Intelligence and academic attainment as predictors of medical careers: A twenty-year follow-up

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Attainment and ability

- **Ability (aptitude)**
  - General mental ability (GMA)
    - Intellectual ability
    - Intelligence / IQ
  - Generic intellectual and problem-solving skills,
  - Independent of specific problem content
  - Stable across the life-span
  - Few effects of training or practice

- **Attainment (achievement)**
  - School-leaving examinations (e.g. A-levels in the UK)
  - Mastery of specific content (e.g. biology or chemistry)
  - Dependent on motivation, study habits and personality
  - Dependent on teaching and educational opportunity
Medical school selection

• Selection in the UK depends to a great extent on *attainment* at A-level

• What is the rationale for using attainment tests?
  – Direct assessment of necessary background knowledge
    • Biology, chemistry, physics and mathematics are the academic underpinning of medical science
  – A-levels are indirect indicators of motivation and study habits
    • Prediction not only of success in undergraduate medicine but also of life-long professional learning
  – Surrogate measures of ability (intelligence)
    • Doctors need to be intelligent and people with high A-level grades are more intelligent
    • If this is the rationale it may be better to use proper IQ tests which are less dependent on educational opportunity
Universities were urged yesterday by the higher education minister, Margaret Hodge, to give places to bright students from poorer state schools — even if they had worse A-level grades than those from the independent sector.

Mrs Hodge gave her backing to a Bristol University scheme which looks favourably on good applicants from schools whose average A-level grades achieve fewer than three Cs, and in many cases gives them lower offers.

She said A-levels long regarded as the "gold standard" of English education — were poor predictors of potential.

"Of course the A-level is important but what's being shown is increasing evidence that they aren't necessarily the only way of measuring potential," Mrs Hodge told reporters.

"What I want the universities to do — particularly the universities that are currently taking on fewer than one in five young people from half the country's population — is to take the brightest and the best," Mrs Hodge said.

More at EducationGuardian.co.uk
The questions

• Do A-levels predict medical careers?
• Does intelligence predict medical careers?
• Which is the better predictor?

Need a long-term prospective study which measures:
– A-level grades
– Intelligence
Westminster Medical School Follow-up

• Dr Peter Fleming
  – Clinical entrants to Westminster, 1975-1982
  – Age, about 21 (born 1954-1961)
  – Timed IQ test (AH5): Verbal & Spatial scores
  – N=511
Westminster Hospital Follow-up

- IQ and A-levels

Mean A-level grade

Total AH5 score
Westminster Medical School Follow-up

• Dr Peter Fleming
  – Clinical entrants to Westminster, 1975-1982
  – Age, about 21 (born 1954-1961)
  – Timed IQ test (AH5): Verbal & Spatial scores
  – N=512

• Followed up 1989 (McManus & Tunnicliffe)
  – Qualified 1978-1985 (4-11 years previously; aged 28-35))

• Followed up 2002 (McManus, Smithers & Partridge)
  – Qualified for 17-24 years
  – Age, about 41-48
Westminster Medical School Follow-up

• Follow-up in 2002
  – Medical Register & Medical Directory CD-ROMs
  – N=511
    • 464 on the register
    • 47 not on the register (9.2%)
      – ?? death / emigration / alternate career / other

• Who dropped off the register?
Westminster Medical School Follow-up
Dropouts by A-levels

p<.001
Westminster Medical School Follow-up
Dropouts by Total IQ

![Scatter plot and box plots showing data distribution and statistical analysis.]

NS
Westminster Medical School Follow-up

- Questionnaire to all those on the Register
  - N=464
  - Sent January 2002
  - Two reminders: final return date 26\textsuperscript{th} April 2002
  - Response rate (26\textsuperscript{th} April)
    - 349 responses (75.2\%)
    - 5 subsequent questionnaires which have not been analysed

- Questionnaire:
  - Career choice, post-graduate qualifications and career progression
  - Stress and burnout; workload
  - Communication style and empathy
  - Personality (Big 5)
  - Masculinity-femininity
Career progression

Hospital Doctors

General Practitioners

Years after qualification

Years after qualification
Post-graduate qualifications

Hospital Doctors

General Practitioners

- Memberships
- Academic degrees
- Diplomas
A-levels, IQ and Memberships

Intelligence: p=.012 (after taking A-levels into account, p=.423)
Modelling academic careers

- Intelligence
- A-level grades
- Performance in finals
- PRHO ratings
- Time to membership
- Time to Consultant/Principal
Conclusions

• A-level grades (attainment/achievement) predict medical careers
  – Undergraduate and PRHO performance
  – Time to Membership
  – Time to Consultant/Principal
  – Dropout from Medical Register

• Intelligence (ability/aptitude) has little predictive value after taking A-levels into account

• A-level predictions are long-lasting.
  – Probably due to being indirect measures of study habits, motivation and self-directed learning rather than because of specific scientific content.