Evidence based selection and mental health: Lessons learned from aviation

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A short history of pilot selection

• The Wright brothers (1903)
• WW1
• WW2
• Computer-based testing 1980-90ties
• New interest in personality traits and other characteristics (from late 1990ties)
• Testing of UAV/RPA pilots and operators
• Pilots of tomorrow and the importance of mental health
Emotional stability (France, ca 1918)
Complex Coordination Test (WWII)
Portabat (US/Nato project) 1980’ties
Computer-based tests II

Two-Hand Coordination
Computer based tests III
The selection process

Step 1: Formal requirements/Screening
- Yes: Proceed to Step 2
- No: Not qualified

Step 2: Initial testing
- Yes: Proceed to Step 3
- No: Fail

Step 3: Advanced testing/Work sample/Assessment center
- Yes: Proceed to Step 4
- No: Fail

Step 4: Interview/Final decision
- Yes: Accept
- No: Reject
How do we know that the predictors work?

• By examining the relationship between test results (predictors) and a measure of work performance (criterion).

• Meta-analyses and systematic reviews where information from many primary studies are combined and variation between studies examined.
Typical validation study

• The majority of studies is based on military pilots
• Ab-initio selection
• Performance criteria are usually training performance – often pass/fail
• Methodological problems including low sample sizes, restriction of range, poor criterion reliability and the use of a dichotomous criterion
What about personality?

- Job analyses indicate and support the idea that personality traits are important for work performance.
- Studies indicate that pilots in general score higher than the normal population on some Big-five personality traits—especially Emotional stability and Conscientiousness.
- But why are the correlations so low?
  - Measurement problems, criterion problems, etc.
- Select in based on positive personality traits vs screening for mental health disorders.
After Germanwings (2015)

• Concern/worry about the mental health of pilots

• Are the psychologists doing their job?

• EASA Task Force
Collaboration between EAAP, ASMA, & ECA

Joint statement on the Aerospace Medical Association (AsMA) Pilot Mental Health: Expert Working Group Recommendations

30 November 2015, 12:07 pm

To strengthen the relationship between aviation medical examiners and pilots, the European Society of Aerospace Medicine (ESAM), the European Association for Aviation Psychology (EAAP) and the European Cockpit Association (ECA) have issued a joint statement on the Aerospace Medical Association (AsMA) Pilot Mental Health: Expert Working Group Recommendations.

Our joint approach to medical and mental fitness assessments of pilots endorses a key set of guidelines developed by the Aerospace Medical Association (AsMA). This endorsement, being a valuable guidance for assessing pilot health while also raising awareness of mental health issues, includes the following observations:

GENERAL

- Guidelines like the ones from AsMA are relevant to any safety critical occupation, and pilots should not be seen to have a greater risk of mental health issues than comparable professionals.

- Safe pilot performance during a long, healthy and fulfilling career should be the joint aim of professional pilots, aeronautical and psychological specialists, airline managers, and authorities. For the pilot, in addition to an adequate lifestyle, active support from the company, peers, family and friends is known to positively contribute.
amending Regulation (EU) No 965/2012, as regards technical requirements and administrative procedures related to introducing support programs, psychological assessment of flight crew, as well as systematic and random testing of psychoactive substances to ensure medical fitness of flight and cabin crew members, and as regards equipping newly manufactured turbine-powered aeroplanes with a maximum certified take-off mass of 5 700 kg or less and approved to carry six to nine passengers with a terrain awareness warning system
The operator shall take all reasonable measures to ensure that no person recklessly, intentionally or negligently acts or omits to act so as to:

- (1) endanger an aircraft or person therein; or
- (2) cause or permit an aircraft to endanger any person or property.

The operator shall ensure that flight crew has undergone a psychological assessment before commencing line flying in order to:

- (1) identify psychological attributes and suitability of the flight crew in respect of the work environment; and
- (2) reduce the likelihood of negative interference with the safe operation of the aircraft.

Considering the size, nature and complexity of the activity of an operator, an operator may replace the psychological assessment referred to in point (b) with an internal assessment of the psychological attributes and suitability of flight crew.';
Is it possible to screen for future severe mental health problems e.g., the onset of psychosis?

• Short answer: No
• How is mental health problems diagnosed? Clinical systematic interviews supplied with measurement instruments
• Sensitivity and specificity (false positives and false negatives)
• Will it work in a selection context? Probably not
• Select in vs select out
Guidelines will come with further specifications

• When should the selection take place
• The competence needed for those who perform the selection
• What type of abilities/traits/characteristics. The following have been suggested:
  – (1) cognitive abilities,
  – (2) personality traits,
  – (3) operational and professional competencies; and
  – (4) social competences in accordance with crew resource management principles.
Evidence based practice in psychology and medicine
Evidence-based pilot selection

Best available research evidence

Evidence based practice

Selection expertise

Applicant and organization
What is the best available research evidence?

- Primary validation studies
- Meta-analyses and systematic reviews of validation studies
- Other types of relevant studies, e.g., job analyses
- Is it possible to rate the evidence from low to high?
  - Based on the quality and number of studies
  - Effect sizes (validation coefficients)
What is selection expertise

- Aviation psychologist
- Experience in selection
- Knowledge in psychometrics
  - Adherence to professional standards (e.g., EFPA, 2013 or AERA/APA, 2014 on test use)
- Able to evaluate research findings, their relevance and limitations given the current context
Applicant and organization

- Applicant experiences and beliefs
- Side-effects (fairness, transparency, values)
- The needs of the organization - health and safety
Selection in a broader context: How to ensure safety

- Recruitment
- Selection
- Training
- Design
- Work environment
- Organizational factors
Questions/comments?

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