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Over the past 2 decades, my research has primarily focused on issues related to risk and morbidity for cardiovascular disease (CVD) with work conducted within approximately 17 police departments. This work includes finding that CVD is 70% more prevalent in police retirees compared to counterparts in the general population with almost double the prevalence of hypercholesterolemia and hypertension as non-police counterparts [1]. We also have studied officers' daily physical activity [2] and the effect of work shift on sleep quality and duration [3].

Analysis of these and other study results has culminated in the decision to develop an intervention to build resilience to stress in police. Recently, we conducted 2 pilot studies funded by 1) the Department of Justice and 2) NIOSH (through the Healthier Workforce Center for Excellence at The University of Iowa.) The purpose of these studies was to test protocols for an intervention to build resilience. While an intervention to build resilience is not a "magic bullet," it does address many of the risk factors and health issues documented in law enforcement over the past 3 decades, especially those related to stress. Recent events have compounded the need for resilience training.

Currently, there is a need in police agencies all over the country to improve community relationships. From the public view, *police need to make the best decisions possible and perform at their very best in every situation they encounter* and of course most officers strive for this goal as well. Given the intrinsic character of policing, changing *stressors* within the environment is not a viable option. It is however, possible to teach officers to *modify how they react to str*ess. This is referred to as "*resiliency or*

self-regulation." *The problem is that presently, there is no consistent training within the profession to equip officers or their families with the skills to modify responses to stress*.

Recent research suggests positive outcomes from stress resiliency training applied to military personnel working under combat and special-forces missions in the Army and the Navy, funded by the Department of Defense [4-7]. This training has recently been expanded to the Army Wellness centers and made accessible to 200,000 soldiers and their families. Given similarities in exposure to stress, it is reasonable that these programs may also benefit sworn police personnel. Improvement in performance, including the ability to self-regulate and improve decision-making, are expected outcomes of resilience programs. Results of our recent pilot studies further support the feasibility and effectiveness of this type of intervention tested in 4 districts of the Milwaukee Police Department.

Our pilot and the military projects utilize a program called *The Resilience Advantage* developed at the HeartMath Research Center at the Institute of HeartMath, a small, nonprofit corporation located in Boulder Creek, CA. The program involves a 2 to 3 hour class followed by 4 booster classes delivered weekly and use of an application or practice device to improve resilience to stress.

Outcome measures include improvements in psychological measures of stress, blood pressure and heart rate variability (HRV) measured by coherence levels. Simply stated, HRV is the measurement between heartbeats and considers the contributions of the sympathetic and parasympathetic nervous systems [8-11]. Coherence is a state measurement of heart rate variability. Previously, a regular heart rhythm was thought to be optimal. However, we now know that some variation in the heart rate is actually

optimal and is indicative of health. This is important because low HRV places officers at risk for sudden cardiac death and all cause mortality. HRV is highest when we are young and decreases with age. However, it is possible to improve HRV through some types of resilience training.

Our pilot study results reflect improvement on several psychological measures including the Impact Events Scale (a measure of PTSD) and significant improvement in diastolic blood pressure ($p=0.02$). The coherence percentage increased significantly as well ($p=<.001$). A concerning finding was the high prevalence of low HRV in officers compared to age determined norms. However, post intervention many of the HRV values improved which is exactly what we hoped to see.

We reviewed the daily heart rate activity via heart rate monitors worn by officers during 24-hour cycles at work and on the off day (n= 40 officers.) We found the mean heart rates for these officers to be alarmingly high, even during sleep; for example, one officer's mean heart rate was 100 bpm.

While promising, this intervention still requires further testing for effectiveness in larger sample sizes and with a different delivery mode that can make this intervention accessible to all agencies in the US. Applications are now available for IPad and IPhone to deliver this content and to practice building coherence improvement with use of a sensor that fits smartphones and tablets. Using this method would also make data accessible to the researcher to track officer practice and progress via a Cloud account.

The next steps are to 1) test this intervention in a larger group of officers with the IPad delivery mode, 2) apply the lessons learned in the pilot studies, 3) evaluate the Em wave Pro software as an efficient and cost effective way to measure HRV and 4) develop

a toolkit accessible by all law enforcement agencies.

A caveat to all of this is we must continue to look at the cost benefit analysis for every newly developed intervention. Interventions like this one have the potential to save taxpayers millions of health care dollars and money currently spent on stress related disability. Recent research suggests that teaching officers practical techniques and practices that allow them to better self-regulate and modify their physiological responses in the moment stressful situations are taking place has significant benefits for both the individual officers and the organization. With proper support, the department can expect reduction in health-care utilization and costs, increased officer retention and job satisfaction, and improvements in the quality of police encounters with citizens. This training could be offered at the Academy with reinforcement provided to officers at in-service sessions to maintain baseline health.

In conclusion, I know it is the hope of the Milwaukee Police Department and the University of Iowa that this current effort to move toward intervention research will benefit law enforcement nationwide by giving officers the tools to improve resiliency to stress, work performance and the officers' quality of life.

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