approaches to criminal justice fail because they do nothing to drive the brain in a corrective direction.<sup>3</sup>

#### 3. Evidence-Based Training Programs with Proven Outcomes

Several programs have translated this research into practical police training with documented outcomes:

Program	Description	Proven Outcomes
Mindfulness-Based Resilience Training (MBRT)	Mindfulness practices and stress management training for law enforcement officers	A 2024 multisite feasibility randomized clinical trial published in <i>BMC Complementary Medicine and Therapies</i> demonstrated high feasibility of recruitment and retention, acceptability of MBRT, and responsiveness to change for physiological and self-report measures. The study sets the stage for a full-scale trial testing MBRT's efficacy in increasing officer health and resilience and decreasing aggression and excessive use of force. <sup>4</sup>
Heart Rate Variability Biofeedback (HRVB) / iPREP	Five-module protocol training officers to use paced breathing techniques to modulate autonomic responses to acute and	The International Performance Resilience and Efficiency Program (iPREP) HRVB protocol, described in a 2024 <i>Applied Psychophysiology and Biofeedback</i> publication, is supported by 10 years of user-informed research. Studies demonstrate immediate and sustained improvements in police performance and physiological health outcomes. The protocol integrates with reality-based training scenarios and includes techniques using prolonged exhalation. <sup>5</sup>

chronic stress

Scenario-Based Cognitive Training (Sit-D)	Immersive, high-pressure simulation training developed by the University of Chicago Crime Lab to challenge cognitive biases and "thinking traps"	A randomized controlled trial with the Chicago Police Department presented at the International Association of Chiefs of Police conference found that officers trained in Sit-D showed improvements in use-of-force decisions and were less likely to be injured on duty. <sup>6</sup>
POWER (Peace Officer Wellness, Empathy & Resilience) Training	12-week program teaching skills promoting well-being, mindfulness, and relationality	A 2024 study demonstrated statistically significant improvements in empathy, mindfulness, social connection, and autonomic health as measured by heart rate variability. Researchers noted increased HRV coherence, which may serve as a physiologic marker of enhanced social connection and group performance. <sup>7</sup>
HeartMath Coherence Advantage	Resilience-building program teaching self-regulation skills focused on heart rhythm coherence	A study of Santa Clara County, California police officers showed that training improved officers' capacity to recognize and self-regulate responses to stressors. Officers experienced reductions in stress, negative emotions, and depression, and increased peacefulness and vitality. The study also found that 11% of officers were at higher risk for sudden cardiac death—more than twice the general population rate—highlighting the value of HRV screening. <sup>8</sup>

4. The Biological Basis of Impulsive and Aggressive Responses

Research confirms that genetic factors contribute to individual differences in aggression and violence-proneness, with heritability of aggressiveness established as a scientific phenomenon.<sup>16</sup> Critically, epigenetic mechanisms mediate the relationship between environmental stress and aggressive behavior. Trauma exposure can trigger epigenetic changes—such as hyper-methylation of the MAO-A gene—that increase aggression risk in vulnerable individuals.<sup>17</sup> The relationship between "social problems and neuropsychological deficits" can lead to "intergenerational recycling of social problems," with crime hot spots functioning as violent and stressful environments that may be associated with DNA methylation profiles related to aggressive behavior.<sup>18</sup>

Officers working in high-stress environments are not immune to these effects. Recent research demonstrates that negative police encounters can increase epigenetic age in youth, and the same occupational stress officers face daily may create biological changes affecting their own behavior and health.<sup>19</sup> When perceived threats trigger primitive neurobiological responses involving the amygdala, hypothalamus, and autonomic nervous system—the "reptilian brain" in popular terminology—that override higher cognitive functions, the result can be impulsive, aggressive actions that harm both officers and the public they serve.<sup>20</sup>

These findings do not excuse harmful behavior but rather explain its biological underpinnings—and point toward solutions. The same neuroplasticity that allows trauma to reshape neural circuitry also allows targeted interventions like MBRT, HRVB, and Scenario-Based Cognitive Training to build resilience and improve impulse control. Understanding these mechanisms reinforces the urgency of investing in officer wellness as a public safety imperative.

5. Recent Systematic Reviews Strengthening the Evidence Base

A comprehensive 2024 systematic review of resilience training programs for police forces examined 32 published studies and identified three main intervention categories: mindfulness-based resilience interventions (13 studies), neurobiological-based resilience interventions (13 studies), and other approaches.<sup>9</sup> The review found that most studies demonstrated positive outcomes on clinical and performance indicators including stress, anxiety, and decision-making, directly validating the MBRT and HRVB programs highlighted in this proposal.<sup>9</sup>

However, a separate 2024 systematic review on trauma prevention programs for law enforcement personnel identified a critical gap: despite extensive literature, there is a lack of high-quality studies investigating effective prevention approaches.<sup>10</sup> The review found no evidence supporting Critical Incident Stress Debriefing (CISD) as a secondary prevention strategy, while noting limited evidence for resilience training, imagery, and psychosocial support approaches.<sup>10</sup>

6. The USC Resilience and Wellness (RAW) Project: A California Model

A significant opportunity for alignment exists with the USC Resilience and Wellness (RAW) Project, a 2025 initiative providing training to Los Angeles County Sheriff's Department and California Highway Patrol personnel.<sup>11</sup> This project teaches trauma-informed strategies using The Community Resilience Model (CRM), a skills-based nervous system stabilization program focused on resetting the system's natural balance.<sup>11</sup> The RAW Project is designed as a clinical trial and field study that will monitor biological markers (heart rate variability and sleep patterns) alongside self-report inventories on compassion fatigue, mental health, critical decision-making, and aggressive policing incidents.<sup>11</sup>

The RAW Project proposal articulates a critical connection: "Research has shown that when police officers are highly stressed, they may engage in more aggressive, biased policing tactics that may harm community members. Therefore, addressing and reducing the impacts of occupational stress on law enforcement personnel can improve their overall mental and physical health and work to keep the community safer."<sup>11</sup> This framing directly supports the argument that officer wellness is not separate from protecting the SB 882 population but is essential to it.

7. Addressing Officer Trauma and Wellness

Your preliminary report briefly mentions officer wellbeing. The neuroscience research elevates this from a peripheral concern to a central public safety imperative. The 2025 BDNF methylation study provides direct evidence that officers themselves experience measurable biological changes from chronic stress.<sup>1</sup> The HeartMath study further documented that officers operating under chronic stress are likely to be at greater risk of error, accidents, and overreactions that can compromise performance and jeopardize public safety.<sup>8</sup>

The same neuroplasticity that allows trauma to damage the brain also allows targeted interventions to heal it—a principle Dr. Merzenich has emphasized throughout his career.<sup>3</sup> Investing in officer wellness through neuroscience-informed programs is not separate from protecting the SB 882 population; it is essential to it.

### 8. Real-World Implementation

These are not laboratory experiments. The Newark, New Jersey Police Department has implemented "Trauma to Trust" training since 2015, reaching over 250 officers alongside community members. The program brings police officers and community members together for two weeks of training to discuss race, trauma, violence, and social and economic inequality. As one Newark strategist explained, the goal is "for law enforcement officers to understand whether they are a good guy or not, this historical trauma is real."<sup>12</sup> While the program requires more rigorous evaluation, it demonstrates institutional interest in trauma-informed approaches.

Additionally, the SAMHSA GAINS Center maintains a listing of trauma-informed response trainers throughout California who teach courses for criminal justice professionals.<sup>13</sup> These trainers are located in multiple counties including San Francisco, Riverside, Santa Clara, San Luis Obispo, and Orange County, and represent probation departments, behavioral health systems, courts, corrections, and community organizations.<sup>13</sup>

### 9. Emerging Academic Programs

Santa Ana College recently proposed a Certificate of Achievement in Crisis Intervention for Law Enforcement, designed to provide advanced training in recognition and response to individuals experiencing mental illness, developmental disabilities, trauma, or crisis situations.<sup>14</sup> The 33.3-unit program includes specialized modules on crisis intervention, communication strategies, special populations (including individuals with developmental disabilities and trauma survivors), and a capstone applying de-escalation strategies and case-based decision-making.<sup>14</sup>

#### Alignment with SB 882 Objectives

This neuroscience framework directly addresses the core challenges identified in your preliminary report:

Council Finding	Neuroscience Contribution	Evidence
Lack of reliable data on interactions	Provides new category of data—biological and neurological markers—explaining <i>why</i> interactions break down	BDNF methylation study showing epigenetic changes from occupational stress; <sup>1</sup> Merzenich's neuroplasticity research; <sup>2,3</sup> genetic and epigenetic factors in aggression <sup>16,17,18</sup>
Need for more effective training	Offers field-tested programs with measurable outcomes	Sit-D: improvements in use-of-force decisions; <sup>6</sup> iPREP HRVB: sustained improvements in performance and health; <sup>5</sup> POWER: improved empathy and social connection; <sup>7</sup> 2024 systematic reviews validating approaches <sup>9,10</sup>
Importance of de-escalation and crisis response	Explains biological mechanisms underlying behavior, supporting health-centered responses	HRVB provides physiological self-regulation tools; <sup>5</sup> understanding of "reptilian brain" threat responses <sup>20</sup> points to need for impulse control training
Need for officer wellness and trauma-informed approaches	Demonstrates that officer wellness is prerequisite for public safety	HeartMath: officers at double the risk for cardiac death; <sup>8</sup> MBRT feasibility trial; <sup>4</sup> Merzenich's writings on trauma's neurological impact; <sup>3</sup> USC RAW Project linking officer stress to community harm; <sup>11</sup> officers themselves vulnerable to epigenetic changes from stress <sup>19</sup>

#### Recommendations for Council Consideration

Based on this research and my decades of experience with the SB 882 population, I respectfully offer the following recommendations for inclusion in your final report:

1. Explicitly endorse neuroscience-informed training programs such as MBRT, HRVB/iPREP, Scenario-Based Cognitive Training (Sit-D), and POWER training in POST curriculum and law enforcement agency recommendations. These programs have peer-reviewed evidence demonstrating improvements in officer decision-making, reductions in use-of-force incidents, and enhanced empathy and social connection.<sup>4,5,6,7</sup>
2. Add the 2024 systematic reviews on resilience training and trauma prevention to the evidentiary foundation for these recommendations, while transparently acknowledging research limitations and positioning California as a leader in rigorous evaluation.<sup>9,10</sup>
3. Acknowledge the biological basis of impulsive and aggressive responses in officer training curricula, helping officers understand that their own stress responses have neurobiological underpinnings—and that targeted interventions can build resilience and improve impulse control.<sup>16,17,18,19,20</sup>
4. Coordinate with the USC Resilience and Wellness (RAW) Project to ensure its findings from training Los Angeles County Sheriff's Department and California Highway Patrol personnel inform statewide POST curriculum development, leveraging this existing California investment.<sup>11</sup>
5. Frame officer wellness explicitly as a public safety metric, incorporating language from the RAW Project that directly links officer stress

reduction to community safety outcomes.<sup>11</sup>

6. Convene the existing SAMHSA GAINS Center trauma-informed trainers located throughout California alongside neuroscientists (such as Dr. Michael Merzenich or his collaborators), disability advocates, and law enforcement leaders to develop model curriculum grounded in both clinical expertise and community experience.<sup>13</sup>
7. Engage with Santa Ana College and other community college systems developing crisis intervention certificate programs, ensuring that neuroscience-informed approaches are integrated into emerging curricula that will train the next generation of California peace officers.<sup>14</sup>
8. Propose a phased implementation strategy for integrating these approaches:

Phase	Activity	Timeline	Partners
Phase 1	Convene working group including neuroscientists, SAMHSA trauma trainers, disability advocates, POST representatives, and USC RAW Project researchers	0-6 months	POST, USC, SAMHSA trainers
Phase 2	Develop model curriculum integrating MBRT, HRVB, Sit-D, and POWER approaches; align with emerging community college certificate programs	6-18 months	Santa Ana College, other community colleges
Phase 3	Disseminate training and evaluate using RAW Project protocols and rigorous research designs	18-36 months	POST, participating agencies, USC
Phase 4	Scale based on evaluation findings	36+ months	POST, Legislature

9. Amend the "Potential Promising Practices" section of your preliminary report to include the neuroscience research and evidence-based programs outlined above, with citations to NIH-published studies and peer-reviewed research.

#### Conclusion

The SB 882 Advisory Council has an extraordinary opportunity to shape law enforcement training for generations to come. The neuroscience research summarized here is not speculative—it is empirically validated, field-tested, and ready for implementation. It answers the very questions your preliminary report raises about data, training effectiveness, and improving outcomes for the SB 882 population. The endorsement of this framework by a scientist of Dr. Michael Merzenich's stature underscores its credibility and urgency.

I have spent more than two decades working alongside individuals with mental illness and developmental disabilities, in settings ranging from locked facilities to community diversion programs, and as a marriage and family therapist intern providing direct clinical support. I have trained with military police and understand the demands placed on those who serve. The convergence of these experiences has convinced me that neuroscience-informed approaches offer the most promising path forward for reducing harm and improving interactions between law enforcement and the vulnerable populations this Council was created to protect.

I respectfully request that you consider this proposal as you finalize your recommendations. I am available to provide additional information, testify before the Council, or participate in any working group you may establish.

Respectfully,

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