



ACADEMIC ACHIEVEMENT AND CREATIVE THINKING CAPACITY IN SOUTH AFRICAN MEDICAL STUDENTS — AN EMPIRICAL STUDY

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Objective. To assess whether the capacity for creative thinking among medical students is related to academic advancement.

Design, setting, subjects, outcome measures. A timed word-association test standardised and scored to assess the tendency for creative thinking was administered to 22 development programme students at the University of Cape Town. Results were compared with grades at the end of the academic year.

Results and conclusions. There was a significant association ($P < 0.05$) between ranking in the upper half of the group and creative thinking scores, indicating that creative thinking may be an asset in medical education for educationally disadvantaged students.

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In recent years there have been excessive dropout rates in South African medical schools, partly because of relatively poor student premedical preparation.¹ At the University of Cape Town special mentoring and additional year programmes have been initiated, with early indications of success. The purpose of this article is to describe an experiment regarding academic achievement involving students in these programmes and to propose an admission screening procedure.

Although all students admitted for medical training are assessed as academically competent, the premise of this study is that the capacity for creative thinking helps educationally disadvantaged students to meet the demands of medical education successfully. Ability to think creatively is not correlated directly with intelligence² or educational background³ and can provide special capacities for overcoming difficulties in learning. Creative thinking usually involves resourcefulness, persistence, and flexibility; it potentially

provides ways of developing new and effective ways of studying, scrutinising and exploring subject matter, and facing the demands of the laboratory and classroom. With respect to the field of medicine, it could be reasonably argued that creative thinking is necessary for any student as well as effective medical practitioners and researchers, but this capacity is especially important in the face of conditions of adversity. Historically, creative thinking has enabled individuals to overcome or transcend obstacles and adverse conditions, while on a broader level it has operated to reduce social and economic hardship.

The hypothesis of this study is that educationally disadvantaged first-year medical students manifesting creative capacity will be academically successful, achieving placement in the upper half of the group at the end of the academic year. Assessment of the students' creative capacities is carried out using a testing procedure standardised in previous creativity research.^{4,6}

METHOD

Twenty-two first-year medical students, 10 males and 12 females, in an academic development programme at the University of Cape Town Faculty of Medicine were administered an orally presented and timed word-association test. Stimuli consisted of 100 words (in English) and subjects were instructed to respond with the first single word that came to mind on presentation of each stimulus. All were aware that responses were timed and that the entire test session was tape recorded. Subjects were informed that individual results of the testing were confidential and would not in any way affect their academic records. Performance was discussed with each individual personally in a closed follow-up session. Information was gathered about the linguistic background (native language and age at which second language competency was acquired) of each subject. Although English was in every case a second language, stimulus word translation was not performed because both preliminary and later testing indicated that all members of the group responded to the stimuli with very high response speeds and with comprehension comparable to that of native English speakers.

MATERIALS

The word-association test used was initially developed and standardised by Kent and Rosanoff.⁷ Traditional scoring methods applied to this test have been used for identifying a variety of psychological factors. The application as a creativity measure and the scoring method used are based on a specific empirically demonstrated form of creative cognition, the janusian process.⁸ Validity of the measure has been determined using populations of Nobel laureates in science, creative

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college students, and creative businessmen.^{4,6} The janusian process consists of *actively conceiving multiple opposites or antitheses simultaneously*; it is measured on the word-association test by the frequency of very rapid opposite (RO) association responses. Time of response was measured electronically to one-hundredth of a second.

RESULTS

Responses were categorised as opposites and non-opposites. Although previous applications of the creativity testing procedure also measured a category of common, popular responses from standardised norms, no similar norms for South African populations are available. Responses overall were, however, strikingly similar to usual English language word-association responses except for some local geographical references. Examples of opposites are 'eating' in response to the stimulus 'hungry', 'sickness' in response to 'health', 'rough' to 'smooth', and 'citizen' to 'king'. The number of opposite associations for the 100 stimulus words ranged from 1 to 30 (mean 7.5, median 6).

Latency of response time — the time elapsed between the investigator's voicing of the word and the start of the subject's response — was measured at the time of testing and verified directly from the recorded audiotapes. Average overall response speeds ranged from 1.31 to 3.64 seconds (mean 2.59 seconds, median 2.50 seconds).

RO response was measured as in past research,⁴ except that in the absence of commonality norms the mean latency of opposite responses was compared with mean overall response latency. Positive mean differences between opposite response latency (faster speed) and mean overall response latency were classified as an RO tendency. The opposite response latencies (uncompared) in the eight subjects manifesting the RO tendency ranged from 0.98 to 2.44 seconds (mean 2.16 seconds, median 1.83 seconds).

Class standing was calculated by averaging first-year final grades in all subjects; namely anatomy, physics, human biology, health and society. One student left school before the end of the year. Seven RO subjects were in the top half of the class and one RO student was in the bottom half. Of the non-RO scoring subjects, 4 were in the top half and 10 in the bottom half of the class (chi-square 4.91 (Yates's correction for small samples), $df = 1$, $P < 0.05$).

DISCUSSION

Results indicate that the tendency to creative thinking is significantly associated with academic success among educationally disadvantaged first-year South African medical students. This suggests three practical applications for medical education. First, the testing procedure can be used for

admission evaluation in preliminary screening or full assessment. Students manifesting positive creative thinking scores would, together with other indications in a total assessment procedure, be considered good candidates for succeeding, and assumedly continuing in medical training.

Secondly, during the course of medical education students with positive creative thinking tendency scores may be encouraged to apply their capacity fully. Creative approaches to study, class questions, and work in the laboratory should be recognised and facilitated, both to aid the individual and as modelling for others. Taking on leadership roles, collaborative study projects, and tutoring of other students may also serve as important applications of creative capacities.

Thirdly, students in elementary and secondary schools could be trained to develop creative thinking approaches.

Although the single student in this study who dropped out did manifest a positive creative thinking tendency score, not enough is known about the reasons for the withdrawal to assess its connection with the experimental results. Moreover, as the dropout frequency in this experimental group was lower than in previous years, and as the experiment does not in itself demonstrate specific connections between creative thinking and academic achievement or school withdrawal, it may be that other factors could currently be leading to overall change and improvement. Further research is needed. Validity assessment should include measurements of intelligence and educational background in diverse student populations.

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