NSCA®
NATIONAL STRENGTH AND CONDITIONING ASSOCIATION

2022 NSCA TACTICAL ANNUAL TRAINING

#NSCATactical22

CONFLICT OF INTEREST STATEMENT

I currently have, or I have had in the past 2 years an affiliation or financial interest with Wellness Solutions- a WorkCare Company around this presentation, including:

- Consulting
- Employment

Marci Guzman ACSM C-EP, CPT, FMS-L1

- 10+ years Health and Wellness Experience
- Onsite with large City Department for 7 years
- Implemented/run programs of all sizes across the State of California

Dr. Robert Lockie PhD, TSAC-F*D

- PhD in Strength and Conditioning and Biomechanics – University of Technology, Sydney
- Associate Professor in Strength and Conditioning at California State University, Fullerton (CSUF)
  - Past positions: University of Newcastle (Australia) and California State University, Northridge
- Tactical and sport performance research
- More than 200 peer-reviewed publications (more than 100 in tactical research)

Learning Objectives

- Identify the process of implementing a health and wellness program for police officers, the challenges that need to be overcome, and what strategies can be used to overcome these challenges.
- Recognize approaches that could be used to encourage officer participation in a health and wellness program and support from leadership within the police department.
- Comprehend the health and fitness data recorded from police officers who participate within a health and wellness program, acknowledge what this data shows relative to program effectiveness, and understand how this data could be used to provide an evidence-base for a health and wellness program in a police department.

Getting a Program Started

- Determine a need
  - First responders health risks: obesity, cardiovascular disease, increased risk of injury, cancer, mental health challenges and alcoholism/drug abuse.
- Make it Specific
  - Needs Assessment, Worker's Comp data, morale
- Provide solutions to the problem
  - What services can be implemented, target different levels of agency

Common Challenges

Funding

- Cost of a heart attack = $400,000+
- Programs/services cost a fraction of this and save lives
- Investing in officer health

Risk Management

- Agencies worry programs will increase injuries of those participating- Reality=
- ↓ injuries and costs

Adapting to Change

- Officers are resistant to new concepts- application to career and life
- Policies to support
- Skepticism

Buy In-

- Check the box vs. addressing needs
- Physical fitness driven vs. comprehensive health
- Support from the top
- CONFIDENTIALITY

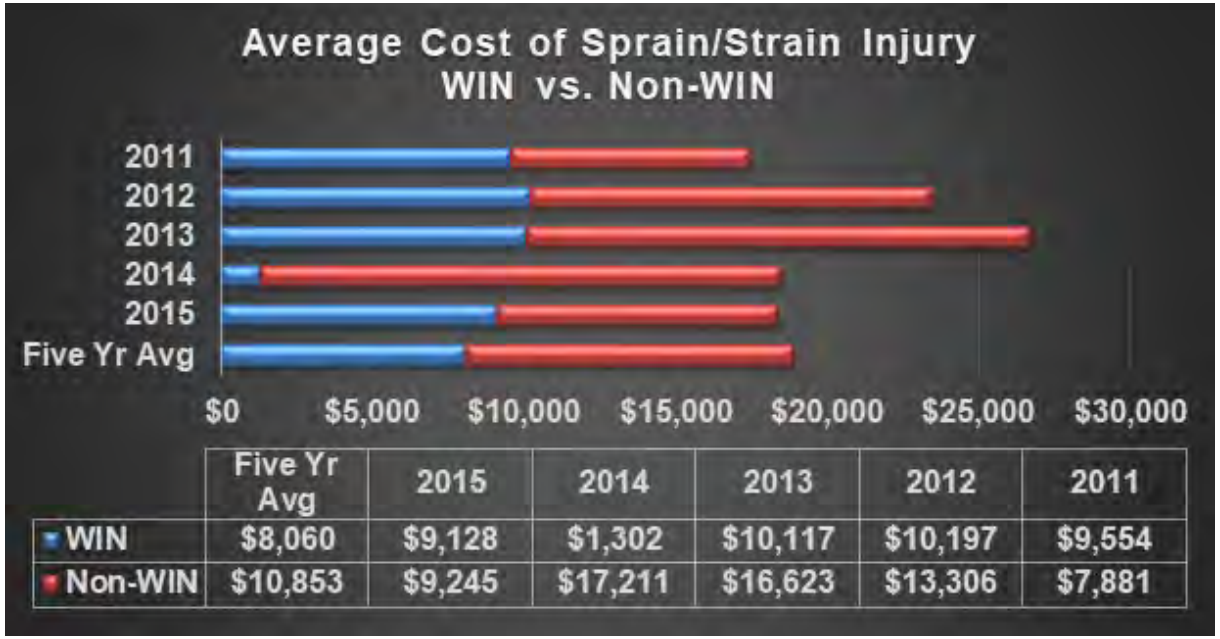
Overcoming Challenges

- Create a comprehensive program
  - Multi-dimensional approach
- Establish program goals- trackable data supporting change
  - Start small- track changes- interactions, health outcomes (aggregate)
- Make it Applicable/Build Rapport
  - Relatable to field occurrences
- Put the right people in place
  - Tactical experience, athletic experience
  - Outside practitioners allow for complete confidentiality

PROGRAM INJURY COMPARISION (2019)	1/1/19 to 12/31/19	
	Program Participants	Non-Participants
Number of Officers	200	193
Number of Officers with a Recordable Injury	38	51
Percentage of Officers with a Recordable Injury	19.0%	26.4%
Number of Officers with a Strain/Sprain Injury	20	21
Percentage of Officers with a Strain/Sprain Injury	10.0%	10.9%
Number of Officers with a Back or Knee Strain Injury	7	10
Percentage of Officers with a Back or Knee Strain Injury	3.5%	5.2%
Average Incurred Cost of a Strain/Sprain Injury among Officers	$6,552	$14,422

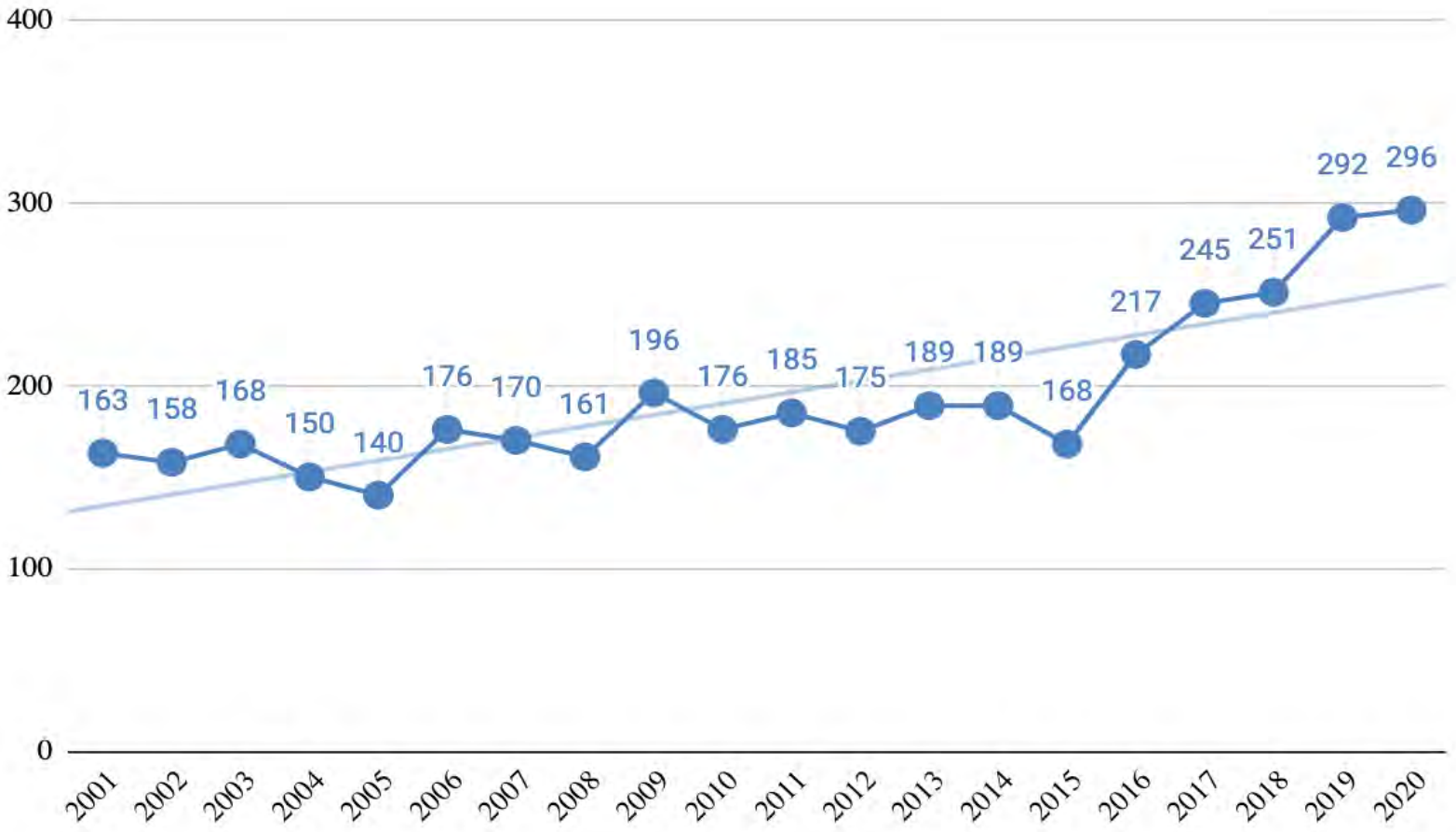
Encouraging Success

- Evidence based outcomes
  - Maintenance = success
  - Injury rates
  - Testimonials
- Inclusivity from all levels of Department
  - Support from Leadership shows staff they are supported. Builds morale and a culture of wellness
- Incentives
  - PDLV, membership discounts, reimbursements, tiered financial incentive



	Five Yr Avg	2015	2014	2013	2012	2011
WIN	$8,060	$9,128	$1,302	$10,117	$10,197	$9,554
Non-WIN	$10,853	$9,245	$17,211	$16,623	$13,306	$7,881

Program Outcomes



Program Outcomes

- Detailed analysis of data
- Step removed from process
- Objective analysis
- Publishable information

Why Research?

- Determine program value and effectiveness
- Data analysis
  - Time restraints → for academics, it's part of our job!
  - Publications → peer-reviewed
  - Evidence
  - Provide information to wider community
- Different questions can be answered

Year-to-Year Trends

- Can be hard to track individual
  - Participation can change from year-to-year
  - Deidentified data provided to researchers (part of IRB process)
- Comparing grouped data across years still valuable
- Profession not conducive to improvement/maintenance of fitness
  - Officers have lesser performance in general fitness (Orr et al., 2019) and job-specific tests (Lockie et al., 2019) compared to recruits
  - Job-specific fitness (measured by Work Sample Test Battery) decreases following academy (Lockie et al., 2019, 2020)

Lockie, RG, Orr, RM, Moreno, MR, Dawes, JJ, and Dulla, JM. Time spent working in custody influences Work Sample Test Battery performance of Deputy Sheriffs compared to recruits. *Int J Environ Res Public Health* 16: 1108, 2019.
Lockie, RG, Pope, RP, Saaroni, O, et al. Job-specific physical fitness changes measured by the Work Sample Test Battery within deputy sheriffs between training academy and their first patrol assignment. *Int J Exerc Sci* 13: 1262-1274, 2020.
Orr, R, Dawes, JJ, Pope, R, and Terry, J. Assessing differences in anthropometric and fitness characteristics between police academy cadets and incumbent officers. *J Strength Cond Res* 32: 2632-2641, 2018.

Descriptive data (mean ± SD) for law enforcement officers who participated in a health and wellness program in 2018, 2019, and 2020. The number of officers (n) with data per year is also noted for each variable in respective order.

	2018	2019	2020
Age (years; n = 209, 238, 186)	39.48 ± 8.49	38.81 ± 8.66	40.76 ± 7.81
Body Mass (kg; n = 209, 237, 186)	86.62 ± 17.28	85.90 ± 14.70	86.08 ± 15.07
BF% (n = 209, 235, 186)	22.54 ± 9.29	22.15 ± 8.56	21.24 ± 8.28
Systolic BP (mmHg; n = 209, 238, 186)	124.69 ± 9.30	123.43 ± 9.53	133.32 ± 12.50*§
Diastolic BP (mmHg; n = 209, 238, 186)	78.98 ± 6.59	79.62 ± 6.50	81.19 ± 9.74
Estimated $\dot{V}O_{2max}$ ($ml \cdot kg^{-1} \cdot min^{-1}$; n = 208, 231, 10)	53.89 ± 9.22	53.71 ± 8.94	56.25 ± 8.99
Sit-and-Reach (cm; n = 208, 237, 184)	30.01 ± 8.80	30.36 ± 8.39	31.43 ± 8.01ϕ
Push-ups (repetitions; n = 208, 234, 181)	43.94 ± 18.40	45.96 ± 18.30	48.36 ± 18.60
Vertical Jump (cm; n = 205, 233, 184)	56.73 ± 13.35	57.12 ± 11.28	54.92 ± 13.10
Grip Strength (kg; n = 209, 238, 185)	91.43 ± 21.09	94.50 ± 22.29	98.72 ± 21.06ϕ
Sit-ups (repetitions; n = 189, 192, 155)	41.40 ± 11.70	45.15 ± 24.62	43.56 ± 10.21
Bench Press Ratio ($kg \cdot body\ mass^{-1}$; n = 209, 237, 183)	1.12 ± 0.31	1.11 ± 0.31	1.12 ± 0.27

Lockie RG, Orr RM, Dawes JJ. Health and fitness data for police officers within a health and wellness program: Implications for occupational performance and career longevity. *Work*. in press.

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Year-to-Year Trends

- Fitness was generally maintained when considering overall sample
- Significant increase in sit-and-reach (flexibility) and grip strength in 2020
  - No specific change in health and wellness program
- Positive result considering the population
  - Officers tend to lose fitness → maintenance is good!

Red Flags

- Does a variable pop during a year?
- Changes in the program?
- Changes in participants?
- Challenges for the year?

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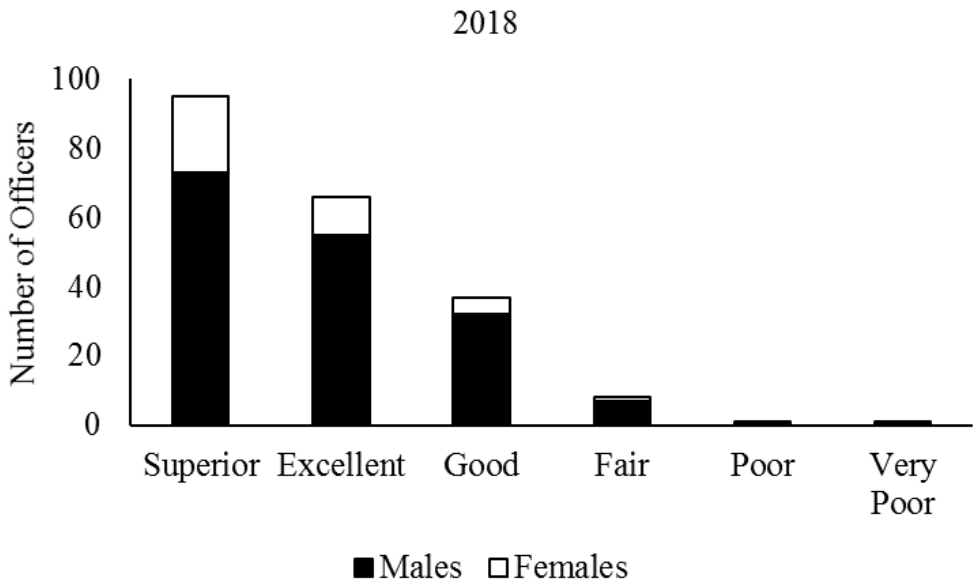
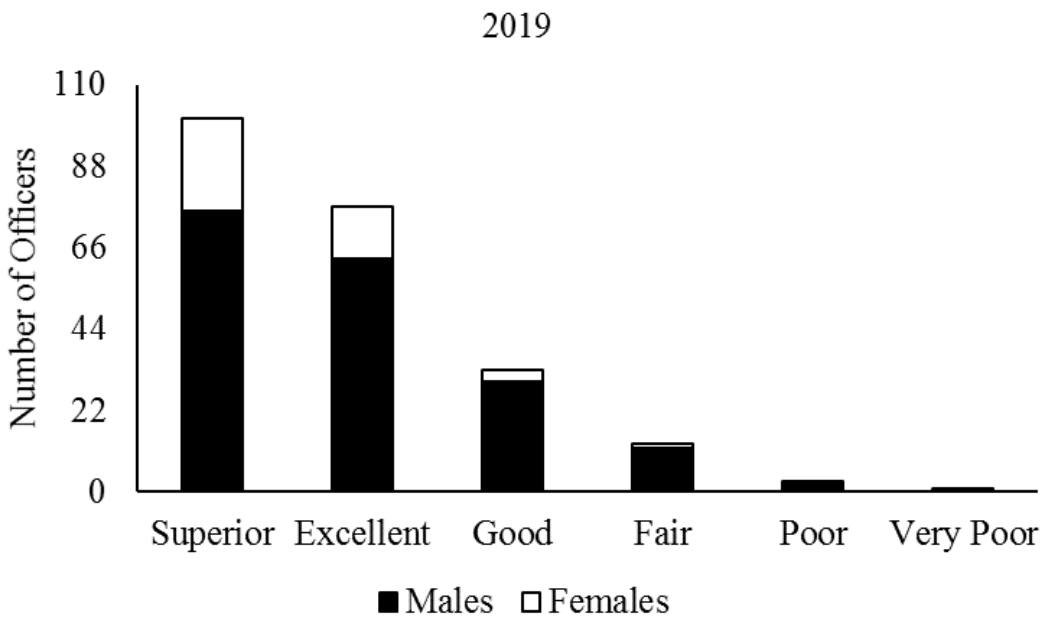
2020

Comparisons to General Population

- Determine whether officers are fit and healthy individuals relative to population where they are expected to work (Lockie et al., 2021)
- Officers not as healthy and fit as they could be may impact the safety of the officer, their colleagues, and the general population
- Compared to normative data (Riebe et al., 2018; Ryan and Cramer, 2012)
- Can be profiled from health and wellness program; strengths and limitations for the individual officer

Lockie, RG, Rodas, KA, Dawes, JJ, et al. How does time spent working in custody influence health and fitness characteristics of law enforcement officers? *Int J Environ Res Public Health* 18: 9297, 2021.
Riebe, D, Ehrman, JK, Liguori, G, and Magal, M. *ACSM's Guidelines for Exercise Testing and Prescription*. 10th ed. Philadelphia: Wolters Kluwer, 2018.
Ryan, ED and Cramer, JT. Fitness Testing Protocols and Norms, In *NSCA's Essentials of Personal Training*. J.W. Coburn and M.H. Malek, eds. Human Kinetics: Champaign, IL, 2012. pp. 201-247.

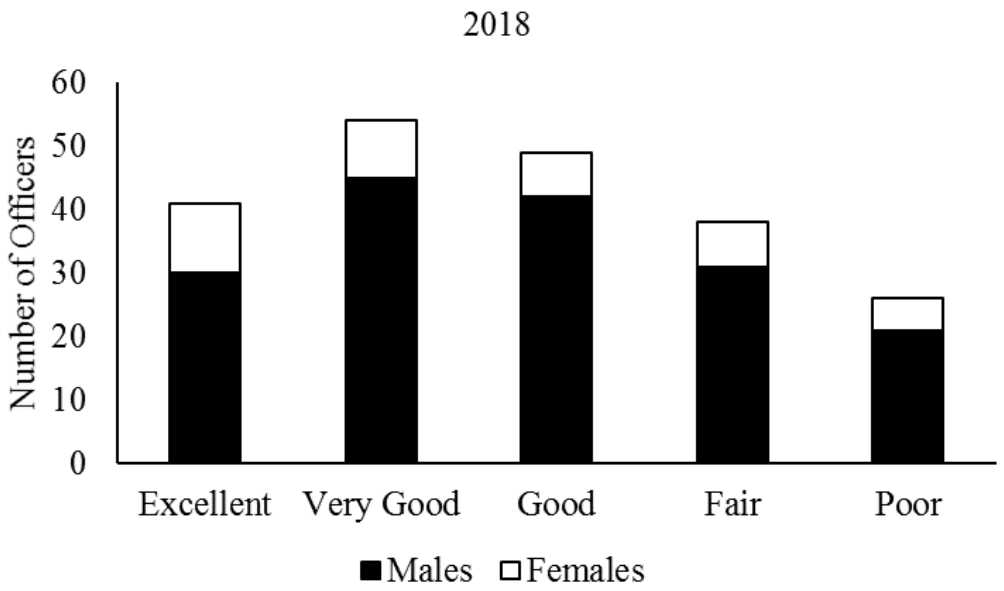


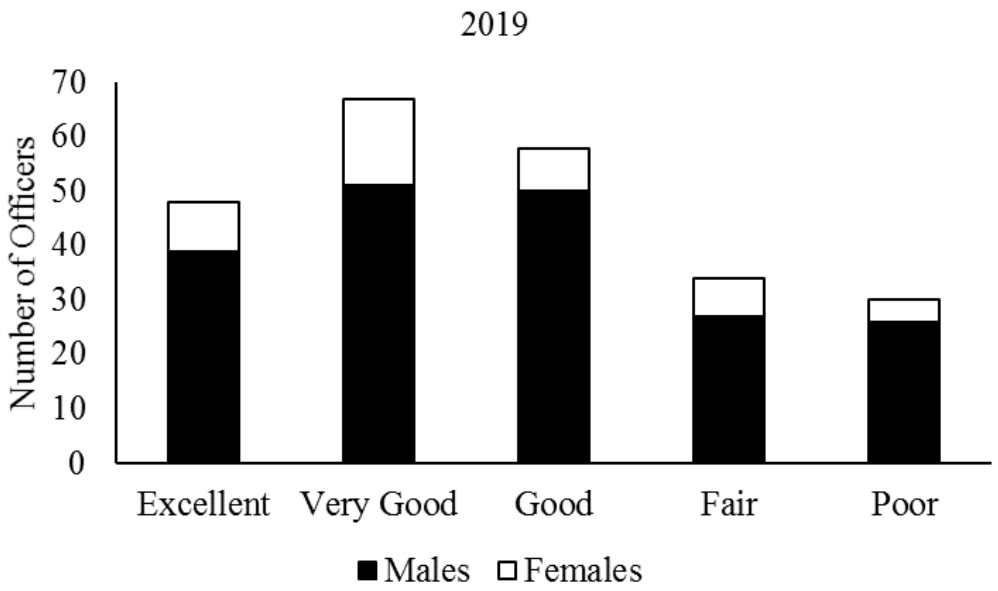


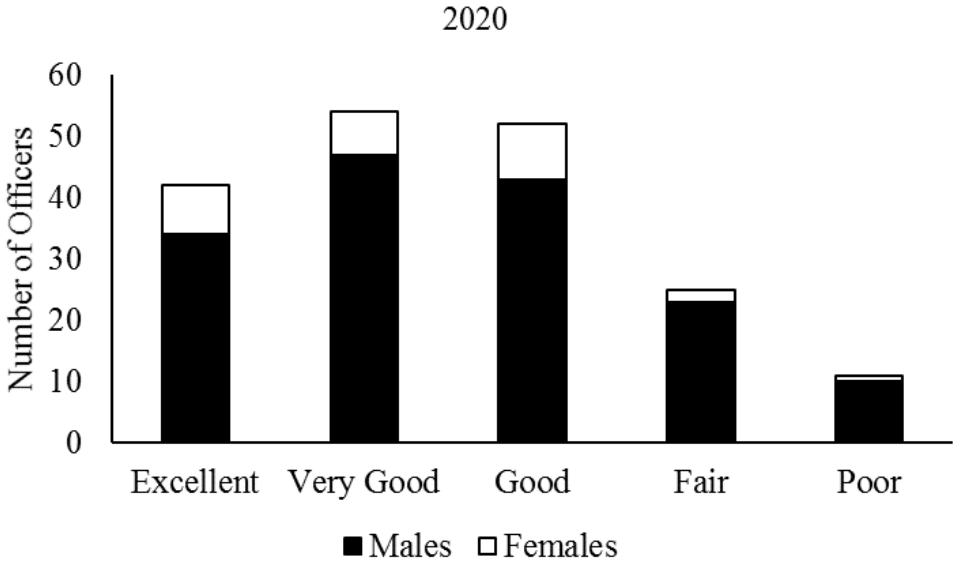
Estimated Maximal Aerobic Capacity

- Gerkin protocol - can overestimate maximal aerobic capacity in apparently healthy men and women

Mier, CM and Gibson, AL. Evaluation of a treadmill test for predicting the aerobic capacity of firefighters. *Occup Med* 54: 373-378, 2004.







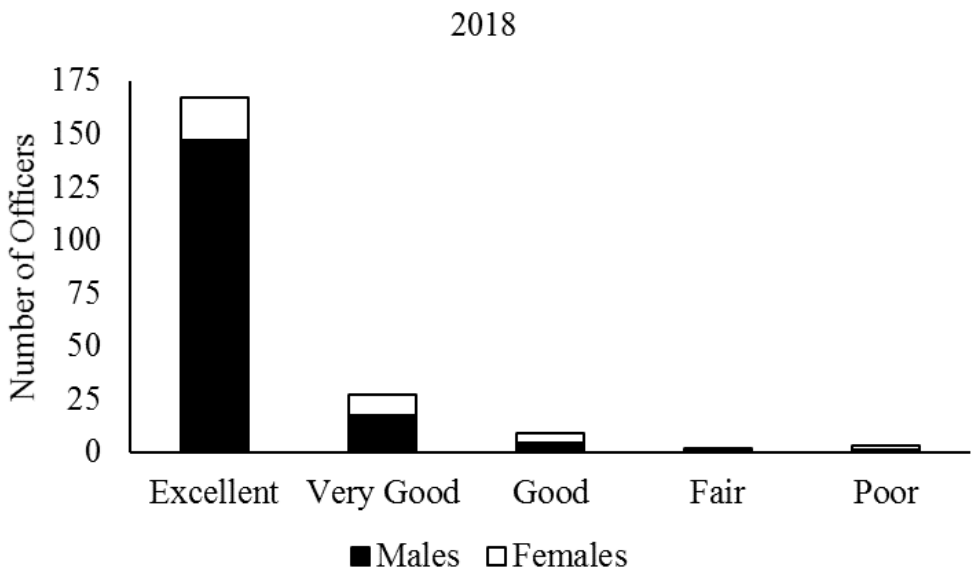
Sit-and-Reach

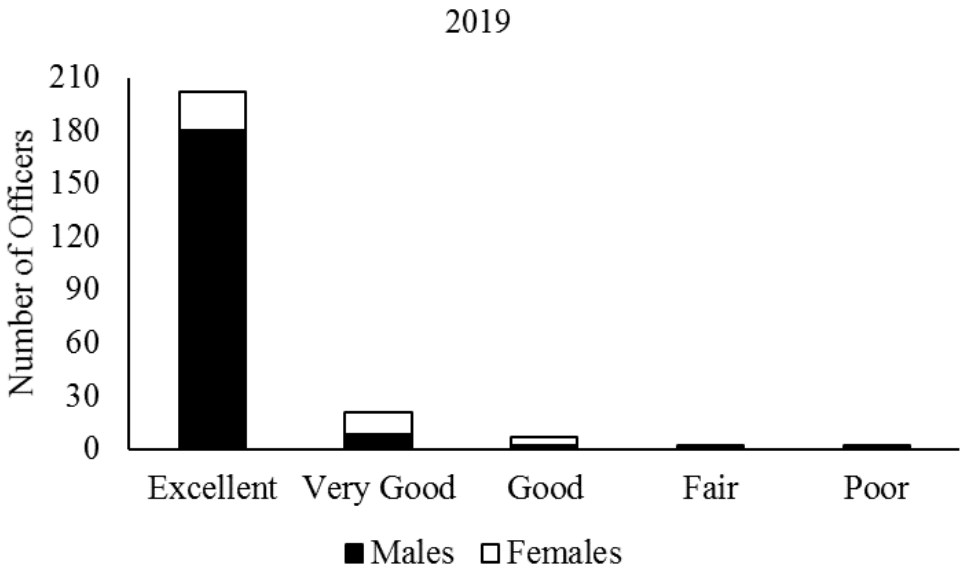
- Hamstring flexibility
- Flexibility important for searches (Jamnik et al. 2010a, 2010b), manual handling (Carregaro et al., 2009)

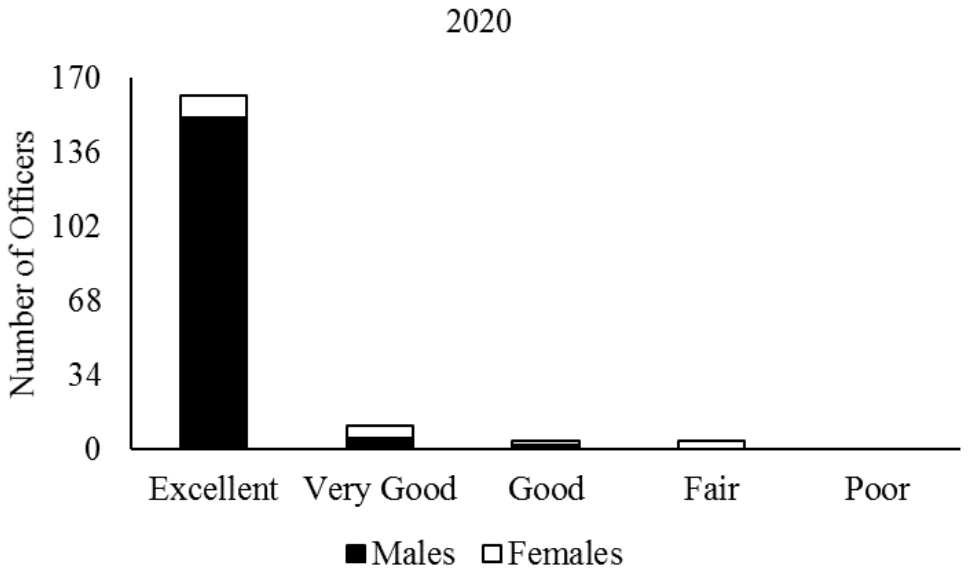
Carregaro, RL and Gil Coury, HJC. Does reduced hamstring flexibility affect trunk and pelvic movement strategies during manual handling? *Int J Ind Ergon* 39: 115-120, 2009.

Jamnik, VK, Thomas, SG, Burr, JF, and Gledhill, N. Construction, validation, and derivation of performance standards for a fitness test for correctional officer applicants. *Appl Physiol Nutr Metab* 35: 59-70, 2010a.

Jamnik, VK, Thomas, SG, Shaw, JA, and Gledhill, N. Identification and characterization of the critical physically demanding tasks encountered by correctional officers. *Appl Physiol Nutr Metab* 35: 45-58, 2010b.



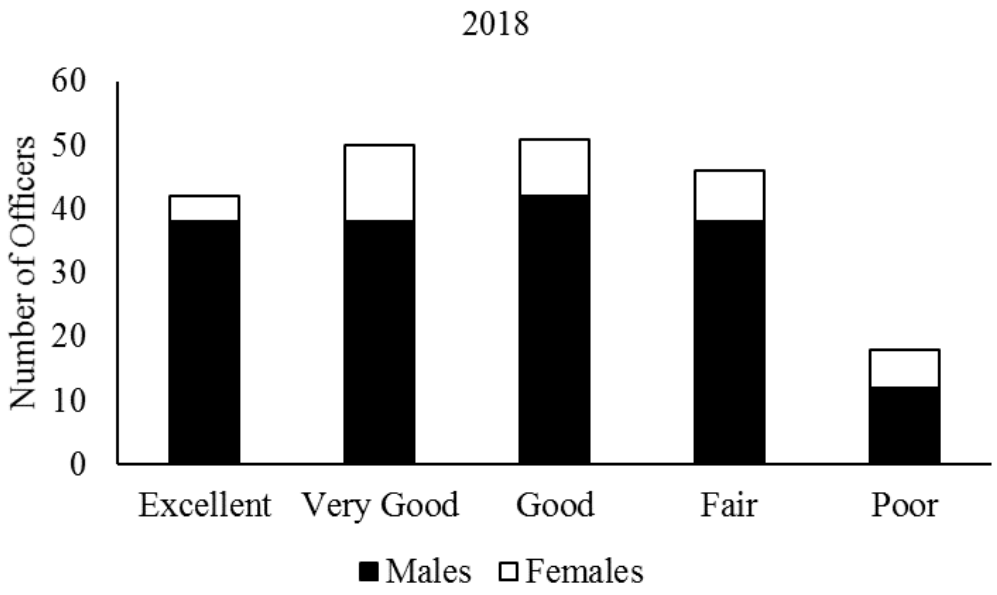


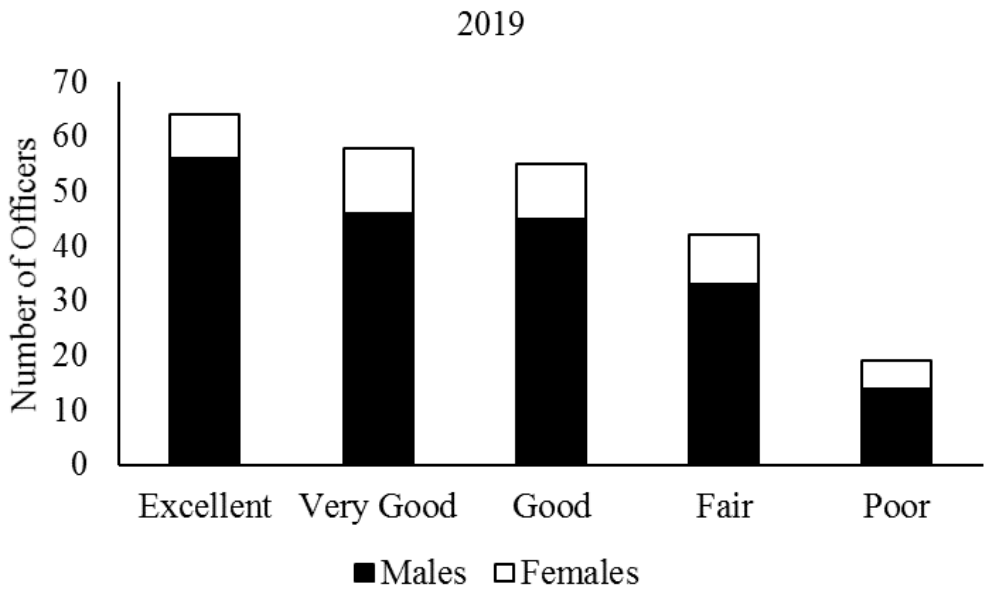


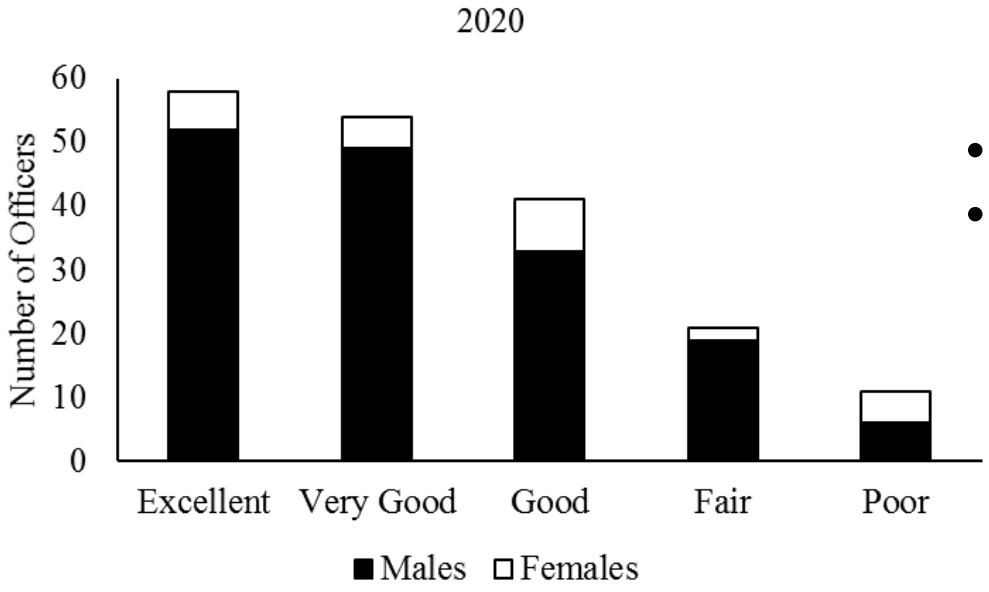
Push-ups

- Upper-body muscular endurance
- Staple exercise/test in law enforcement (Lockie et al., 2020)

Lockie, RG, Dawes, JJ, Orr, RM, and Dulla, JM. Recruit fitness standards from a large law enforcement agency: Between-class comparisons, percentile rankings, and implications for physical training. *J Strength Cond Res* 34: 934-941, 2020.







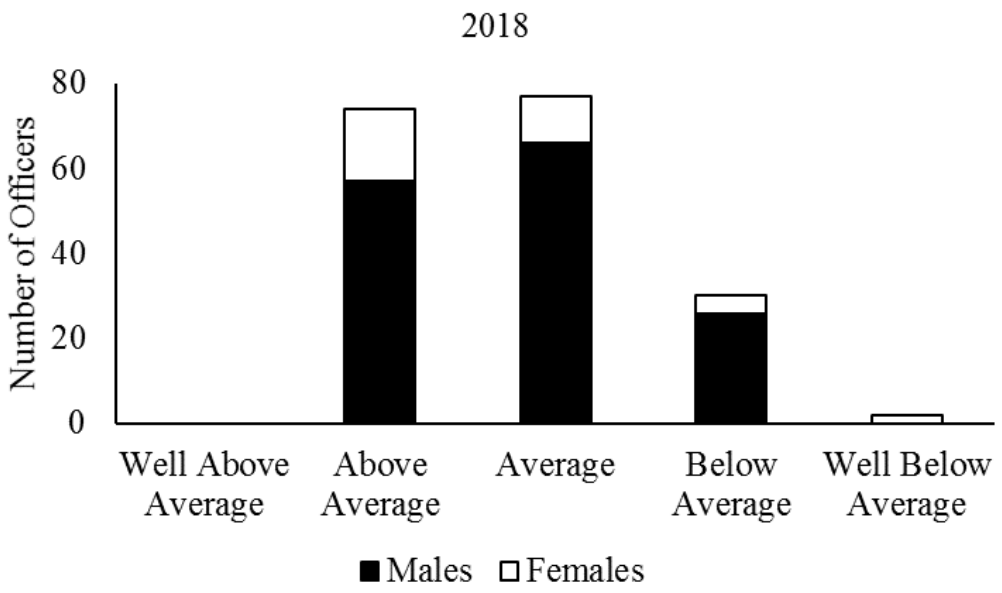
Combined Grip Strength

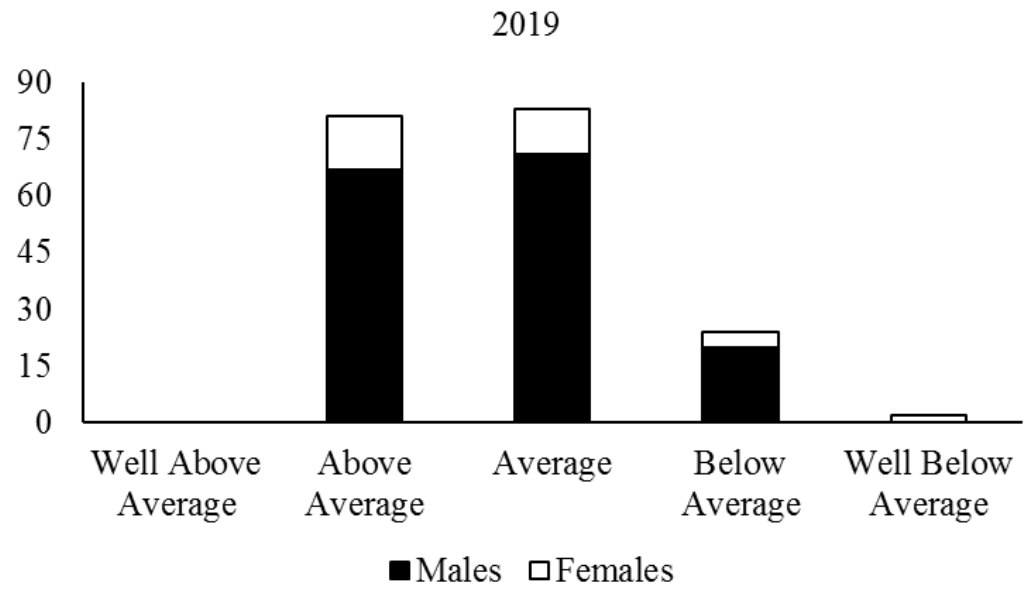
- Upper-body muscular strength
- Contributes to inmate restraint (Jamnik et al., 2010), defensive tactics (Orr et al., 2017), firearm use (Copay et al., 2001)

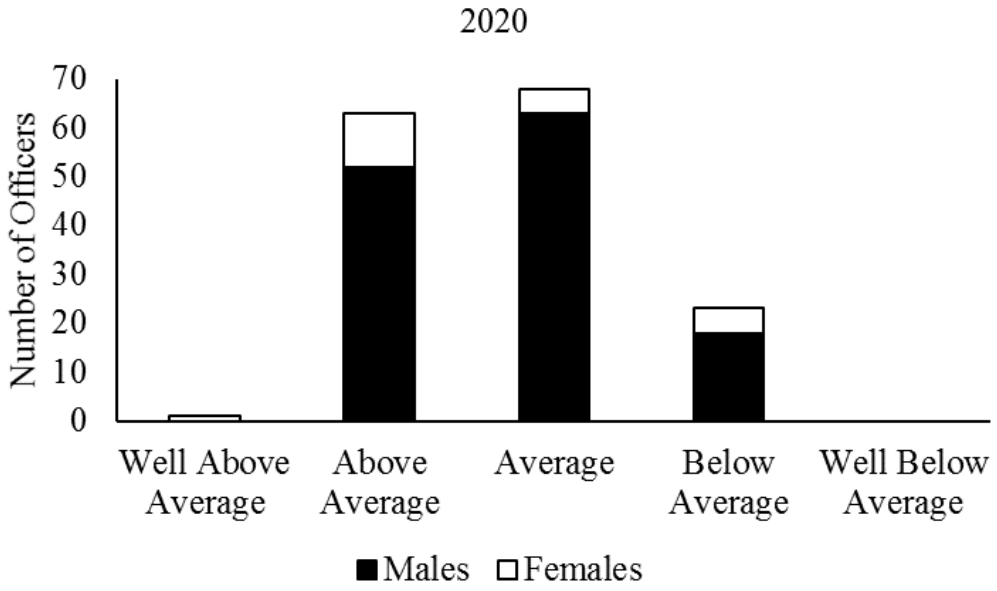
Copay, AG and Charles, MT. The influence of grip strength on handgun marksmanship in basic law enforcement training. *Policing: Intl J Police Strat & Mgmt* 24: 32-39, 2001

Jamnik, VK, Thomas, SG, Shaw, JA, and Gledhill, N. Identification and characterization of the critical physically demanding tasks encountered by correctional officers. *Appl Physiol Nutr Metab* 35: 45-58, 2010.

Orr, R, Pope, R, Stierli, M, and Hinton, B. Grip strength and its relationship to police recruit task performance and injury risk: A retrospective cohort study. *Int J Environ Res Public Health* 14: 941, 2017.





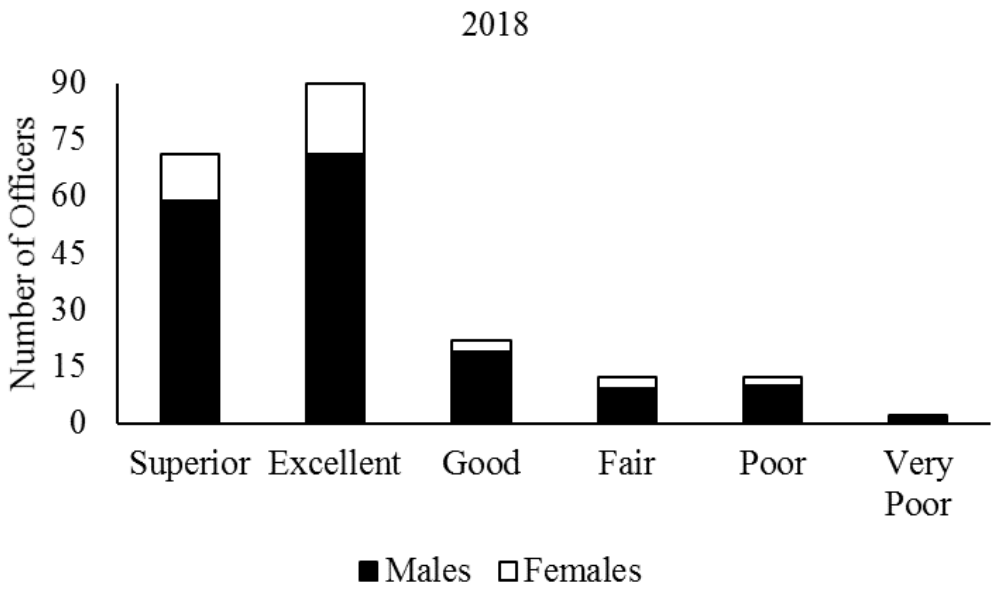


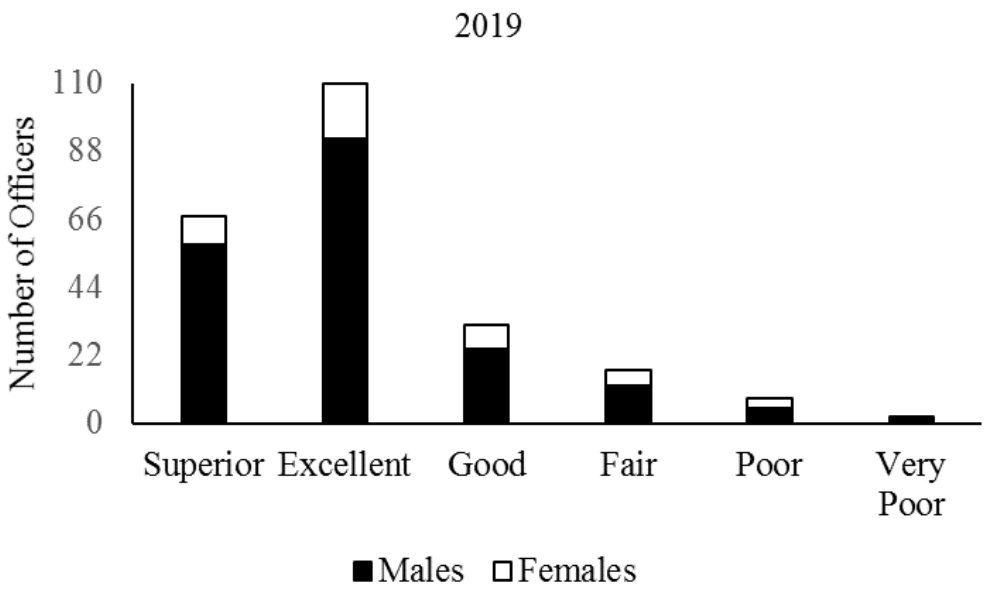
Crunches

- Abdominal muscular endurance
- Sit-ups common law enforcement exercise/test (Lockie et al., 2020)
- Eliminates use of hip flexors (Ryan and Cramer, 2012)

Lockie, RG, Dawes, JJ, Orr, RM, and Dulla, JM. Recruit fitness standards from a large law enforcement agency: Between-class comparisons, percentile rankings, and implications for physical training. *J Strength Cond Res* 34: 934-941, 2020.

Ryan, ED and Cramer, JT. Fitness Testing Protocols and Norms, In *NSCA's Essentials of Personal Training*. J.W. Coburn and M.H. Malek, eds. Human Kinetics: Champaign, IL, 2012. pp. 201-247.





Relative 1RM Bench Press

- Upper-body muscular strength
- Modified for safety as needed Lockie et al., 2022a, 2022b)

Lockie, RG, Orr, RM, and Dawes, JJ. Slowing the path of time: Age-related and normative fitness testing data for police officers from a health and wellness program. *J Strength Cond Res* 36: 747-756, 2022a.

Lockie, RG, Orr, RM, and Dawes, JJ. Fit (and healthy) for duty: Blood lipid profiles and physical fitness test relationships from police officers in a health and wellness program. *Int J Environ Res Public Health* 19: 5408, 2022b.

Healthy Worker Effect

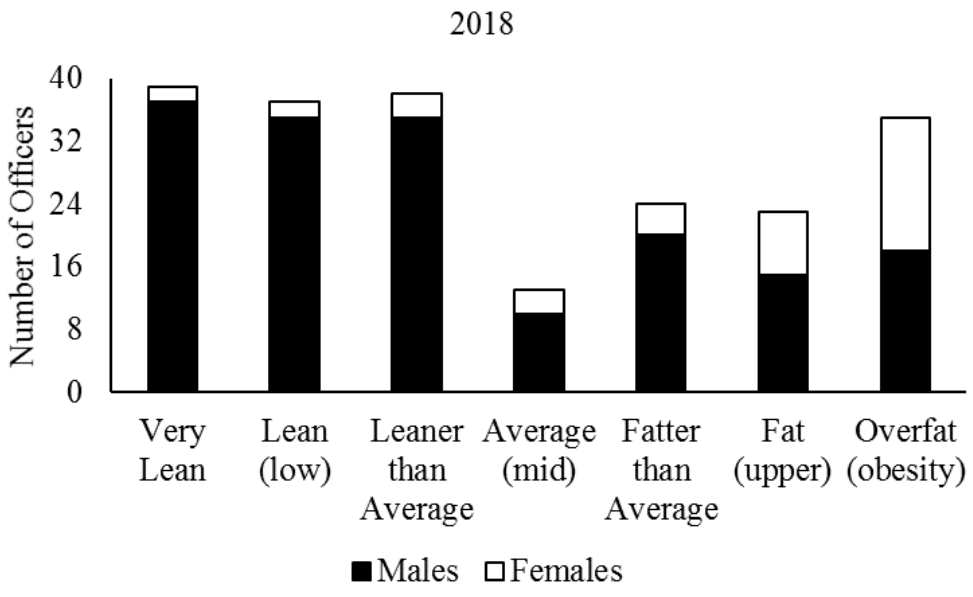
- Bias that can occur in occupational epidemiology studies (Chowdhury et al., 2017; Kirkeleit et al., 2013)
- Less healthy officers more likely to not participate in the health and wellness program
- Healthier police officers would be involved and may provide impression that department is healthier than they might otherwise be
- Still a positive outcome relative to the general health of participating officers and supports value of such programs (Lockie et al., 2022)

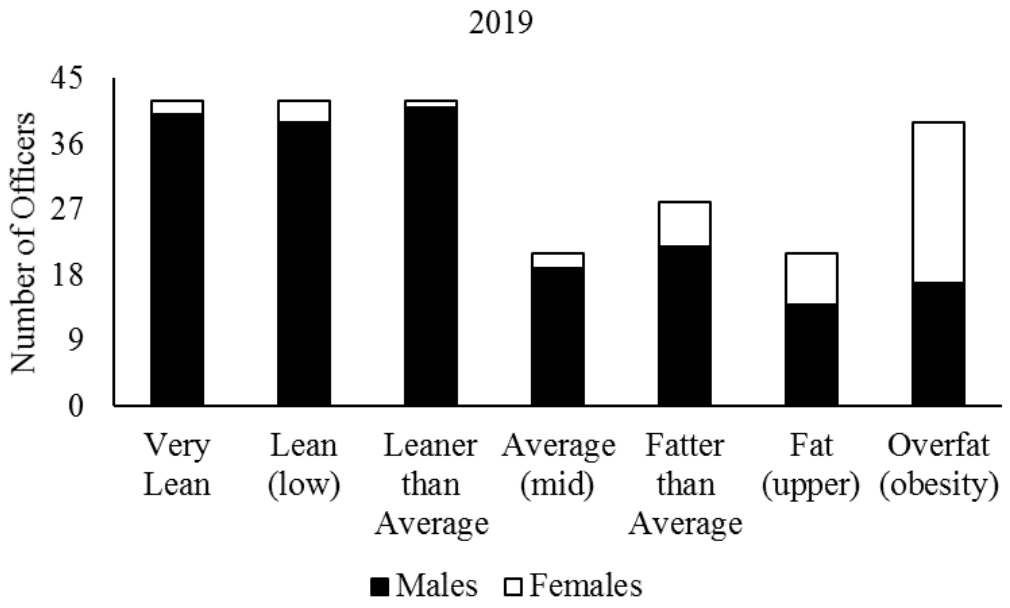
Chowdhury, R, Shah, D, and Payal, AR. Healthy worker effect phenomenon: Revisited with emphasis on statistical methods - A review. *Indian J Occup Environ Med* 21: 2-8, 2017.
Kirkeleit, J, Riise, T, Bjørge, T, and Christiani, DC. The healthy worker effect in cancer incidence studies. *Am J Epidemiol* 177: 1218-1224, 2013.
Lockie, RG, Orr, RM, and Dawes, JJ. Fit (and healthy) for duty: Blood lipid profiles and physical fitness test relationships from police officers in a health and wellness program. *Int J Environ Res Public Health* 19: 5408, 2022.

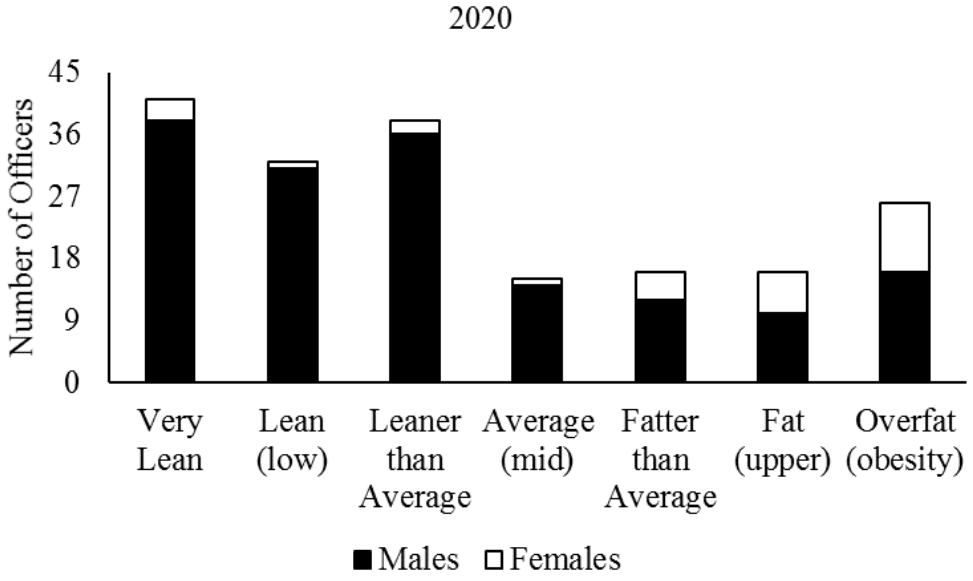
Fit and Healthy?

- Law enforcement profession may not be conducive to long-term health
  - Shift work, stress, disrupted sleep, decreased physical activity/sedentary
- Officers involved in health and wellness program may be more motivated to be physically active
- However, the job is still the job!
- Cardiovascular disease risk (Zimmerman, 2012)

Zimmerman, FH. Cardiovascular disease and risk factors in law enforcement personnel: A comprehensive review. *Cardiol Rev* 20: 159-166, 2012

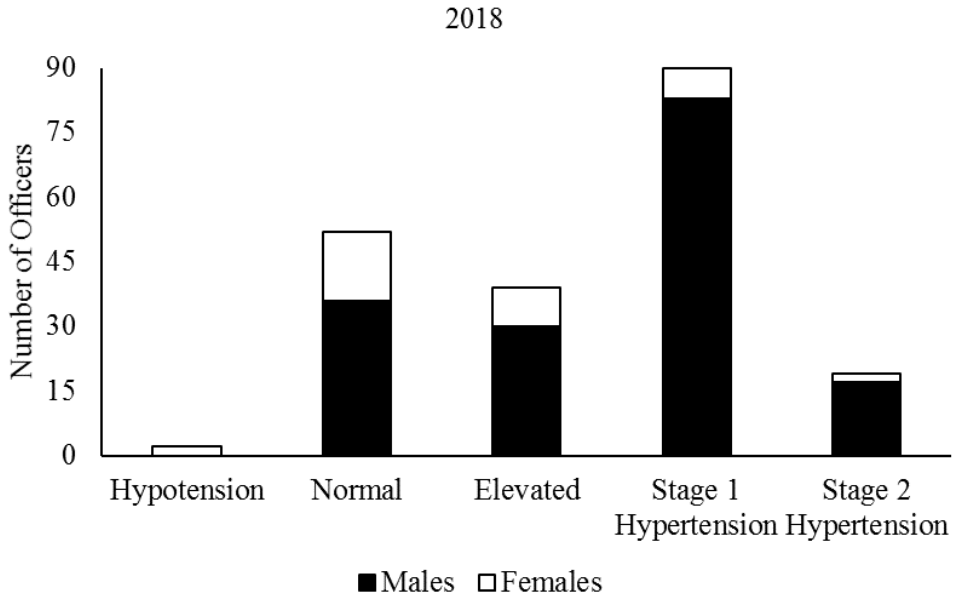


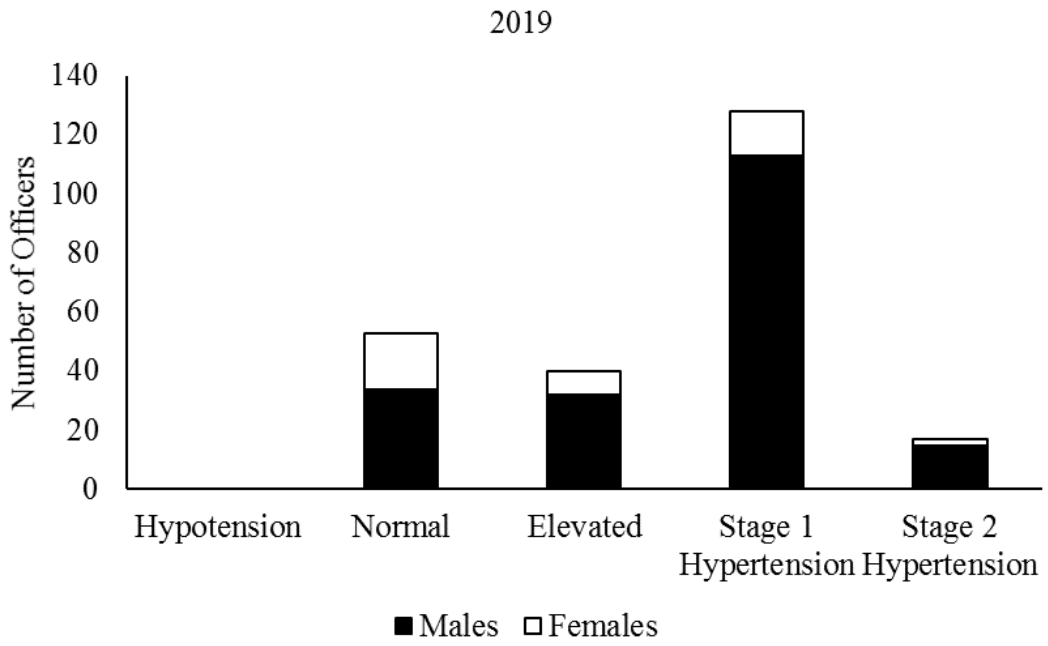


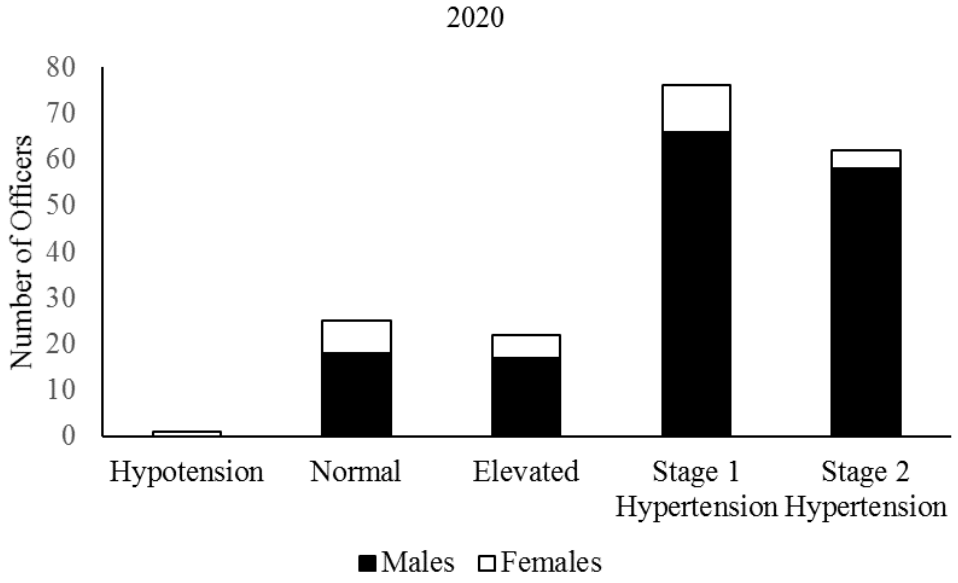


Body Fat Percentage

- Officers may be fit but have more than optimal body fat







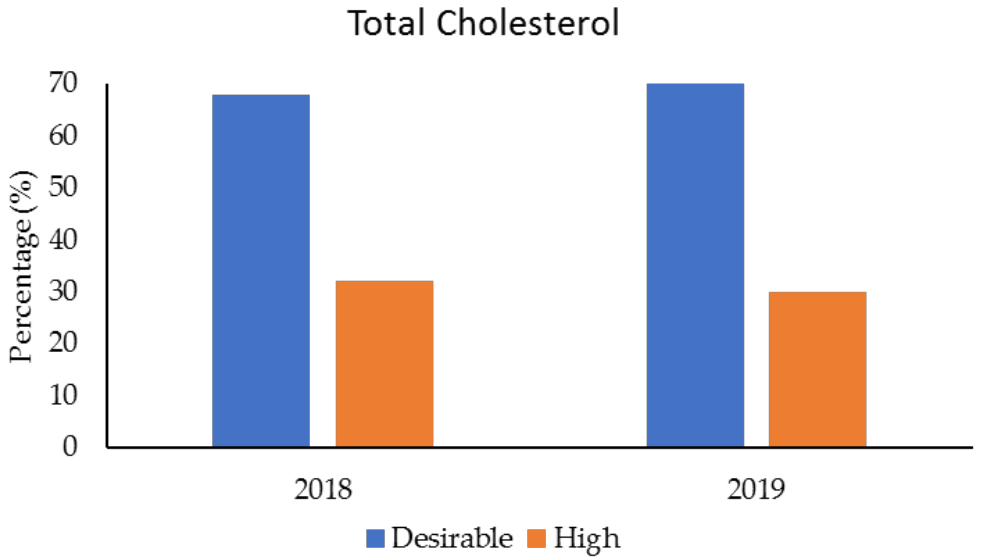
Blood Pressure

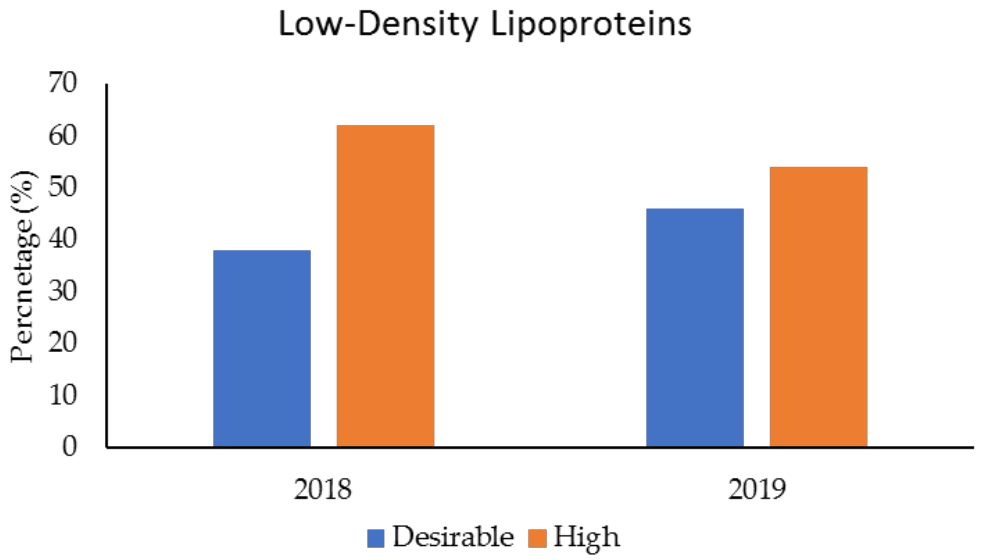
- High percentage of officers with elevated-to-high blood pressure

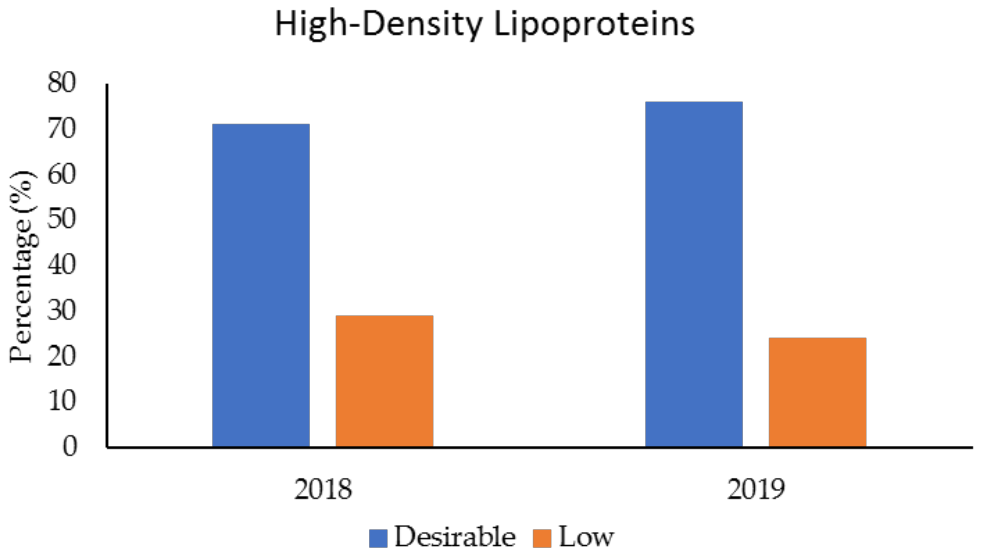
Blood Lipids and Fitness

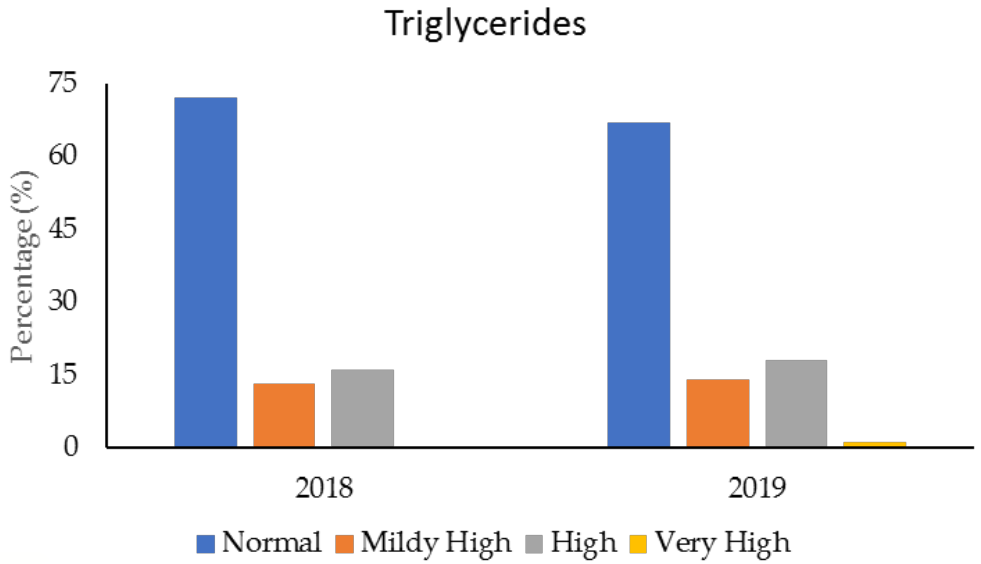
- Lockie, RG, Orr, RM, and Dawes, JJ. Fit (and healthy) for duty: Blood lipid profiles and physical fitness test relationships from police officers in a health and wellness program. *Int J Environ Res Public Health* 19: 5408, 2022.
- Did officers with better lipid profiles also demonstrate better fitness?
- Blood lipids:
  - Total cholesterol, low-density lipoproteins (LDL-C), high-density lipoproteins (HDL-C), triglycerides
- Compared to national standards (Centers for Disease Control and Prevention, National Cholesterol Education Program)

Centers for Disease Control and Prevention. Getting Your Cholesterol Checked. Available from: https://www.cdc.gov/cholesterol/cholesterol_screening.htm. Accessed September 27, 2021.
National Cholesterol Education Program. Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). Available from: https://www.nhlbi.nih.gov/files/docs/guidelines/atp3xsum.pdf. Accessed September 27, 2021,


Total Cholesterol
Percentage (%)
70
60
50
40
30
20
10
0
2018
2019
Desirable
High


Low-Density Lipoproteins
Percnetage (%)
70
60
50
40
30
20
10
0
2018
2019
Desirable
High


High-Density Lipoproteins
Percentage (%)
80
70
60
50
40
30
20
10
0
2018
2019
Desirable
Low


Triglycerides
Percentage (%)
75
60
45
30
15
0
2018
2019
Normal
Mildy High
High
Very High

2018		Total Cholesterol	LDL-C	HDL-C	Triglycerides
Estimated $\dot{V}O_{2max}$	ρ	-0.048	-0.118	0.291*	-0.158*
	p	0.542	0.129	<0.001	0.041
Sit-and-Reach	ρ	0.046	0.046	0.112	-0.108
	p	0.556	0.559	0.149	0.163
Push-ups	ρ	0.096	0.079	0.175*	-0.105
	p	0.216	0.310	0.023	0.175
Vertical Jump	ρ	-0.079	-0.094	0.083	-0.087
	p	0.314	0.233	0.291	0.266
Grip Strength	ρ	-0.004	-0.037	0.169*	-0.121
	P	0.963	0.636	0.028	0.118
Sit-ups	ρ	-0.041	-0.066	0.138	-0.233*
	P	0.613	0.415	0.089	0.004
1RM Bench Press	ρ	-0.141	-0.102	0.016	-0.112
	P	0.069	0.190	0.839	0.149
Relative Bench Press	ρ	-0.024	-0.013	0.157*	-0.144
	p	0.762	0.872	0.042	0.063

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2019		Total Cholesterol	LDL-C	HDL-C	Triglycerides
Estimated $\dot{V}O_{2max}$	ρ	-0.062	-0.054	0.118	-0.163*
	p	0.396	0.465	0.107	0.026
Sit-and-Reach	ρ	0.048	0.066	0.141	-0.083
	p	0.505	0.372	0.050	0.254
Push-ups	ρ	-0.063	0.032	0.065	-0.275*
	p	0.383	0.666	0.367	<0.001
Vertical Jump	ρ	-0.124	-0.046	-0.006	-0.163*
	p	0.087	0.533	0.930	0.025
Grip Strength	ρ	0.031	0.094	-0.001	-0.111
	P	0.668	0.199	0.985	0.123
Sit-ups	ρ	-0.113	-0.151	0.155	-0.222*
	P	0.157	0.059	0.051	0.005
1RM Bench Press	ρ	-0.057	0.018	-0.092	-0.111
	P	0.426	0.808	0.203	0.122
Relative Bench Press	ρ	-0.027	0.046	0.061	-0.188*
	p	0.711	0.530	0.401	0.009

2019		Total Cholesterol	LDL-C	HDL-C	Triglycerides
Estimated $\dot{V}O_{2max}$	ρ *p*	-0.062 0.396	-0.054 0.465	0.118 0.107	-0.163* 0.026
Sit-and-Reach	ρ *p*	0.048 0.505	0.066 0.372	0.141 0.050	-0.083 0.254
Push-ups	ρ *p*	-0.063 0.383	0.032 0.666	0.065 0.367	-0.275* <0.001
Vertical Jump	ρ *p*	-0.124 0.087	-0.046 0.533	-0.006 0.930	-0.163* 0.025
Grip Strength	ρ *P*	0.031 0.668	0.094 0.199	-0.001 0.985	-0.111 0.123
Sit-ups	ρ *P*	-0.113 0.157	-0.151 0.059	0.155 0.051	-0.222* 0.005
1RM Bench Press	ρ *P*	-0.057 0.426	0.018 0.808	-0.092 0.203	-0.111 0.122
Relative Bench Press	ρ *p*	-0.027 0.711	0.046 0.530	0.061 0.401	-0.188* 0.009

Practical Applications

- Most participating officers had good lipid profiles relative to cardiovascular disease risk
- Officers with poorer lipid profiles would benefit from continued program participation
- Bloop lipids and fitness relatively independent from each other
- Health and wellness programs should incorporate multiple approaches (e.g., exercise testing and programming, dietary interventions, wellness and drug education, etc.) to reduce cardiovascular disease risk, enhance physical fitness, and improve quality of life for police officers

Research Conclusions

- Monitor any group variations for year-to-year
- Track individuals (next step for research!)
- Although healthier officers may be more likely to participate – involvement of less fit and healthy officers is a positive
- Fitness and health measures may be somewhat independent
- Research supports multifaceted approach to officer health and wellness

Take-Homes

- Communication is key- include all levels of Department
- Create a network for program administration
  - C-EP, TSAC-F, CSCS etc.
  - Dietician
  - Physical Therapist
  - Researchers
- Data to support effectiveness
- Comprehensive Programming

Questions?

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