

# The validity of the self-directed learning readiness instrument with the academic achievement among the Saudi medical students

Hamza Mohammad Abdulghani<sup>1</sup>, Noha Almndeel<sup>1</sup>, Afnan Almutawa<sup>1</sup>, Razan Aldhahri<sup>1</sup>, Maha Alzeheary<sup>1</sup>, Tauseef Ahmad<sup>1,2</sup>, Abdullah Alshahrani<sup>3</sup>, Ahmad Hamza<sup>3</sup>, Nehal Khamis<sup>1,4</sup>

<sup>1</sup>Department of Medical Education, College of Medicine, King Saud University, Riyadh, Saudi Arabia, <sup>3</sup>Department of Medical Education, College of Medicine, Imam Muhammad Bin Saud University, Riyadh, Saudi Arabia, <sup>2</sup>Department of Computer Science and Information Technology, NIMS University, Jaipur, Rajasthan, India, <sup>4</sup>Departments of Pathology and Medical Education, College of Medicine, Suez Canal University, Ismailia, Egypt

**Correspondence to:** Hamza Mohammad Abdulghani, E-mail: hamzaabg@gmail.com

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## ABSTRACT

**Background:** Self-directed learning (SDL) is very crucial for continuous professional development for all health-care professionals. **Objectives:** This study aims to measure the SDL readiness of the first clinical year medical students and its relation with their academic achievement. In addition, to examine the reliability and validity of SDL rating scales. **Materials and Methods:** This is a quantitative cross-sectional study involving the 3<sup>rd</sup> year medical students at a Saudi medical school. The level of SDL readiness was measured by a validated Fisher's scale which includes three subscales: Self-control (SC), self-management (SM), and desire for learning (DL), and student's academic achievement by their grade point average (GPA). The data were collected through a self-administered questionnaire and were analyzed using the Statistical Package for the Social Sciences. **Results:** High SDL scores were found to have a positive relationship with students' academic achievement. The overall mean score of Fisher's scale was  $156.73 \pm 15.85$ . The mean score of SC was  $61.2 \pm 6.4$  followed by the DL  $48.4 \pm 5.6$  and SM skills  $47.1 \pm 6.6$ . Factor analysis revealed that all three-factor models and individual subscales have an average to poor fit. **Conclusion:** The study results showed that the high SDL readiness score is directly proportional to students' academic achievement. The students were highly self-directed learners, but the study could not confirm that the current SDL model had a strong level of reliability and validity when tested with undergraduate level medical student's achievement by the GPA. Although the study confirmed that our students are self-directed learners, their time management skills need to be improved.


**KEY WORDS:** Academic Performance; Medical Students; Self-Directed Learning; Self-Directed Learning Readiness Scale; Undergraduate

## INTRODUCTION

Self-directed learning (SDL) is a very crucial aspect of the learning process. The challenging nature of health-care provision

and the rapid turnover rate of medical knowledge and skills require health-care professionals to gain SDL skills and become efficient lifelong learners.<sup>[1-4]</sup> There are many definitions for SDL, but one of the best is that by Knowles, who has defined it as: "A process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human, and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes."<sup>[5]</sup>

The SDL readiness is influenced by three factors: Self-management (SM), desire for learning (DL), and self-control

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(SC),<sup>[5]</sup> self-directed learners are quite independent individuals who can interpret, plan, create, and assess their learning.<sup>[6]</sup> SM focuses on task control skills including the achievement of learning targets and the determination of learning resources and support.<sup>[7]</sup> On the other hand, the DL provides learners with the motivation necessary for gaining knowledge and skills are required for the academic achievement.<sup>[6]</sup> The students' academic achievement can be defined as achieving a particular result in an assignment, examination, subject, or degree and is ordinarily expressed in terms of a numerical grade or grade point average (GPA).<sup>[8]</sup> A GPA is a number used by education institutions to represent the average value of the accumulated final grades earned in courses overtime.<sup>[9]</sup> The relationship between SDL and academic achievement has attracted many researchers interest in the past decade.<sup>[3,6,10]</sup> The relationship between SDL and academic achievement has been emphasized under the cognitive theory that SDL is acquired through an interaction between three important characteristics: Observation (monitoring one's actions), judgment (evaluation of one's performance), and reactions (one's response to performance outcomes or final GPA).<sup>[8,11]</sup> The previous studies have shown positive and good relationships between the use of SDL strategies and academic outcomes within traditional learning settings.<sup>[8]</sup> Medical students need to be self-directed learners to be able to define their goals, learning needs, resources, and strategies and to evaluate their results independently.<sup>[2,3]</sup> Despite the importance of SDL and its use as one of the essential educational methods for problem-based learning<sup>[12,13]</sup> and the fact that many students can avoid anxiety and stress if they have appropriate SDL skills.<sup>[2]</sup> An extensive literature review has shown a deficiency in SDL research in Saudi Arabia. Up to our knowledge, there has not been any reported research that studies the readiness of the Saudi medical students for SDL during the clinical years nor its relation to academic achievement. The only Saudi study that we retrieved investigated the 1<sup>st</sup> year medical students SDL readiness in this study, the students were not exposed to the strategies of SDL as they were novice students in the being of the medical school.<sup>[14]</sup> Therefore, we initiated this study to measure the SDL readiness among the 1<sup>st</sup> clinical year medical students who have learnt the SDL strategies through problem-based learning (PBL) systems and to investigate its relation to their academic achievement. Furthermore, we aim to examine the reliability and validity of SDL rating scale as applied in one of the Saudi medical colleges.

## MATERIALS AND METHODS

This is a quantitative cross-sectional design study and the participants were the 3<sup>rd</sup> year medical students. The 3<sup>rd</sup> year is the 1<sup>st</sup> clinical year after completing the problem-based learning program in the first 2 years of medical school where SDL as an essential educational method in the curriculum. At this level, students are required to put their study plan and

to select resources on their own.<sup>[15]</sup> Fisher's SDL readiness scale (SDLRS) was applied because it is a validated scale that has been used in many health profession studies including medicine.<sup>[2,16]</sup> This scale was originally developed by Fisher to measure SDL readiness of nursing students. However, SDLRS has also been used to assess medical student's readiness.<sup>[2,14,16]</sup> The SDLRS covers the three factors that determine the level of SDL readiness in students which are SM, DL, and SC.<sup>[3]</sup>

The questionnaire is composed of 45 questions in four main sections. The first section is about demographic data. It contains three closed-ended questions and two open-ended questions which include five attributes: Gender, age, GPA, and ID number. The second section consists of the first factor of Fisher's SDLRS, which is SC. It contains 15 closed-ended questions with a total score of 75. The third section consists of the second factor of Fisher's SDLRS that is SM. It contains 13 closed-ended questions, and its total score is 65. The last section consists of the third factor of Fisher's SDLRS which is DL. It contains 12 closed-ended questions with a total score of 60. The 5 points on the Likert scale of the Fisher indicate: 1 = strongly disagree, 2 = disagree, 3 = unsure, 4 = agree, and 5 = strongly agree. The total score ranges from 40 to 200 with a cutoff score of 150, where a score above 150 indicates a high level of SDL readiness while a score below or equal to 150 indicates a low level of SDL readiness. Reliability of Fisher's scale was previously determined by Cronbach's coefficient alpha ( $\alpha = 0.945$ ). The alpha coefficient on SM, DL, and SC was  $\alpha = 0.837$ ,  $\alpha = 0.809$ , and  $\alpha = 0.890$ , respectively.<sup>[17,18]</sup>

The data were collected by self-administered both paper-based and online questionnaires to improve the response of the students. The questionnaire was distributed among the 3<sup>rd</sup> year medical students manually and by e-mail in the period from December 1, 2017, to March 1, 2018.

Comprehensive sampling technique was used among the 3<sup>rd</sup> year medical students, where the online questionnaire link was sent by e-mail to all students. The participation was voluntary, and confidentiality was assured. A pilot study was done to test the survey's questions and time required to complete all questions. The paper-based questionnaire was also filled by the 13, 3<sup>rd</sup> year medical students. The students commented that the questions were clear and understandable. However, in the SM part, few students did not understand some terms. To avoid this misunderstanding, we added the Oxford dictionary definitions<sup>[19]</sup> of these words within the questionnaire. The study was approved by the Ethical Review Committee of the College of Medicine, King Saud University, Riyadh, Saudi Arabia.

## Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 21.0, and SPSS Amos 22.

One-way ANOVA test has been used to find the relation between academic achievement (GPA) and SDL readiness (SDLRS) score.

Confirmative factor analysis (CFA) was used for the evaluation of construct validity. This study investigated the fit of individual subscale models. *P*-value of Chi-square, the standardized root-mean-square residual (SRMR), the comparative fit index (CFI), and the parsimony goodness-of-fit index (PGFI) were calculated to determine and compare modal fit. The values of reference which we used are SRMR  $\leq 0.09$ , CFI  $\geq 0.90$ , and PGFI  $\geq 0.50$  (25) for test our model of CFA. The analysis of the results was tabulated in the form of mean and standard deviation for each item, as well as for total score and the three subscales to determine the most effective factor.

**Table 1:** Demographic distribution of the study respondents ( $n=204$ )

Variables	<i>n</i> (%)
Gender	
Female	115 (56.4)
Male	89 (43.6)
Age	
21–23	188 (92.1)
>23	16 (7.84)
Grade point average	
A+ (5–4.75)	84 (41.1)
A (4.75–4.50)	53 (26)
B+ (4.50–3.75)	64 (31.4)
B (3.75–2.75)	3 (1.5)

**Table 2:** Descriptive statistic, item-total correlation, and Cronbach's alpha of the self-control readiness scale

Item	Mean±standrad deviation	Corrected item-total correlation	Cronbach's alpha if item deleted
I am able to focus on a problem	3.9±0.7	0.54	0.863
I prefer to set my own learning goals	4±0.8	0.47	0.864
I am responsible	4.2±0.8	0.58	0.862
I have high personal standards	4.3±0.7	0.47	0.864
I have high personal expectations	4.2±0.8	0.47	0.864
I have high beliefs in my abilities	4.2±0.8	0.2	0.869
I am aware of my own limitations	3.9±0.81	0.43	0.865
I am logical	4±0.9	0.43	0.865
I evaluate my own performance	3.9±0.9	0.4	0.865
I prefer to set my own criteria on which to evaluate my performance	3.8±0.9	0.379	0.866
I am responsible for my own	4.4±0.6	0.56	0.864
I can find out information about myself	4.2±0.81	0.54	0.863
I like to make decisions for myself	4.3±0.7	0.4	0.866
I prefer to set my own goals	4.3±0.7	0.54	0.863
I am not in control of my life	3.6±1.1	-0.23	0.881

Overall mean±standrad deviation of self-control 61.2±6.4;  $\alpha=0.787$

## RESULTS

A total of 317 questionnaires were distributed to all the 3<sup>rd</sup> year medical students and 204 (64.4%) of them responded. Out of the 204 respondents, 90 (43.9%) were male and 115 (56 %) were female. The total number of responding students in the age groups of 21–23 years was 188 (92.1%) and the number of responding students in the age groups of >23 years was 16 (7.84%) and their GPA score is shown in Table 1.

The highest score reported from the three subscales was for the SC subscale ( $61.2 \pm 6.4$ ) followed by the DL ( $48.4 \pm 5.6$ ) and the SM ( $47.1 \pm 6.6$ ). The mean score and standard deviation for each item of the three subscales are summarized in Tables 2-4. The overall mean score of SDLRS for medical students participating in the study was  $156.73 \pm 15.85$ .

Table 5 shows the results of the CFA. Overall, for the all three-factor (SC, SM, and DL) model, the Chi-square value was 2980 ( $P < 0.001$ ), indicating an average fit between the original model and the data. Further, analysis of the all three model SRMR = 0.091, CFI = 0.63, and PGFI = 0.68 and the reliability was 0.869. The basis of all values in the three-factor model showed an average to a poor fit to the data. The fit indices of the SC subscale were SRMR = 0.081, CFI = 0.68, and PGFI = 0.74 and the reliability was 0.787. The fit indices of the SM subscale were SRMR = 0.071, CFI = 0.74, and PGFI = 0.77 and the reliability was 0.615. The fit indices of the DL subscale were SRMR = 0.069, CFI = 0.79, and PGFI = 0.76 and the reliability was 0.733. Based on the results of these indices, all the individual subscale models showed comparatively better good fit than the all three factors model.

**Table 3:** Descriptive statistic, item-total correlation, and Cronbach's alpha of the self-management readiness scale

Item	Mean±standrad deviation	Corrected item-total correlation	Cronbach's alpha if item deleted
I solve problems using a plan	3.7±1	0.4	0.865
I priorities my work	3.9±0.9	0.46	0.864
I do not manage my time well	2.9±1.1	-0.22	0.881
I have good management skills	3.4±0.8	0.48	0.864
I set strict time frames	3.2±1	0.36	0.866
I prefer to plan my own learning	3.9±0.8	0.47	0.864
I am systematic in my learning	3.8±0.8	0.51	0.863
I am confident in my ability to search out information	4.1±0.8	0.484	0.864
I set specific times for my study	3.6±1	0.32	0.867
I am self-disciplined (controlled behavior)	3.8±0.9	0.37	0.866
I am disorganized	3.3±1.1	-0.17	0.879
I am methodical (established procedure)	3.5±0.8	0.39	0.866
I can be trusted to pursue (follow) my own learning	3.9±0.8	0.46	0.864

Overall mean±standrad deviation of self-management 47±6.6;  $\alpha=0.615$

**Table 4:** Descriptive statistic, item-total correlation, and Cronbach's alpha of the desire for learning readiness scale

Item	Mean±standrad deviation	Corrected item-total correlation	Cronbach's alpha if item deleted
I need to know why	4.3±0.8	0.54	0.863
I critically evaluate new ideas	3.8±0.8	0.45	0.864
I learn from my mistakes	4.2±0.8	0.46	0.864
I am open to new ideas	4.2±0.8	0.51	0.863
When presented with a problem I cannot resolve, I will ask for assistance	3.6±1.1	0.10	0.873
I like to evaluate what I do	3.9±0.9	0.45	0.864
I do not enjoy studying	3.2±1.2	-0.18	0.880
I have a need to learn	4.2±0.8	0.40	0.866
I enjoy a challenge	4±1	0.44	0.864
I want to learn new information	4.4±0.7	0.59	0.863
I enjoy learning new information	4.3±0.7	0.53	0.864
I like to gather the facts before I make a decision	4.4±0.6	0.53	0.864

Overall mean±standrad deviation for desire for learning 48.4±5.6;  $\alpha=0.733$

**Table 5:** Model fit statistics for confirmative factor analysis of students perception ( $n=204$ )

Variable	Chi-square	Chi-square df	P-value	SRMR	CFI	PGFI	Cronbach's alpha
Self-control	797.13	105	<0.001	0.081	0.68	0.74	0.787
Self-management	609.35	78	<0.001	0.071	0.74	0.77	0.615
Desire for learning	650.28	66	<0.001	0.069	0.79	0.76	0.733
Three-factor model	2980.32	780	<0.001	0.091	0.63	0.68	0.869

df: Degrees of freedom, SRMR: Standardized root-mean-square residual, CFI: Comparative fit index, PGFI: Parsimony goodness-of-fit index

Table 6 those students have good academic grade it's also have good SDL readiness scores. Eighty-four (41.1%) of the students with Grade A+ have the highest mean score in all three subscales ( $160.5 \pm 14.1$ ). Moreover, students with Grades A and B have high SDL readiness with mean scores equal to  $156.6 \pm 14.5$  and  $152.4 \pm 17.9$ , respectively. Only 3 (1.5%) students with Grade B have low SDL readiness with a mean score equal to  $140 \pm 5.6$ .

## DISCUSSION

This study is considered, up to our knowledge, the first local study that sheds light on the SDLRs of the medical students in their 1<sup>st</sup> clinical year of the undergraduate program of medicine, KSU. In addition, it is one of the few studies<sup>[14,16]</sup> that used the scale of Fisher on medical students. An important finding that the study showed that high



**Table 6:** Comparison of mean values of self-directed learning readiness score in relation to GPA categories

GPA	Self-control	Self-management	Desire for learning	Total
A+ (5–4.75)	62.6 (5.8)	48.6 (6.4)	49.3 (5)	160.5 (14.1)
A (4.75–4.50)	60.9 (6.2)	47.4 (5.8)	48.3 (5.3)	156.6 (14.6)
B+ (4.50–3.75)	60 (7)	44.9 (7)	47.5 (6.6)	152.4 (17.9)
B (3.75–2.75)	53.7 (6.7)	42.7 (2.5)	43.7 (1.5)	140 (5.6)

GPA: Grade point average

SDLRs is directly proportional to the students' academic achievements among the subset of Saudi medical students that we investigated. Although the study confirmed that the students are self-directed learners, their time management skills need to be improved. The study also could not confirm that the current SDL model has a strong level of reliability and validity when applied to undergraduate level medical students.

The current study investigated the association between academic achievement and level of SDL readiness. The current study findings agree with studies in literature<sup>[3,6]</sup> which revealed a significant correlation between high academic achievement and high SDLRs. In the current study, students with GPA of highest scores (A+ and A) possessed high SDL readiness ( $160.5 \pm 14.1$  and  $156.6 \pm 14.6$ , respectively). Furthermore, students with a B+ grade scored high SDLRs ( $152.4 \pm 17.9$ ). This correlation might have been influenced by the curriculum design in university where SDL activities are used as one of the important educational methods to achieve the PBL course objectives. In the current study, the mean score of SDLR was  $156.7 \pm 15.85$  with mean scores of subscales; SM, DL, and SC were, respectively,  $47.1 \pm 6.6$ ,  $48.4 \pm 5.6$ , and  $61.2 \pm 6.4$ . This is slightly higher than the results reported from some of the studies investigating nursing students SDLR in other countries.<sup>[16]</sup> A study conducted on medical students in Pakistan, found that the mean of the SDLR subscales was 47.9, 47, and 58.2 on SM, DL, and SC, respectively, while the mean of the total score of SDLRs was 153.2.<sup>[18]</sup> Similarly, in a study showed<sup>[2]</sup> the total SDLRs among Australian undergraduate nursing students to be 150.55 and its three subscales, SM, DL, and SC scores, were 44.26, 47.31, and 58.98, respectively.<sup>[2]</sup> On the other hand, our SDLR mean score results were slightly lower than the earlier reports in literature<sup>[6,20]</sup> (159.60 and 162.5, respectively). This could be attributed to their use of larger sample size.<sup>[6,20]</sup> As stated in earlier that the scores higher than 150 are considered to lie in the category of high SDL, while scores that are  $\leq 150$  are within the category of low SDL.<sup>[2]</sup> In this current study, high readiness was found among 66% of the students. An international study referred that 60.2% of the students showed an SDL mean score above 150.<sup>[16]</sup> A study that was carried out in South India on the fifth-semester MBBS students revealed that only 30% of the students were in the high readiness category, the authors stated that their results were the lowest among literature.<sup>[21]</sup> This proportion variance could be due to the differences between the curricula and

practicing of SDL strategies through the implementation of PBL program.<sup>[16]</sup> The current study, the participating medical students scored higher in the SC subscale more than the DL and SM subscales. This could be interpreted that students are capable of handling problems and setting their own learning goals. Similar findings were reported by different studies investigating nursing and medical students.<sup>[6,14,16,17]</sup> On the other hand, SM was recorded as the lowest subscale. This could indicate that students might be facing difficulties with the time budgeting, acquiring organizational and planning skills, and using a methodological style for the learning process. In concordance, with this, the results of the present study showed that 40% of the students are struggling with managing their time. Time management skills of the students need to be enhanced. Attending extracurricular sessions which aim to improve time management,<sup>[22]</sup> training on using online study, and SM plans and mentorship are among the methods that can be used; this is in addition to putting more emphasis on the learning skills and professionalism courses which are given to students in the preclinical years.<sup>[14]</sup> Furthermore, students should be aware of the impact of time scheduling on the academic-induced stress. Meanwhile, faculty must participate in seminars that assert the importance of time prioritization.<sup>[22,23]</sup> Similar to several studies,<sup>[6,13,19,24]</sup> our findings observed no significant gender difference in SDLR scores as obtained among males and females students. However, one Indian study<sup>[21]</sup> showed that males scored higher in SDLR than females. The overall reliability of the application of the SDLRs to the Saudi students was average to good. Cronbach's alpha esteems showed average to good interior consistency between the three-factor model and every one of the three subscales. In the meantime, the model with the bigger number of items had a tendency to have higher Cronbach's alpha values. Therefore, it is conceivable that the real Cronbach's alpha values could be lower. The items "I am not in control of my life" (SC); "I do not have management skills," "I am disorganized" (SM); and "I do not enjoy studying" (DL) demonstrated a low item-to-total correlation. The differences of the interpretations from the student's side might weaken the single item-total correlation. The general validity of the application of the SDLRS to the Saudi medical students was not very much strong. Regarding CFA, the authors attained the only average to poor fit model fit indices. This could be related to sample size or the college testing strategies. However, the SRMR was good in all three-factor model, but at the individual model level (SC, SM, and DL), it was average. It is also evident that its values were not

touched with the cutoff value to affect the judgment of the absolute fit to the data. Consequently, the reason for average to poor fit indices might have resulted from a lack of fit with Saudi medical undergraduate level students in the context of the SDLS or the factor structure, rather than sample size or the sampling approach. Meanwhile, since not all fit lists indicated normal fit, these findings are not really which can be denied or challenged.

### Limitation

A limitation of the current study is that the study was carried out in only one institution which is the College of Medicine. This limits the external validity of our results. Although the response rate in this study was 64.4% which is concordant with student's response rates reported in literature, yet we expected to reach a higher rate as we distributed the questionnaire all over the batch using two means; paper and online forms.

### Recommendation

For the future, we recommend the conduction of multi-institutional studies to allow generalization of the findings to Saudi undergraduate medical students. Studies using different educational study level, with consideration of the confounding factors that affect the correlation between SDL and students' performance (e.g., those related to the curriculum and psychometrics of the examinations), are also highly recommended.

### CONCLUSION

The study results clearly showed that the high SDL readiness score is directly proportional to students' high academic achievement. The students were highly self-directed learners, but the study could not confirm that the current SDL model had a strong level of reliability and validity when tested with undergraduate level medical student's achievement by the GPA. Although the study confirmed that our students are self-directed learners, their time management skills were poor and need to be improved.

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