

Chapter 7

The Effect of Self-concept on Student Achievement

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7.1 Introduction

Individuals who appear to be similar to each other may have different thoughts about themselves and may exhibit different behaviors depending on how they perceive themselves and on their beliefs about what they can achieve (Bong and Skaalvik 2003). This belief of the individuals about their personality, roles, skills and relationships with other individuals is called self-concept. In the most general sense, self-concept refers to people's perceptions about themselves. There are different conceptualizations of self-concept in the literature. McInerney et al. (2012) emphasized the way individuals perceive their own strength and weaknesses, skills, attitudes and values, whereas Wang and Lin (2008) considered self-concept as a sense of confidence that individuals feel about themselves and as an important factor for predicting success or failure in academic duties. In this context, self-concept is related to individuals' personal perceptions about their own academic abilities or skills, it is usually developed through experience and through an interpretation of the learning environment, and it is seen as one of the most important factors in learning (Marsh and Martin 2011). Shavelson et al. (1976) have divided self-concept into two categories: academic self-concept and non-academic self-concept. Based on this, they linked academic self-concept with particular subject areas (e.g., English, history, math and science), and they further divided non-academic self-concept into three categories, namely social, emotional and physical self-concept. Among these categories, academic self-concept is the most common one in educational environments. Academic self-concept can be defined as the individuals' perceptions, feelings and perspectives about their academic skills

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and it reflects their beliefs about a certain intellectual or academic environment (Lent et al. 1997). One of the most common definitions of academic self-concept is the individual's way of showing his/her skills mentally in school or in academic environments (Brunner et al. 2010).

Many researchers have supported that academic self-concept plays a central role in the academic achievement and adaptation of the students; therefore, researching how students develop their academic self-concept and its effect on achievement are becoming more important (Wouters et al. 2015). A major problem, however, is the direction of the relationship between these two concepts. In other words, does academic self-concept affect academic achievement or the vice versa? The review of the literature on self-concept revealed three major models about the relationship between academic self-concept and academic achievement. The first model is the self-enhancement model which assumes that academic self-concept affects academic achievement. According to this model, academic achievement can be increased by eliminating negative feelings and situations about individuals' own selves (Marsh and Scalas 2011). The second model is the skill development model which assumes that academic achievement affects academic self-concept. According to this model, the academic self-concept of students can be improved by improving their academic skills. Marsh (1990) criticized these two models and suggested the reciprocal effects model which emphasizes that there is a reciprocal relationship between self-concept and academic achievement. According to this model, the relationship between academic self-concept and academic achievement is reciprocal and mutually reinforcing.

The presence of a reciprocal relationship between academic self-concept and academic achievement has been a source of inspiration for scientific debates, numerous theoretical models and many experimental works (Retelsdorf et al. 2014). The review of these studies shows that there is a strong relationship between academic self-concept and academic achievement (Areepattamannil 2012a; Fryer 2015; Hansford and Hattie 1982; Huang 2011; Iroegbu 2013; Marsh and Hau 2004; Marsh and Martin 2011; Möller and Pohlmann 2010; Skaalvik and Skaalvik 2004; van den Berg and Coetzee 2014; Wang and Lin 2008; Yoshino 2012). This reciprocal relationship between self-concept and achievement shows that self-concept and achievement are the predictors and outcomes of the learning process (Fryer 2015). In addition to the works that directly examine the relationship between these two concepts, the studies that focus on the moderator role of these variables are also interesting. In this context, Areepattamannil (2012b) examined the moderator role of academic motivation in the relationship between school self-concept and school achievement; he found that for Indian immigrant adults in Canada both intrinsic and extrinsic motivations play a moderator role in the relationship between school self-concept and school achievement; however, for Indian adults in India intrinsic motivation is the only moderator variable in this relationship. Similarly, Khalaila (2015) and Areepattamannil (2012a) emphasized that academic self-concept was one of the most important variables that motivated students, and they underlined that it was an important factor for improving

achievement. In this context, supporting students' achievement and improving their academic self-concept are perceived as interwoven components of formal education, and self-concept is considered as an important factor for predicting future achievement (Fryer 2015). In other words, examining the reciprocal relationship between these two concepts and making relevant deductions are important for improving students' academic self-concept and increasing their academic achievement.

This study investigated the effect of self-concept on student achievement. Additionally, the factors that are thought to affect the average effect size obtained in the study were set as moderators. These are (i) the publication year of the research, (ii) the publication type of the research, (iii) the country (culture) where the research was carried out, (iv) the course in which the achievement was measured, and (v) school level. All these variables, along with the results of previous studies, were used to test the following hypotheses of this study:

H₁ Self-concept has a positive effect on student achievement.

H₂ School subject or assessment type is a moderator for the positive effect of self-concept on student achievement.

H₃ Country (culture) in which the study was conducted is a moderator for the positive effect of self-concept on student achievement.

H₄ Publication year of research is a moderator for the positive effect of self-concept on student achievement.

H₅ Publication type of research is a moderator for the positive effect of self-concept on student achievement.

H₆ School level is a moderator for the positive effect of self-concept on student achievement.

7.2 Method

7.2.1 Study Design

In this study, the effect of self-concept on student achievement was tested with a meta-analysis design.

7.2.2 Review Strategy and Criteria for Inclusion/Exclusion

To determine the research studies to include in the meta-analysis, the Science-Direct, Proquest and Ebsco academic databases were used to conduct a literature review. For this process, the terms *self-concept* and *student achievement/student success* included in the titles of the studies were used to screen the research studies. The deadline for the research studies included in the research was identified as January 2016. Doctoral dissertations and peer-reviewed journals were included in the study.

Many strategies were used to identify the research studies that were appropriate for the meta-analysis of the study. First, a research study pool (962 research studies) was established; it included all studies with self-concept and student achievement/success in their titles. The studies which were obtained, limited to years 2005–2015. The abstracts of these studies were reviewed, and 191 research studies were found to be appropriate to include in the study. In the second stage, abstracts of research studies were examined in detail. The results of the examination found that 123 of the research studies in the pool were appropriate, and 65 were not found to be appropriate. The descriptive statistics of the 123 research studies included in the analysis are presented in Table 7.1.

The criteria for inclusion of the research studies in the analysis study were identified as follows:

- To have the statistical information necessary for correlational meta-analysis (n and r , or R^2 values)
- To be a study measuring the correlation self-concept and student achievement/success

Reasons for not including a research study in the meta-analysis:

- Having no quantitative data (qualitative research)
- Not having a correlation coefficient
- Not focusing on student achievement
- Not focusing on self-concept.

7.2.3 Coding Process

The coding process was essentially a data sorting process used to ascertain which data were clear and suitable for the study. In this scope, a coding form was developed before the statistical analysis was conducted, and the coding was conducted according to the form. The main aim was to develop a specific coding system that allowed the study to see the entirety of the research studies in general and that would not miss any characteristics of each individual research study. The coding form developed in the study was comprised of:

Table 7.1 Characteristics of the studies included in the meta-analysis

Options		1	2	Total
Publication year		2005–2009	2010 and beyond	–
	n	57	66	123
	%	46.4	53.6	100
Publication type		Dissertations	Articles	
	n	36	87	123
	%	29.3	70.7	100

- References for the research
- Sample information
- Publication types and years of studies
- School subject or assessment type
- Methodological information
- Quantitative values.

7.2.4 *Statistical Processes*

The effect size acquired in meta-analysis is a standard measure value used in the determination of the strength and direction of the relationship in the study (Borenstein et al. 2009). Pearson's correlation coefficient (r) was determined to be the effect size in this study. Because the correlation coefficient has a value between $+1$ and -1 , the r value calculated was evaluated by converting this value into the value as it appears in the z table (Hedges and Olkin 1985). Provided that more than one correlation value is given between the same structure categories in correlational meta-analysis studies, two different approaches are used in the determination of the one to be used in the meta-analysis (Borenstein et al. 2009; Kulinskaya et al. 2008). For this study, (i) first, if the correlations were independent, all the related correlations were included in the analysis and were considered to be independent studies, and (ii) if there were dependent correlations, then the *highest correlation value* were accepted. A *random effect model* was used for the meta-analysis processes in this study. The *Comprehensive Meta-Analysis* program was used in the meta-analysis process.

7.2.5 *Moderator Variables*

To determine the statistical significance of the differences between the moderators of the study, only the Q_b values were used. Four moderator variables that were expected to have a role in the average effect size were identified in the study. The first of these considered is *the publication year of research* as a moderator in regards to the relationship between self-concept and student achievement. The second is the *publication type*. The rest are the *country (culture)* in which the study conducted *school subject/assessment type* and *school grade*.

7.2.6 *Publication Bias*

A funnel plot for the research studies included in the meta-analysis of can be seen in Fig. 7.1. Evidence that publication bias affected the research studies included in the meta-analysis can be seen in Fig. 7.1. A serious asymmetry would be expected in

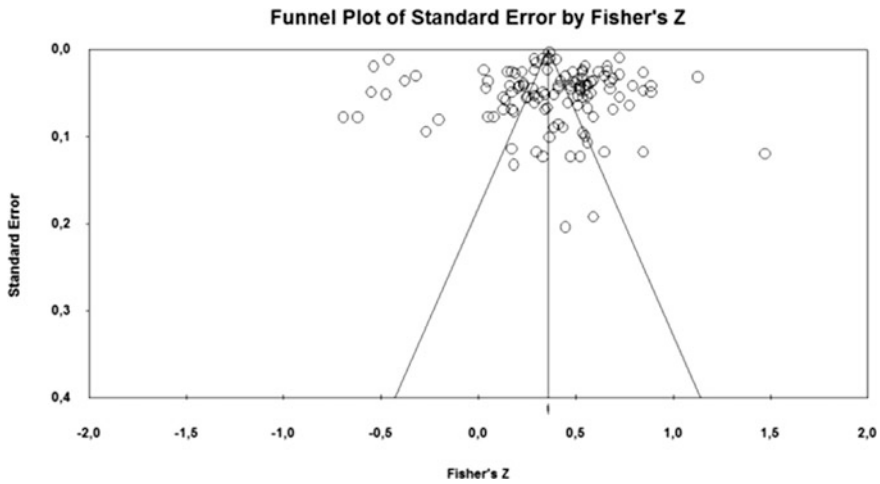


Fig. 7.1 Effect size funnel for publication bias

Table 7.2 Duval and Tweedie’s trim and fill test results

	Excluded studies	Point estimate	CI (confidence interval)		Q
			Lower limit	Upper limit	
Observed values		0,34	0,33	0,34	6268.02*
Corrected values	0	0,34	0,33	0,34	6268.02*

* $p < .05$

the funnel plot if there were a publication bias. The concentration of plots on one side under the line of average effect size, particularly in the bottom section of the funnel, suggests the probability of a publication bias in the research studies. In this study, no evidence of partiality of the publications was observed in any of the 123 data subjected to meta-analysis

Although no partiality in publications was observed in the funnel plot, the results of Duval and Tweedie’s trim and fill test, which was applied to determine the effect of partiality in publications acquired with the meta-analysis using the random effect model, are given in Table 7.2. As is seen in Table 7.2, there is no difference between the effect observed and the artificial effect size created to fix the effect of the partiality of publications. The research on each side of the center line is symmetrical, and this is the indicator of non-difference. Because there is no evidence indicating lost data on either side of the center line, the difference between the fixed effect size and observed effect size is zero.

7.3 Findings

The results of the meta-analysis about the relationship between self-concept and student achievement are displayed in Table 7.3. The findings supported hypothesis H1 which formulated that there is a positive relationship between self-concept and student achievement. The effect size of self-concept on student achievement was calculated as .38, which showed that self-concept had a medium level effect (see Cohen 1988) on student achievement.

The first moderator analysis did not support hypothesis H2 which stated that the course in which the achievement was measured has an effect on student achievement. Although the effect size differences were not found to be statistically significant, ($Q_b = 4.34, p > .05$) the effect of self-concept was low on language using ability [$r = .30$] and medium on cumulative point average [$r = .36$], mathematics [$r = .41$], English [$r = .41$], reading ability [$r = .41$] and chemistry [$r = .43$]. According to this moderator analysis, among the various courses the highest effect size of self-concept on student achievement belonged to music [$r = .51$].

The findings did not support hypothesis H3 which formulated that the culture where the research was carried out plays a moderator role in the effect of self-concept on student achievement. Although the effect size differences were not found to be statistically significant ($Q_b = 3.49, p > .05$) self-concept had a medium level significant effect on achievement in both horizontal-individualistic cultures [$r = -.36$] and vertical-collectivist cultures [$r = .43$].

The findings did not support hypothesis H4 which stated that the publication year of the studies plays a moderator role in the effect of self-concept on achievement. Although the effect size differences among the publication years of the studies were not found to be statistically significant ($Q_b = .09, p > .05$) for the studies conducted between 2005 and 2009 [$r = .39$] and from 2010 onwards [$r = .38$] the effect of self-concept on student achievement was medium and statistically significant.

The findings supported hypothesis H5 which formulated that the publication type plays a moderator role in the effect size of self-concept on student achievement. While the effect size difference between the publication types was found to be statistically significant ($Q_b = 18.08, p < .05$) the effect of self-concept on student achievement was at a low level for articles [$r = .27$] and at a medium level for dissertations [$r = .42$].

The findings supported hypothesis H6 which formulated that the school level plays a moderator role in the effect of self-concept on achievement. The effect size differences among school levels were statistically significant ($Q_b = 12.5, p < .05$). In particular, while the effect of self-concept on student achievement was at a low level and significant for elementary schools [$r = .30$] the effect was at a medium level and significant for high schools [$r = .36$], secondary schools [$r = .39$], universities [$r = .43$] and for mixed groups [$r = .32$] which included more than one education level.

Table 7.3 Findings of the correlations between self-concept and student achievement: Results of the meta-analysis

Variables	k	N	r	CI (confidence interval)		Q	Q _b
				Lower limit	Upper limit		
Self-concept	123	223.068	.38*	.35	.41	6268.02*	
Moderator [course]							4.34
GPA	50	38.754	.36*	.31	.42		
Mathematic	32	128.009	.41*	.35	.48		
English	15	16.230	.41*	.31	.50		
Reading ability	6	4435	.41*	.25	.55		
German	5	3848	.32*	.14	.48		
Science	3	3077	.33*	.09	.53		
Physical education	2	2262	.26	-.03	.52		
Chinese	2	1862	.39*	.10	.61		
Language using ability	2	889	.30*	.00	.55		
French	2	873	.34*	.05	.58		
Biology	1	7413	.34	-.07	.65		
Physics	1	7413	.38	-.02	.67		
Chemistry	1	7413	.43*	.03	.71		
Music	1	590	.51*	.12	.76		
Moderator [country]							3.49
Vertical-collectivist	33	31.087	.43*	.37	.48		
Horizontal individualistic	90	191.981	.36*	.33	.40		
Moderator [publication year]							0.09
2005–2009	57	34.031	.39*	.34	.43		
2010 and beyond	66	189.037	.38*	.34	.42		
Moderator [publication type]							18.08*
Dissertation	87	212.850	.42*	.39	.45		
Article	36	10.218	.27*	.21	.33		
Moderator [school level]							12.5*
Secondary	43	65.310	.39*	.34	.44		
High	29	132.814	.36*	.30	.43		
Elementary	25	10.092	.30*	.23	.37		
University	18	6487	.43*	.35	.50		
Mixed	8	8365	.52*	.41	.61		

* $p < .05$

7.4 Conclusion

This meta-analysis which aimed to determine the effect size of self-concept on student achievement included 123 studies. In this study, publication year, publication type, the country (culture) where the research was carried out, the course in which the achievement was measured and the level of education were taken as moderator variables. The meta-analysis results obtained from the study showed that self-concept had a medium level positive effect on student achievement. This finding supports the view in the literature that self-concept is associated with student achievement (Areepattamannil 2012a; Fryer 2015; Hansford and Hattie 1982; Huang 2011; Iroegbu 2013; Marsh and Hau 2004; Marsh and Martin 2011; Möller and Pohlmann 2010; Skaalvik and Skaalvik 2004; van den Berg and Coetzee 2014; Wang and Lin 2008; Yoshino 2012). It is possible, therefore, to conclude that self-concept is an important factor for increasing student achievement as well as for predicting it (Fryer 2015).

The findings of moderator analysis showed that the effect size differences among the courses in which the achievement was measured were not statistically significant. On the other hand, it was observed that self-concept had a significant low level effect on language using ability [$r = .30$] and a medium effect on cumulative point average [$r = .36$], mathematics [$r = .41$], English [$r = .41$], reading ability [$r = .41$], and chemistry [$r = .43$]. According to this moderator analysis, the highest effect size of self-concept on student achievement among the various courses belonged to music [$r = .51$]. The above results regarding self-concept and academic achievement of students confirm the findings from the current literature. In particular, it is argued in the literature that self-concept is positively associated with language using ability (Fryer 2015), chemistry (Jansen et al. 2014), cumulative point average (Areepattamannil and Freeman 2008; Areepattamannil 2012b; Bell 2005; Marsh et al. 2006), mathematics (Abu-Hilal and Nasser 2012; Areepattamannil 2012a; Yoshino 2012), English (Noureen and Naz 2011b; Pinxteen et al. 2010), reading ability (Förster and Souvignier 2014; Guich 2007) and music (Ruismaki and Tereska 2006).

The effect size difference of the country (culture) was not statistically significant. The effect of self-concept on student achievement was at a medium level and statistically significant in both horizontal individualistic [$r = -.36$] cultures and vertical-collectivist cultures [$r = -.43$]. In other words, the relationship between self-concept and student achievement is reciprocal and mutually reinforcing both in extremely individualistic cultures, such as Canada (Areepattamannil 2012a; Guay et al. 2010; Roy et al. 2015) and Germany (Bakadorova and Raufelder 2014; Förster and Souvignier 2014; Marsh et al. 2006) and in extremely collectivistic cultures, such as China (Chen et al. 2013; Zhou et al. 2015) and Hong Kong (Fong and Yuen 2009; McInerney et al. 2012). Therefore, an educator should realize that the relationship between self-concept and student achievement will not function similarly for students coming from different cultural backgrounds and ethnic origins and he should act accordingly (McInerney et al. 2012).

As a result of the moderator analysis performed according to publication year, the effect size differences between self-concept and student achievement were not statistically significant. However, in the studies conducted between 2005 and 2009 [$r = .39$] and from 2010 onwards [$r = .38$] the effect of self-concept on student achievement is medium and statistically significant. Considering that the values of the effect sizes are close to each other, it is possible to conclude that the relationship between self-concept and student achievement is at the focus of the studies for a long time. The analysis of the effect sizes according to publication type showed that the effect of self-concept on student achievement varied for articles and dissertations. While there was a low level effect for articles [$r = .27$] the effect was significant and at a medium level for dissertations [$r = .42$].

Concerning the school level on which the studies focused, findings showed that the effect size differences among education levels were statistically significant. In particular, the effect of self-concept on student achievement is low for elementary schools [$r = .30$] and medium for high schools [$r = .36$], secondary schools [$r = .39$], universities [$r = .43$] and for mixed level schools [$r = .52$]. These findings overlap with the study of Skaalvik and Skaalvik (2009) which analyzed the moderator effect of self-concept and self-efficacy on academic achievement. The researchers of this study tested the hypothesis that students' self-concept is an important prerequisite of learning and achievement, and they concluded that self-concept has a strong effect on academic achievement at successive education levels.

The results about the effect of self-concept on student achievement are summarized as below:

- Self-concept has a medium level positive effect size [$r = .38$] on student achievement.
- Regarding the moderator variables, the country (culture) where the research was carried out, the course in which the achievement was measured and publication year do not play a moderator role in the effect size of self-concept on student achievement, whereas publication type and school level play a moderator role in the effect size of self-concept on student achievement.

Based on the results obtained from this study, it is concluded that there is a strong relationship between self-concept and academic achievement, and these two concepts mutually reinforce each other in educational environments. The finding that students who feel themselves more confident in a certain topic or in a certain course will get better results than other students makes academic self-concept one of the most effective predictors of academic achievement and other desired educational outcomes (OECD 2003). In this context, families, teachers and advisors should focus on improving students' self-concept and academic achievement, and at the same time programs developed for improving self-concept and academic skills should be integrated into the education (Huang 2011). As Marsh and Craven (2006) have argued, considering these two concepts separately would lead to only short-term achievements and reduce the effectiveness of education programs.

Accordingly, this meta-analysis study is important in terms of revealing that the studies focusing on the relationship between self-concept and student achievement should be deeply examined. Therefore, in order to examine the effect of self-concept on academic achievement, it is suggested that further qualitative studies and comparative meta-analysis studies should be conducted.

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- Note.* “*” References marked with an asterisk indicate studies included in the meta-analysis. The in-text citations to studies selected for meta-analysis are not followed by asterisks.
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