ENTRY FITNESS LEVELS AND SUBSEQUENT ACADEMY PERFORMANCE IN MASSACHUSETTS POLICE RECRUITS

LAURENT BENEDETTI MD MPH
CHIEF RESIDENT, OCCUPATIONAL AND ENVIRONMENTAL MEDICINE RESIDENCY
HARVARD SCHOOL OF PUBLIC HEALTH
OBJECTIVES

1. Discuss the impact of entry-level aerobic physical fitness on Police Academy activities
2. Analyze relationships between entry aerobic physical fitness level and Police Academy outcomes
3. Determine minimum physical fitness levels for successful completion of Police Academy training
OUTLINE

- Background
- Purpose
- Hypothesis
- Aims
- Research Methods
- Results
- Conclusions/Applications
SPECIFIC HAZARDS TO LAW ENFORCEMENT

1. High rate of fatal work-related injuries
   1. Increased 40% in 2010

2. High physical and psychological stress

1. High rate of comorbidities and cardiac risk factors
   1. Obesity, hypertension, high cholesterol, and smoking

2. Irregular physical activity shown to be associated with an increase in the risk of myocardial infarction
When compared to routine/non-emergency activities, the risk of sudden cardiac death is greater among U.S. law enforcement officers during certain stressful law enforcement duties:

- 34-69 times greater during restraints/altercations
- 32-51 times greater during pursuits
- 20-23 times greater during physical training
- 6-9 times greater during medical/rescue operations
Massachusetts mandates all recruit police officers pass a medical exam and Physical Ability Test (PAT) prior to potential entrance at a Commonwealth Police Academy.

PAT is designed to replicate certain functions/capabilities of police work in an effort to test a participant’s ability to safely perform essential law enforcement duties.

However, the PAT requires only moderate aerobic capacity and overall fitness.

Massachusetts Municipal Police Training Committee finds many student recruits to be ill prepared for the rigors of police academy training despite having successfully completed the PAT.
The purpose of this retrospective cohort study is to assess police academy students’ entry fitness levels as predictors of subsequent performance in the academy.
HYPOTHESES

Null hypothesis

- Successful academy completion is *not associated* with a particular degree of aerobic fitness
  - Successful recruit defined as graduate of academy with acceptable class average, minimal discipline violations and injuries with few or no lost training days

Alternate Hypothesis

- Favorable academy performance is *positively associated* with the aerobic fitness of a police officer recruit
Aim 1

- Categorize recruit officers’ entry fitness levels as determined by Cooper Assessments
- Describe the distribution of various fitness attributes (Weight, Body Mass Index, Body Fat, Aerobic Capacity, Flexibility) across this population

Aim 2

- Examine the association of entry fitness levels with subsequent performance in the academy
  - Successful graduation, GPA, attendance, incidence of disciplinary actions, number and severity of training injuries and illnesses

Aim 3

- Estimate the minimum fitness requirements predicting successful completion of a Municipal Police training academy
REGIONAL & MUNICIPAL POLICE ACADEMY TRAINING

- Commonwealth of Massachusetts Municipal Police Training Committee

- Recruit Officer Courses
  - Regional Academies: Boylston, Plymouth, Randolph, Reading, Western Mass
  - Municipal Academies: Boston (Hyde Park), Lowell, MBTA, Springfield, New Braintree, Worcester

- Full, part-time municipal, University of Massachusetts, Transit and Environmental police officers
**METHODOLOGY**

- Recruit officers 18 years of age and older who entered Police Academies across Massachusetts between 2006-2012

- Retrospective review of Academy records

- 2,993 subjects from 10 Police Academies throughout Massachusetts
METHODOLOGY

- **Exposure Assessment**: (Initial Cooper Test)
  1. Height
  2. Weight
  3. BMI
  4. Body fat percent
  5. Push ups (number per one minute)
  6. Sit ups (number per one minute)
  7. Sit and reach (flexibility in inches)
  8. 1.5 mile run (time in minutes:seconds)
METHODOLOGY

- **Outcome Assessment:**
  1. **Successful graduation: yes/no and reason**
  2. Days of attendance: lost training days
  3. Overall class average: GPA based on physical and written evaluations
  4. Violations: number and category
     - Academic
     - Performance
     - Discipline
  5. Illness or injury: number, diagnosis, restrictions
Police recruits by selected characteristics

Graduated (90.4%)  Not Graduated (9.6%)
Police recruits by selected characteristics

Graduated (90.4%)  Not Graduated (9.6%)
### Odds ratios of academy failure from multivariable model (backward selection)

*Estimates from logistic regression models with random intercept on academy*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Graduated</th>
<th>Univariates Analysis</th>
<th>Multivariate analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>OR</td>
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<td>Gender</td>
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Abbreviation: 95%CI, 95% confidence interval; OR, odds ratio; Ref, reference category.
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**Probability of academy failure** based on gender, number of push-ups, and VO2 max estimates from the multivariable model presented in previous slide

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<th>VO2 max (1.5 miles run time)</th>
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<td>1.4%</td>
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<td>2.7%</td>
<td>4.3%</td>
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<tr>
<td>35-42 ml•kg⁻¹•min⁻¹ (15’20″–12’33″)</td>
<td>0.7%</td>
<td>0.8%</td>
<td>1.4%</td>
<td>2.3%</td>
</tr>
<tr>
<td>42-49 ml•kg⁻¹•min⁻¹ (12’33″–10’37″)</td>
<td>0.5%</td>
<td>0.5%</td>
<td>1%</td>
<td>1.6%</td>
</tr>
<tr>
<td>&gt;49 ml•kg⁻¹•min⁻¹ (&gt;10’37″)</td>
<td>0.2%</td>
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<td>0.3%</td>
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SENSITIVITY ANALYSIS

- **All Data Analysis**
  - 10 Academies
  - 2006-2012
  - 63 Classes
    - Missing exposure data
  - 2993 Recruits

- **Sensitivity Analysis**
  - 10 Academies
  - 2006-2012
  - 28/63 Classes (44.4%)
    - 67% recruits with ALL exposure data recorded
  - 1236 Recruits
### Sensitivity Analysis

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CONCLUSIONS

- Initial BMI, Weight, Body fat, Push-ups, Sit-ups and Run-time/VO2 max are all predictors of successful graduation from Massachusetts Police Academies
  - Run-time/VO2 max, Push-ups and Sit-ups are strongest predictors

- Multivariate comparisons are more strongly predictive of graduation than univariate comparisons

- For example, ≥ 40 push-ups & 1.5 mile time of < 12’33” failing rate should be < 5%
APPLICATIONS

- Promote overall fitness among officers throughout their careers

- Good physical fitness is expected to confer protection against adverse health outcomes
  - Cardiovascular disease
  - Musculoskeletal injuries

- Enhance professional performance in physically demanding situations such as suspect pursuits and restraints
ACKNOWLEDGEMENTS

- Stefanos N. Kales MD, MPH
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- Andrea Farioli, MD
- Maria Korre, RN, MS
- Sara Boyd


QUESTIONS?

Thank You