Motivation as an independent and a dependent variable in medical education

Medical Teacher May 2011, Vol. 33, No. 5: e242–e262

Mashayekhi V MD
Dermatology Department
Emamreza Hospital
Mashhad University of Medical Sciences
Introduction

• Motivation in general education a predictor for
  – learning, academic success, persistence or
    continuation in a study and well-being

• Motivation in medical education could be different
  – intertwining with clinical work
  – restricted and clearly defined profession. The teaching
    and learning environment is highly specific.
  – Also, medical students are considered highly
    motivated from the outset.
Maslow's hierarchy of needs

- Physiological: breathing, food, water, sex, sleep, homeostasis, excretion
- Safety: security of: body, employment, resources, morality, the family, health, property
- Love/belonging: friendship, family, sexual intimacy
- Esteem: self-esteem, confidence, achievement, respect of others, respect by others
- Self-actualization: morality, creativity, spontaneity, problem solving, lack of prejudice, acceptance of facts
The self-determination continuum (Ryan & Deci 2000a).

- Amotivation
  - External regulation
    - Least autonomous
  - Introjected regulation
  - Identified regulation
  - Integrated regulation

- Extrinsic motivation

- Intrinsic motivation
  - Most autonomous
Intrinsic motivation

• is built on the inherent needs for
  – Autonomy:
    • volition in one’s actions.
  – Competence:
    • capability in achieving the target.
  – Relatedness:
    • desire to relate to the significant others in one’s life through work and achievement
Motivation as a dependent & independent variable

- Independent
  - Influence learning and outcome of, academic success ...

- Dependent
  - Learning experience changes quality of motivation
  - Level of motivation changes by Feeling of self-efficacy, expectation of success or failure and incentive value of success or failure (Expectancy-value Theory),
Aim of study

• To answer
  – How has the literature studied motivation as either an independent or a dependent variable?
  – How is motivation useful in predicting and understanding processes and outcomes in medical education?
  – How these variables influence motivation in the light of SDT?
## Methods

- Papers published in journals as well as presented at conferences during 1979-2010 were included.

<table>
<thead>
<tr>
<th>Inclusion criteria</th>
<th>Exclusion criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Studies/reviews on motivation which report empirical research on pre-medical, undergraduate, graduate and post-graduate medical students</td>
<td>1. Studies which were not empirical in nature like viewpoints</td>
</tr>
<tr>
<td>2. Studies identifying motivation for medical school/medicine/branches of medicine</td>
<td>2. Studies on populations other than on pre-medical, undergraduate, graduate and post-graduate medical students</td>
</tr>
<tr>
<td>3. Quantitative research studies with well-formulated definitions and operationalization of concepts, analysis of data, specific measurement of motivation</td>
<td>3. Studies which did not measure motivation with a valid method</td>
</tr>
<tr>
<td>4. Qualitative research studies with well-defined concepts, reliable methods (2-3 coders and consensus reached), well-reasoned conclusions and analysis</td>
<td>4. Studies which measured motivation for very specific aspects like reading, etc.</td>
</tr>
<tr>
<td></td>
<td>5. Quantitative studies which did not have complete statistical analyses</td>
</tr>
</tbody>
</table>
Results

• The total number of papers found initially was 460, finally after all considerations and limits, 56 articles were finally included in the review.
Motivation as an independent variable

• Here motivation is the **controlling variable**, i.e. it behaves as an independent variable and **influences other variables** (determines the possible outcomes).

• These outcomes can be **subsumed in five categories**
  – Learning and study behavior
  – Academic success/performance
  – Choice of medicine as a career
  – Choice of a specialty within medicine
  – Intention to continue medical studies
Motivation influence

Learning and study behavior

• Greater time investment in study
• Deep approach and reflection in learning
• Intention to continue studies
• In small group, lack of motivation in a group member is perceived as inhibiting the learning process of other students in the group
• Is related to a vocational approach to study in medical students
  – are stimulated to gain knowledge that will help them in their practice of medicine
• More optional credit courses and peer-tutoring activities
• health-related extracurricular activities like working in old-age home.
Motivation influence

Academic success/performance

• There is *conclusive and inconclusive* evidence
  – higher academic grades in both pre-clinical and clinical years
  – Significantly higher Tutorial group productivity
  – Achievement motivation; a better *predictor of professional attainment* in males than females
  – having higher *extrinsic* career motivation *predict greater advancement* in the thesis

• There were other *studies that failed to find* significant correlations
  – Neither extrinsic nor intrinsic motivation was significantly correlated with academic performance in a *UK* study (Popovic 2010).
Motivation influence

Choice of medicine as a career

• What kind of motivation or motives drive students to enter medical school?
  – helping people, being respected, being indispensable and becoming a scientist
  – The ability to help people appears to be the strongest motive
  – Women>30; to find intellectual motivation, competence and achievement feeling
  – who had a background in nursing education; increased patient care responsibility, medical knowledge, personal challenge and status
Choice of a specialty within medicine

• Primary care and psychiatry
  – people-oriented motive or diversity in diagnosis and treatment

• High technology or non-primary care specialties
  – science-oriented motive or working with new technology
  – Other motives for choosing non-primary care specialties were better lifestyle, monetary rewards and prestige
  – Strong career motivation or higher intrinsic career motivation were found to be independent predictors of choice of speciality.
Intention to continue medical studies

• Autonomous motivation significantly positive
• amotivation was negatively correlated with

by the findings of this review

Our belief that motivation is an independent variable in medical education was confirmed
Motivation as a dependent variable

• Motivation for medical study may be influenced by a variety of factors in the individual student and the learning environment and curriculum.

• Vallerand and Ratelle (2004) has proposed and empirical evidence has been gathered to support the view that motivation can change and be manipulated by
  – Variables that cannot be manipulated
  – Variables that can be potentially manipulated
Variables that cannot be manipulated

- Age
- Gender
- Ethnicity
- Socioeconomic status
- Personality traits
- Educational background
- Year of medical curriculum
- Teacher and parent support

Further research needs to be done on these variables because the findings can have an impact on the selection procedures for admission to medical schools.
Variables that cannot be manipulated

• Age
  – For mature-age entrants (41 Yrs) cited
    • main reason intellectual satisfaction
    • working with people
  – For normal-age entrants (34 Yrs) cited
    • desire to help others
    • enjoyment through working with people
    • and intellectual satisfaction

In most countries, the average age at entry into medical study is around 17 years, except in the US and Australia where it is around 23 years.
Variables that cannot be manipulated

• Gender
  – Males
    • Interest in science
    • Being indispensable
    • Helping people
    • Having a career
    • Financial security or prestige/status
    • Higher extrinsic career motivation
  – Females
    • Helping people
    • Having a career
    • More achievement oriented
    • Higher tutorial groups motivation

*There is considerable evidence that female medical students seem to have higher strength and better quality of motivation than male medical students*
• Ethnicity:
  – white students ‘challenge of the medical profession’
  – black students ‘chance to help people’
  – This was in contrast with a UK-based study

• Socioeconomic status
  – Higher; intrinsic factors like challenge, achievement and fulfilment in medicine,
  – Lower; extrinsic rewards like expected income
• Year of medical curriculum
  – first-year medical students
    • prestige, money and success,
    • higher achievement orientation
  – final year students
    • relief of suffering and importance for mankind
Variables that can be potentially manipulated

• Autonomy
  – the students can plan their educational activities of their own volition, within the boundaries of defined limits

• Competence
  – Feeling competent in learning stimulates intrinsic motivation for it

• Relatedness
  – could have a special significance in medical education
Autonomy

• Autonomy support
  – by instructors during clerkships enhanced students’ motivation to select a residency in that particular field of medicine
  – support by teachers predictor for both, students’ autonomous motivation and competence

• Curriculum
  – PBL curriculum motivate to learn for learning’s sake
  – Traditional curriculum motivate to obtaining high grades, i.e. extrinsic motivation
  – **Blended** learning complements face-to-face classes with e-learning modules and when incorporated into a PBL curriculum gives higher autonomy to students in their learning.

• Patient responsibility
  – Greater responsibility also means more autonomy in patient handling and treatment
Competence

• Self-efficacy
  – positively correlate with Intrinsic motivation

• Selection procedure
  – significantly higher strength of intrinsic motivation and lower certificate orientation
  – they engaged more in health-related extracurricular activities
  – did not necessarily make students achieve higher grades
Competence influenced by

• Type of assessment
  – deep approach to learning when evaluated against pre-set standards as opposed to when evaluated against each other
    • could stimulate feelings of competence
    • opposed to comparison with peers which could result in feelings of personal failure and incompetence

• Rewards
  – Does not necessarily motivate students and may demotivate a significant number of them over the time (O’Neill et al. 1999).
  – honours system could work in a negative way for students who know that they are not likely to get honours, by making them feel incompetent in learning
Competence influenced by

• Knowledge acquisition
  – increase in knowledge and understanding of subject matter (feelings of competence) increases students’ motivation

• Task value
  – Higher perceived task value of training leads to feelings of competence in learning
Relatedness

• Significant others could **not only** be **parents**, **teachers**, **peers**, but could **also** be **patients**

• **Contact with patients** could help students relate to their identity as future doctors and strengthen their beliefs about why they are in medical education in the first place
Relatedness

• Early patient/clinical contact
  – Stimulates students’ motivation for biomedical and further study by connecting theory to clinical practice. Thus, inspired towards their future work

• Well-being
  • Well-being in this study was defined as ‘a balance among multiple parts of residents’ personal and professional lives, including professional, family, social, physical, mental, spiritual and financial domains’.
  – lower well-being lead to feelings of ambiguity in career choice and higher well-being lead to greater zeal towards purpose in medicine and intrinsic passion for work
<table>
<thead>
<tr>
<th>Serial number</th>
<th>Motivation as an independent variable influences</th>
<th>Total number of papers (Reference numbers of papers included as per the table in the appendix)</th>
<th>Major findings</th>
</tr>
</thead>
</table>
| 1.            | Learning and study behaviour                  | 7, size of correlations some small and some moderate (papers 7, 9, 16, 26, 40, 41, 51)          | - Autonomous motivation was positively correlated with deep approach to study, reflection in learning and intention to continue studies  
- Motivation influenced learning in small groups  
- Motivation to be a good doctor stimulated vocational approach to learning  
- Motivation correlated positively with peer tutoring, extracurricular activities, academic and others |
| 2.            | Academic success/ performance                 | 14, small size of correlations (papers 1, 5, 6, 9, 11, 15, 16, 23, 30, 33, 35, 41, 42, 48)      | - Nine studies found positive relation between higher motivation and academic performance  
- The other studies either did not find significant correlations or one found significantly negative correlation, but in this study intrinsic motivation was measured with only one item in the questionnaire |
| 3.            | Choice of medicine as a career                | 14 (papers 13, 14, 17, 18, 20, 22, 25, 29, 28, 35, 39, 44, 45, 50)                          | - Motives – helping people, being respected, being indispensable and becoming a scientist  
- Helping people is the strongest motive  
- Women over 30 and nurses join medicine for personal challenge |
| 4.            | Choice of specialty within medicine           | 6 (papers 1, 2, 19, 20, 38, 45)                                                             | - Primary care specialities are chosen for people-oriented motive  
- High technology specialities are chosen for science oriented motive |
<p>| 5.            | Intention to continue medical studies         | 1, moderate size of correlations (paper 41)                                                 | - Autonomous motivation positively correlated with intention to continue studies and amotivation correlated negatively |</p>
<table>
<thead>
<tr>
<th>Serial number</th>
<th>Motivation as a dependent variable is influenced by</th>
<th>Total number of papers (Reference numbers of papers included as per the table in the appendix)</th>
<th>Major findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannot be manipulated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Age</td>
<td>1 (paper 14)</td>
<td>Mature-age and normal-age entrants had differences in motivations for choosing medicine</td>
</tr>
<tr>
<td>2.</td>
<td>Gender</td>
<td>10 (papers 1, 5, 22, 24, 28, 35, 37, 44, 45, 50)</td>
<td>Males and females had different type of motives for joining medicine, also some similarities</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Females were found to have higher strength of motivation and males were found to have higher extrinsic motivation</td>
</tr>
<tr>
<td>3.</td>
<td>Ethnicity</td>
<td>2 (papers 28, 41)</td>
<td>Predominant motives of black and white students for joining medicine were different and the findings of the two studies were contradictory</td>
</tr>
<tr>
<td>4.</td>
<td>Socioeconomic status</td>
<td>1 (paper 12)</td>
<td>Higher socioeconomic status students were found to focus on intrinsic factors for choosing medical study whereas lower socioeconomic status students chose medical study for extrinsic rewards</td>
</tr>
<tr>
<td>5.</td>
<td>Personality traits</td>
<td>1 (paper 43)</td>
<td>The temperament dimension of persistence and the character dimensions of self-directedness and self-transcendence are associated with intrinsic academic motivation in medical students</td>
</tr>
<tr>
<td>6.</td>
<td>Educational background</td>
<td>1 (paper 21)</td>
<td>Non-graduate entry students had higher achievement motivation as compared to graduate entry students</td>
</tr>
<tr>
<td>7.</td>
<td>Year of medical curriculum</td>
<td>2 (papers 3, 34)</td>
<td>In one study, first-year students were more oriented towards extrinsic rewards of the medical profession, whereas final-year students were more oriented towards helping mankind</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>In the other study, first-year students had higher achievement motivation than third-year students</td>
</tr>
<tr>
<td>8. Teacher and parent support</td>
<td>1 (paper 27)</td>
<td>Having parent support and not having teacher support play a positive and negative role, respectively, in students choosing for medical study</td>
<td></td>
</tr>
<tr>
<td>------------------------------</td>
<td>--------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Can be manipulated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Autonomy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autonomy support</td>
<td>4 (papers 32, 49, 54, 55)</td>
<td>Autonomy support in medical study was found to stimulate choice of a particular specialty and intrinsic motivation for learning</td>
<td></td>
</tr>
<tr>
<td>Curriculum</td>
<td>2 (papers 49, 56)</td>
<td>PBL curriculum was found to stimulate intrinsic motivation and traditional curriculum was found to stimulate extrinsic motivation</td>
<td></td>
</tr>
<tr>
<td>Greater patient responsibility</td>
<td>1 (paper 4)</td>
<td>Blended PBL increases students’ motivation as compared to traditional PBL</td>
<td></td>
</tr>
<tr>
<td>10. Competence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>1 (paper 32)</td>
<td>Greater patient responsibility was responsible for greater motivation for learning</td>
<td></td>
</tr>
<tr>
<td>Selection procedure</td>
<td>1 (paper 16)</td>
<td>Intrinsic motivation was positively correlated with self-efficacy</td>
<td></td>
</tr>
<tr>
<td>Assessment</td>
<td>1 (paper 52)</td>
<td>Students entering through medical entrance exam have higher motivation</td>
<td></td>
</tr>
<tr>
<td>Rewards</td>
<td>1 (paper 31)</td>
<td>Type of assessment influences type of motivation for study</td>
<td></td>
</tr>
<tr>
<td>Knowledge acquisition</td>
<td>1 (paper 10)</td>
<td>Rewards may demotivate significant number of students</td>
<td></td>
</tr>
<tr>
<td>Perceived task value</td>
<td>2 (papers 32, 55)</td>
<td>Perception of increased knowledge increases motivation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intrinsic motivation was found to be positively correlated with perceived task value</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Perceived task value of PBL groups increased the motivation for group working</td>
<td></td>
</tr>
<tr>
<td>11. Relatedness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early patient/clinical contact</td>
<td>2 (papers 8, 46)</td>
<td>Early patient contact stimulates student motivation</td>
<td></td>
</tr>
<tr>
<td>Well-being</td>
<td>1 (paper 36)</td>
<td>Feeling of well-being enhances motivation</td>
<td></td>
</tr>
</tbody>
</table>
Discussion

• in medical education
  – ‘Motivation correlates with academic performance
    • +++
    • ??
    • –

• In general education
  – The relationship between motivation and learning success has been well-substantiated
Discussion

• Satisfaction of the basic needs of autonomy, competence and relatedness enhance intrinsic motivation in general education students.

• Identifying factors influencing motivation could help medical educators incorporate them into design of a curriculum or development of their institute’s teaching culture and learning environment.
More questions?

• If motivation does influence performance, then what are the mechanisms that cause this relationship?
• Do the strength and quality of motivation change over the course of medical study (in a longitudinally designed study)?
• What are the causes for these changes?
• Are these causes related to curriculum structure or learning environment?
• Can they be influenced or manipulated?
• **Motivation of students can be enhanced by**
  
  – incorporating teaching methods like PBL, small group working, etc.

  – Learning environments inculcating autonomy-supportive behaviours by teachers, supporting students’ feelings of competence through regular and constructive feedback and enhancing feelings of relatedness through mentoring support, positive role models, small group working and early contact with patients,

• **Autonomously motivated students’ would experience greater satisfaction with the profession**, leading to lowering of stress and burnout possibilities.

• **Integration of values of the medical profession into the culture of medical institutions** could also help in shifting extrinsic goal contents to intrinsic goal contents, changing the focus from money, status and power to community service.

• **SDT applied to medical education could perhaps be the answer to medical educators’ dreams of intrinsically motivated students and doctors.**
THANKS FOR YOUR ATTENTION