STUDENT SELF-PERCEIVED COMPETENCE AND MOTIVATION IN A LEARNER CENTERED STUDENT RUN CLINIC (LC-SRC) – AN EXPLORATORY PILOT STUDY

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ABSTRACT

Background: The Learner-Centered Student-run Clinic (LC-SRC) was designed to teach and train prescribing skills grounded in a real-life context, to provide students with early clinical experience and responsibility. The current studies’ theoretical framework was based on the Self-determination Theory. According to the Self-determination Theory, early involvement in clinical practice combined with a high level of responsibility makes the LC-SRC an environment that can stimulate intrinsic motivation. We investigated the different types of motivation and the proficiency in CanMEDS competencies of the participating students.

Method: Type of motivation was measured using the Academic Motivation Scale and Intrinsic Motivation Inventory. CanMEDS competencies were evaluated by faculty using a mini-clinical examination and by the students themselves using a post-participation questionnaire.

Results: The twenty-nine participating students were highly intrinsic motivated for this project on all subscales of the Intrinsic Motivation Inventory. Motivation for medical school on the Academic Motivation Scale was high before and was not significantly changed after participation. Students considered that their CanMEDS competencies “Collaborator”, “Communicator”, “Academic”, and “Medical expert” had improved. Their actual clinical team competence was judged by faculty to be at a junior doctor level.

Conclusion: Students showed a high level of intrinsic motivation to participate in the LC-SRC and perceived an improvement in competence. Furthermore their actual clinical competence was at junior doctor level in all CanMEDS competencies. The stimulating characteristics of the LC-SRC, the high levels of intrinsic motivation and the qualitative comments of the students in this study makes the LC-SRC an attractive place for learning.
INTRODUCTION

In the undergraduate medical curricula, there is a need of opportunities for students to practice prescribing [1]. Prescribing encompasses a range of activities from performing a consultation, identifying a need for drug therapy, selecting and prescribing the appropriate drug to being involved in the subsequent management of the patient [1, 2]. McLellan et al. suggest that the way to teach and provide training in prescribing skills is to design interventions grounded in a real-life context, so that students can be observed and evaluated in the context of their (future) workplace [3]. Learning in the (future) workplace (Workplace Learning) is “as old as medicine itself” however does not necessarily contain specific responsibilities for students [4]. Giving students a feeling of responsibility for patient care makes their clinical experiences more ‘real’ and legitimate, and might stimulate student motivation [5]. Such enrichment of responsibility (for patient care) is thought to be an important factor to improve the training of rational prescribing skills of medical students [6]. This combination of context/workplace learning, early clinical experience, and sense of responsibility has been described as learning by doing [7].

Based on this concept, a Learner-Centered Student-run Clinic (LC-SRC) was started at the VUmc School of Medical Sciences in 2013 [8, 9]. The LC-SRC is a learner-centered project, as opposed to regular SRCs that primarily focus on providing (free) care [7]. In the LC-SRC students get the opportunity to train themselves in complex competencies such as patient communication, therapeutic reasoning, and prescribing in a real context. The LC-SRC concept and development is based on the conceptual framework of learning by doing, as an example within the more general experiential learning theory by Kolb [7, 9, 10]. Besides the experience itself, its timing and the attending responsibilities of the clinical experience are important. Experiences should be real and legitimate for optimal learning effects and involvement [4, 5, 11].

Student motivation is in general a neglected aspect in the designing of medical curricula [12]. In spite of description of the best principles for doing this [13], few initiatives consider and measure the effect of interventions catered to enhance student motivation in medical education [14], especially so in undergraduate medical curricula. The theoretical framework for this study is based on the Self-determination Theory (SDT). According to this theory, motivation can be classified into intrinsic and extrinsic types; the intrinsic motivation originates from within oneself, and extrinsic originates from external factors [15–17]. An example of intrinsic motivation is to learn to prescribe out of genuine interest and the desire to help one’s patients; an example of extrinsic motivation is to learn about certain drugs for an exam one has to pass. Intrinsic motivation depends on the fulfilment of three basic psychological needs, namely, autonomy, competence, and relatedness [15]. It is considered the best form of motivation to promote in-depth learning and to improve performance and competence in learning outcomes [16, 18–20]. Based on SDT, an individual is never thought to be exclusive intrinsically or extrinsically motivated and motivation is different for different activities. Furthermore, both intrinsic and extrinsic types of motivation are always present in differing levels, which can be influenced. The key feature in the transformation of extrinsic to intrinsic motivation is internalization. The level of internalization differs across the SDT continuum (see Figure 1)[21]. Internalization itself is stimulated by similar components that stimulate intrinsic motivation, being autonomy, competence, and relatedness [22]. The higher the level of internalization, the more autonomous is the motivation. Autonomous motivation is calculated as an average of the scores on score identified regulation and intrinsic motivation, whereas controlled motivation is calculated as an average of the introjected regulation and external regulation scores (see Figure 1).

An early involvement in clinical practice combined with a high level of responsibility makes the LC-SRC an environment that can fulfil all three basic psychological needs for students intrinsic motivation and internalization: autonomy by giving students responsibility of patients, competence through feedback from supervisors and confidence in handling patients and relatedness through working in teams of peers, near-peers and supervisors [18]. Therefore we hypothesize that participation in LC-SRC will stimulate the intrinsic and autonomous motivation of students for this type of (pharmacotherapy) teaching and learning [12, 15–17, 23].

Since the LC-SRC was designed to stimulate intrinsic and autonomous motivation, and thereby the competence of students, our research questions were:
1) What type of motivation do students have for this educational innovation?
2) Does the motivation for medical education change after participation in this innovation?
3) How does this innovation influence students’ proficiency in CanMEDS competencies?
Participants
Participation in the LC-SRC project is extracurricular and voluntary, students were invited to apply before/during a regular lecture by sending a letter regarding their expectations and their experiences in healthcare. All students who participated in the LC-SRC pilot from March to July 2013 (n=31) were invited to take part in the present research project. They were sent an e-survey before and after their participation. All mini-Clinical Evaluation Exercises (mini-CEX) of consultations in the LC-SRC, within this period, were included.

Measurements: Motivation
Motivation was assessed with two standardized validated questionnaires, the Academic Motivation Scale (AMS) [24–26] and the Intrinsic Motivation Inventory (IMI) [27–29]. The AMS was used to differentiate between intrinsic and extrinsic motivation for studying at the medical school [24]. Intrinsic motivation for this particular project was measured using the IMI subscales Interest, Usefulness, and Perceived Choice (Likert scale of 1–7). The Interest/Enjoyment subscale is considered the primary self-report measure of intrinsic motivation [30]. Furthermore, together the IMI subscales are related to the three psychological needs, which are all important components within intrinsic motivation, and moreover to stimulate integration/regulation of extrinsic motivation into autonomous motivation [15, 22, 27, 28, 30]. The AMS was completed twice, pre and post participation. The IMI was completed once, post participation. Written feedback was collected by means of open questions in the post-participation questionnaire.

Measurements: Competencies
The CanMEDS competencies framework [31] was chosen to evaluate clinical competencies, as both students and supervisors are used to the competences described within this framework, from their experience within the regular medical curriculum. A post-participation questionnaire was used to evaluate students’ perceived improvement in CanMEDS competencies. In order to objectively measure students’ CanMEDS competencies, these were evaluated by faculty from internal medicine, using mini-CEX, to grade and provide feedback for student teams after each consultation. These CanMEDS mini-CEX were regularly used by faculty to evaluate clinical competence of students in their regular clerkships. The seven CanMEDS mini-CEX were scored on a 5-point Likert scale (compared to the level of a junior doctor, 3 meant achieving a junior doctor level, >3 better, <3 worse) (See supplement 1, CanMEDS mini-CEX). Supervisors were questioned about their opinion on the improvement in medical knowledge, communication, clinical reasoning, and pharmacotherapeutic knowledge/skills of students after their participation in the LC-SRC. Figure 2 indicates which tests, questionnaires and assessments were performed at which time point.
Using the scale (1–7), indicate to what extent each of the following items presently corresponds to one of the reasons why you go to medical school. 1: Does not correspond at all. 4: Corresponds moderately. 7: Corresponds exactly.

AMS (Academic Motivation Scale)
The AMS, Academic Motivation Scale, was originally described by Vallerand et al 1989 in French as the EME (Échelle de motivation en éducation), and in 1992 in English as the AMS. This instrument has 28 items, scored on a 7-point Likert scale. The individual items are grouped into subscales for which the scores are calculated as the average score of the individual items within these subscales (these subscales are Intrinsic, extrinsic identified, Extrinsic introjected, Extrinsic external regulation, Amotivation, and the more overarching subscales controlled motivation and autonomous motivation, see also figure 1). The AMS is based on the conceptual framework of the Self-determination Theory and is used to differentiate between intrinsic and extrinsic motivation. In 1993 Vallerand et al studied the validity and reliability of the AMS to measure motivation (types).

Intrinsic Motivation Inventory (IMI)
The IMI, Intrinsic motivation inventory, was originally used by Ryan in 1982 to study intrinsic motivation and self-regulation in laboratory experiments. Later on, the IMI has also been used in educational settings (sports, dental education) to study psychometric properties in real practice. The IMI has several subscales, of which interest/enjoyment is considered the main self-report measure of intrinsic motivation. The subscale usefulness is considered relevant in the process of internalization, that drives the transition from controlled to autonomous motivation (see figure 1). Other subscales include perceived choice, perceived competence, effort, felt pressure and tension, and relatedness. Intrinsic motivation for this particular project was measured using the IMI-subscale subscale interest/enjoyment, usefulness and perceived choice, for which the questions are displayed below. Given the IMI is project/subject specific, it could only be measured in participants who participated, and was therefore measured after participation, see figure 2.

Using the scale (1–7), indicate to what extent each of the following items presently corresponds to your opinion 1: Not true at all. 4: Somewhat true. 7: Very true.

Table 1: Motivation questionnaires used in this study, items indicated with (R) are reverse scored items
During the pilot period between March and July 2013, 31 medical students (11 first-year, 10 third-year, and 10 fifth-year students) performed 31 consultations. The students performed the consultations in teams, and the individual students participated on average for two half-days (range 1–5). Cronbach’s alphas for reliability were 0.95, 0.92, and 0.59 for the IMI Interest, Usefulness, and Perceived Choice subscales, respectively (Figure 3). The reliability score for the Usefulness subscale was higher than that reported earlier [36]. Cronbach’s alphas for the reliability of the AMS subscale of Controlled Motivation, Autonomous Motivation and Amotivation were 0.86, 0.85, and 0.69, respectively, before participation and 0.86, 0.90, and 0.81, respectively, after participation (Figure 3). These reliability scores were consistent with those reported earlier [37, 38].

Participation outcomes on motivation
Twenty-nine students, out of which 25 were females, completed the IMI questionnaire (post-participation) about intrinsic motivation to participate in the LC-SRC (response rate 93.5%). They scored a mean of 6.20 (SD 0.67) on the Interest/Enjoyment subscale. The mean scores for the Usefulness and Perceived Choice subscales were 6.02 (SD 0.81) and 5.93 (SD 0.72), respectively (Table 2). We found no significant differences in the scores of the IMI-subscales between male and female students.
In 25 paired cases (80.6% of participants), of which 20 were female, motivation was measured with the AMS before and after participation. Intrinsic motivation for attending medical school was 5.37 (SD 0.69) before and 5.31 (SD 0.69) after LC-SRC participation (paired t-test p=0.532). Corresponding before and after scores were 3.98 (SD 1.01) and 4.23 (SD 1.03), respectively, for Controlled Motivation (paired t-test, p=0.055), 5.51 (SD 0.59) and 5.39 (SD 0.64) for Autonomous Motivation (paired t-test, p=0.217), and 1.21 (SD 0.42) and 1.20 (SD 0.40) for Amotivation (paired t-test, p=0.788) (Table 2). We found no significant difference on eventual change in motivation (before-after) within either the subgroups of male and female students or between the pre-clinical students (1st and 3rd year) and already clinical students (5th year).

**Participation and competence**

Twenty-seven students (response rate 87.1%) evaluated whether their CanMEDS competencies had improved (Likert scale 1–5, strongly disagree to strongly agree). Students considered that their proficiency in the CanMEDS competencies of “Collaborator”, “Communicator”, “Academic”, and “Medical expert” had improved after participation (Likert score ≥4.0). Faculty staff evaluated their clinical competence as being at a junior doctor level (Likert score 3.15 (SD 0.60) on mini-CEX at the team level) (Figure 4). Additionally, in the post-participation questionnaire three out of four supervisors reported that in their opinion the communication skills, medical knowledge, and clinical reasoning of the participating students had improved. The fourth supervisor doubted whether these proficiencies had improved. Half of the supervisors regarded it doubtful that the pharmacotherapeutic knowledge and skills of the students had improved after their participation, and the other two did think the students’ knowledge and skills had improved.

Table 3 shows the responses and comments of student participants, arranged by the categories identified during the analysis, based on the three psychological needs as described in the SDT, i.e. autonomy, competence, and relatedness. Twenty-nine students provided feedback, these responses reflected the students valued working together in teams and enjoyed the supervision (n=14) (relatedness), they valued their roles and opportunities in contributing to real patientcare (n=13) (autonomy), and they felt responsible and competent in the consultations, including the patient management/proposing a treatment plan (n=11) (autonomy and competence).
Correlations between motivation and competence improvement

Table 4 shows the Pearson correlations between motivation (subscale of IMI and AMS) with the effect sizes and perceived improvement in CanMEDS competencies. Strong positive correlations (defined as r=0.7 to 0.9)[39] were found between the IMI subscale Interest and the IMI subscale Usefulness (r 0.724; p<0.01), and between improvement in the CanMEDS competencies Communicator and Collaborator (r 0.713; p<0.01). Moderate positive correlations (r 0.4 to 0.6) [39] were found between the IMI subscale Interest and improvement in the CanMEDS competencies Medical Expert and Academic (0.522; p<0.01) (0.656 p<0.01), and between the IMI subscale Usefulness and all self-reported improvement in the CanMEDS competencies except Collaborator (r 0.401 to 0.672). Furthermore, multiple positive correlations (significant, moderate) were found between the perceived improvement in CanMEDS competencies (see Table 4).

Regression analysis

A regression analysis was performed to find out whether IMI-subscale Interest, Usefulness, and Perceived Choice affected Autonomous motivation. We found that the only IMI-subscale with a significant predictive effect was Perceived Choice (R² = 0.309, p=0.018), the effects of Interest (p=0.392) and Usefulness (p=0.708) were not significant.
DISCUSSION

In this study we investigated the different types of motivation and the proficiency in CanMEDS competencies of the participating students in our Learner-Centered Student-run Clinic (LC-SRC). Type of motivation was measured using the Academic Motivation Scale (AMS, both pre- and post-participation) and Intrinsic Motivation Inventory (IMI, after participation). CanMEDS competencies were evaluated by faculty using a mini-clinical examination and by the students themselves using a post-participation questionnaire.

Students were intrinsically motivated to participate in the LC-SRC project, which was based on the conceptual framework of learning by doing and SDT [16, 17]. While motivation for attending the medical school in general (which was already high) did not change during the study, the students’ intrinsic motivation for the LC-SRC was positively correlated with their perceived improvement in their CanMEDS competencies medical expert and academic. The faculty involved in the assessment considered that the student teams performed at a junior doctor level.

We found no significant difference on (change in) motivation between male and female participants on the AMS and IMI subscales. Previous studies did find different motivation profiles in males and females. In these studies males tend to have higher levels of controlled motivation, and lower levels of autonomous motivation and Relative Autonomous Motivation (RAM) [38, 43-45]. A possible explanation for this difference is the majority of female participants in this study and the small sample size. Therefore this study has a limited power to detect gender differences. The students perceived that their proficiency in CanMEDS competencies improved as a result of LC-SRC participation. Nevertheless, self-reported improvement is known to be biased and is poorly correlated with other performance measures [46]. However, the faculty in this study also reported that the students’ proficiency had improved, with specific improvement in communication with patients, medical knowledge, and clinical reasoning, and that the student teams of 1st, 3rd and 5th year students performed at the level of junior doctors. The last one is especially important because competence at the level of junior doctors is expected from the students only after they finish their medical study.

In the regression analysis of the correlations between motivation and perceived competence improvement, we found the main intrinsic motivation outcome, the IMI interest subscale, was positively correlated with the students’ perceived improvement in CanMEDS competencies medical expert and academic. The IMI-usefulness subscale which is important in self-regulation/ internalization, seemed to have stronger correlations with perceived competence improvement. The latter could be expected, if a student would think his/her competences improved he/she would be more likely to consider the project useful (and thus have a higher IMI usefulness score, and vice versa). Even though expected, an earlier study in dentistry students showed no significant correlation between the IMI usefulness score and their competence (unfortunately, the IMI interest subscale was not used) [36]. An interesting finding in the regression analysis was the weak/absent correlation between the AMS intrinsic motivation and IMI subscales, this finding suggests the IMI has additional value next to the AMS. A possible explanation for this difference is the IMI measures the intrinsic motivation for a particular topic, and the AMS measures this for medical education in general.
The study had some limitations. The main limitation was the sample size and study design (no control group). Other limitations included a social desirability- and observer bias (participants could give socially desirable answers while filling out questionnaires, and faculty were not blinded while scoring students). Furthermore there was a selection bias, such that highly enthusiastic students might have applied and consequently have been selected, as discussed previously [9]. This selection might have influenced the (intrinsic) motivation, knowledge, and skills assessed during this study. The selection-bias was unavoidable, given the LC-SRC is a voluntary extracurricular activity with real patients. Therefore, the results regarding the clinical competence and (unchanged) high levels of motivation cannot be extrapolated to non-selected medical students in general. In spite of these limitations, we think that this exploratory pilot study contributes to our knowledge of motivation and learning in a student-run clinic, and helps in designing future studies. Such future research (with a control group) is needed to determine whether prolonged participation in a SRC setting improves competence and motivation for medical education.

CONCLUSIONS

Students showed a high level of intrinsic motivation to participate in the LC-SRC and perceived an improvement in their competence. Furthermore their actual clinical competence was at junior doctor level in all CanMEDS competencies. We are of the opinion these competencies can be learned best in a setting similar to the future profession such as a LC-SRC, so that students are exposed to responsibility, real patient contact, and inter and intra disciplinary collaboration that is important to stimulate students’ intrinsic motivation. The LC-SRC offers an stimulating environment according to the theoretical framework based on the SDT. Together with the observed high levels of intrinsic motivation and the qualitative comments of the students in this study, this makes the LC-SRC an attractive place for learning.

DECLARATIONS:

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Ethics approval, consent to participate and Availability of data: See methods section. The datasets during and/or analysed during the current study available from the corresponding author on reasonable request.

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SUPPLEMENTARY MATERIAL

Additional Supporting Information may be found online in the supporting information tab for this article: Supplement 1: Supplement miniCEX CanMEDS competencies.pdf
REFERENCES


30. Intrinsic Motivation Inventory [IMI] [http://www.selfdeterminationtheory.org/questionnaires/10-questionnaires/50]


