# Chapter 3
# The Effect of Motivation on Student Achievement

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## 3.1 Introduction

The concept of motivation is considered as a crucial factor that affects human behavior and performance (Kian et al. 2014; Turan 2015). Especially educational researchers and practitioners express that motivation is one of the most important factors in student achievement and in ensuring continuious achievement (Alkış 2015; Aluçdibi and Ekici 2012; Guay et al. 2010; Pintrich 2003; Pintrich and Schunk 2002). Lin (2012) describes motivation as intrinsic desires which are already present in the individual or which are reflected in the individual while acquiring new information and learning. There are, however, in the literature other definitions of motivation; the latter word was derived from the word "movere" that means moving in Latin (Seiler et al. 2012). In this regard, according to Ertem (2006), motivation is an inner state uncovering individuals' behavior and directing them to these behaviors; however, according to Baumeister and Vohs (2007), it is a state where the individual displays various attitudes voluntarily in order to achieve a certain goal. Küçüközkan (2015) defined motivation as the sum of the efforts made for mobilizing the individual towards one or more particular goals and for ensuring the continuity of this movement, whereas according to Waterman (2005) it is a force representing the internal factors initiating the movements that should be performed to fulfill a need and the external factors that encourage this behavior. To summarize, there are three important factors in the concept of motivation. *(i)* Triggering the behavior of the individual that is required for a certain goal; *(ii)* guiding this behavior; and *(iii)* the internal state that initiates and guides this behavior.

The urge of satisfying the needs of the individual is the main source of motivation. In addition, many concepts, such as interest, values, attitude and desire of

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the individual towards an action, affect the process of motivation as well (Akpur 2015). Therefore, motivation has a multi-dimensional structure instead of a simple and basic one. In this regard, each individual may have a different amount of motivation. Deci and Ryan (2002) examined three categories of motivation that affects achievement:

*(i). Intrinsic motivation:* If the factors that direct the individual to a certain behavior comes from his own inner world, in a manner that is independent of the drives outside of the individual, this is intrinsic motivation (Ural 2009). The main sources of intrinsic motivation are the interest, curiosity and needs of the individual. Actions which are performed through intrinsic motivation and which originate from these sources are inherently rewarding for the individual, thus no additional motive or punishment is needed (Şen 2006). In this case, the individual is expected to display behaviors such as volunteerism, willingness and making a choice (Deci and Ryan 2000). Therefore, these actions usually generate intrinsic results as personal experiences which have a meaning for the individual (Erdoğan 2013). A study underlining the importance of intrinsic motivation indicated that students will learn a topic more easily if they are willing to apprehend and grasp this topic (Çelen 2010).

*(ii). Extrinsic motivation*: If the drive of the individual's behavior is independent of him, in other words if it lies in his environment, then this is extrinsic motivation. The behaviors which originate from external sources, such as rewards, punishment, and social support, are behaviors which are linked with the result of the individual's action (Erdoğan 2013). In this regard, the individual is not motivated by any interest in the action itself but rather he is motivated by the benefits that this action brings (Şen 2006). Some actions which are considered to be important for the students by teachers and parents are triggered by extrinsic motivation, and, therefore, they do not draw the intrinsic attention of individuals (Deci and Ryan 2016).

*(iii). Amotivation:* If individuals cannot establish a connection between their actions and the results of their actions there is no motivation, not and the individuals experience amotivation (Reeve 2014). In this case, individuals cannot make an association with the impact of their actions or the impact of their surroundings, and, thus, they cannot be motivated either intrinsically or extrinsically. Therefore, the individual who believes that his actions will not provide a benefit for him does not take any action and falls into the state of amotivation (Tahiroğlu and Aktepe 2015).

Apart from these motivation types, there are in the literature additional motivational components that give clues about the nature of the motivation of the individuals. Some of these components are directly related to the academic achievement of the individuals; these are intrinsic goal orientation, extrinsic goal orientation and the value of the subject, control of learning beliefs, self-sufficiency and test anxiety (Aktan and Tezci 2013; Bates et al. 2016). Moreover, these components are composed of three sub-components which are: *Value* that can be affected by the value of the subject and the intrinsic and extrinsic goal orientation; *expectation* that can be affected by the control of learning beliefs, self-sufficiency and performance; and *thrill* that can be affected by test anxiety and student's self-esteem level (Liu and Lin 2010). In addition to the different motivation types

and components that are used in understanding the importance of motivation for student achievement, researchers on education use different motivation theories as well (Fortier et al. 1995). Expectation-value theory (Berndt and Miller 1990), goal theory (Meece and Holt 1993), self-sufficiency theory (Zimmerman et al. 1992) and the theory of intrinsic motivation (Deci and Ryan 1985) are some of these motivation theories. Moreover, the theories of Keller, Wlodkowski, Herzberg, Maslow, Mayo, McClelland, McGregor, Likert, Luthans and Vroom, which examine the relationship between achievement and motivation, have also revealed that motivation has an important effect on student learning (Dede and Yaman 2008).

The above literature review on motivation as a prerequisite for learning showed that the literature is mostly focused on the factors that make individuals to act and to pursue these actions (Liu et al. 2016). In particular, the studies underlining the importance of motivation as a factor that facilitates the learning achievements of the individuals (Karagüven 2012; Kaya 2013; Wolters and Rosenthal 2000) have argued that learning achievement and effectiveness may vary according to motivators such as interest, desire and need (Tahiroğlu and Aktepe 2015). In this regard, although there are studies showing that there is a positive relationship between intrinsic motivation and achievement (Burton et al. 2006; Lepper et al. 2005) there are studies suggesting that intrinsic and extrinsic motivation should be combined together in order to motivate an individual to get into action for a goal (Barrett et al. 2005; Gillet et al. 2009; Hayenga and Corpus 2010). It is important, therefore, to look at the relationship between these two variables and their effect on student achievement which are investigated in this study. Additionally, the factors that are thought to affect the average effect size generated by 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 *school subject*in which the achievement was measured, and (*v*) the *sample group* or level of education. All these variables, along with the results of previous research, were used to test the following hypotheses of this study:

**$H_1$** Motivation has a positive effect on student achievement.
**$H_2$** *Publication year* is a moderator for the positive effect of motivation on student achievement.
**$H_3$** *Publication type* is a moderator for the positive effect of motivation on student achievement.
**$H_4$** *Country (culture)* is a moderator for the positive effect of motivation on student achievement.
**$H_5$** *School subject* is a moderator for the positive effect of motivation on student achievement.
**$H_6$** *Sample group* is a moderator for the positive effect of motivation on student achievement.

## 3.2 Method

### *3.2.1 Study Design*

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

### *3.2.2 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 motivation and student achievement included in the titles of the studies were used to screen the research studies. The end date for the research studies included in the research was identified as January 2016. 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 (956 research studies) was established; it included all studies with motivation and student achievement in their titles. The abstracts of these studies were reviewed, and all were found to be appropriate to include in the study. In the second stage, all research studies in the pool were examined in detail. The results of the examination found that 205 of the research studies in the pool were appropriate, and 751 were not found to be suitable. The descriptive statistics of the 205 research studies included in the analysis are presented in Table 3.1.

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 motivation and student achievement

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 motivation

**Table 3.1** Characteristics of the studies included in the meta-analysis

| Variables | | 1 | 2 | 3 | 4 | 5 | 6 | Total |
|---|---|---|---|---|---|---|---|---|
| Publication year | | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | |
| | *n* | 36 | 33 | 30 | 34 | 39 | 33 | 205 |
| | % | 17.5 | 16 | 14.6 | 16.5 | 19 | 16 | 100 |
| Publication type | | Dissertations | Articles | | | | | |
| | *n* | 49 | 156 | | | | | 205 |
| | % | 23.9 | 76.9 | | | | | 100 |
| Country (culture) | | Vertical-collectivist | Horizontal-individualist | Mixed culture | | | | |
| | *n* | 61 | 142 | 2 | | | | 205 |
| | % | 29.7 | 69.2 | 0.9 | | | | 100 |

### 3.2.3 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:

- References for the research
- Publication year
- Publication type
- Country (Culture)
- School subject
- Sample group
- Data collection tool(s)
- Quantitative values

### 3.2.4 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 was 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.

### 3.2.5 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, as a moderator in regards to the relationship between motivation and student achievement. The second is the publication type which was thought to have a role on the average impact of motivation on student achievement. The rest are the country (culture), school subject and sample group.

### *3.2.6 Publication Bias*

A funnel plot for the research studies included in the meta-analysis of can be seen in Fig. 3.1. Evidence that publication bias affected the research studies included in the meta-analysis can be seen in Fig. 3.1. A serious asymmetry would be expected in 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 Evidence for publication bias was observed for the 205 research studies included in the meta-analysis study.

A publication bias was observed in the funnel plot, and the results of Duval and Tweedie's trim and fill test, which was applied to determine the effect size related to partiality in the publications that was acquired with the meta-analysis using the random effect model, are shown in. As seen in Table 3.2, there is a difference between the observed effect size and the virtual effect size established to correct the effect of the publication bias. The reason for the difference is the asymmetry of the concentration on both sides of the center line and the studies plotted to the left of and above the center line, skewing the symmetry.

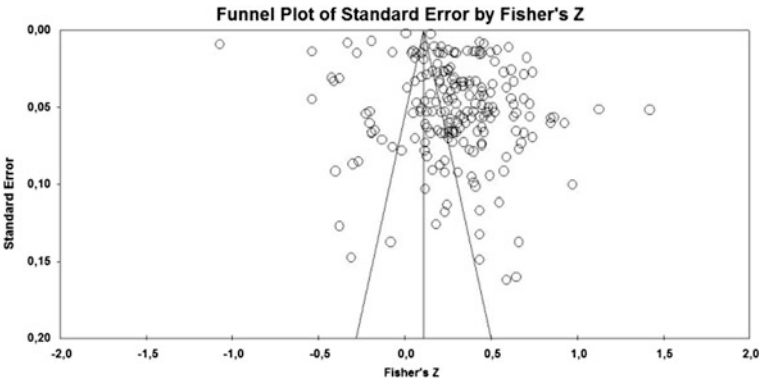


**Fig. 3.1** Effect size funnel for publication bias

**Table 3.2** Duval and Tweedie's trim and fill test results

| | Excluded studies | Point estimate | *CI* (confidence interval) | | *Q* |
|---|---|---|---|---|---|
| | | | Lover limit | Upper limit | |
| Observed values | | 0.10 | 0.11 | 0.27 | 52891.1 |
| Corrected values | 49 | 0.08 | 0.08 | 0.16 | 60053.4 |

## 3.3 Findings

The results of the meta-analysis about the relationship between motivation and student achievement are displayed in Table 3.3. The findings supported the hypothesis $H_1$ which stated that there is a positive relationship between motivation and student achievement. The effect size of motivation on student achievement was calculated as .27 which shows that motivation has a low level effect (see Cohen 1988) on student achievement.

The results of moderator analysis supported the hypothesis $H_2$ which stated that the publication year of the research plays a moderator role in the effect of motivation on student achievement. As a result of the moderator analysis, the differences between the effect size of the publication year of the research were found to be statistically significant ($Q_b = 4.32$, $p < .01$). According to studies published in 2010 [$r = .27$], 2011 [$r = .19$], 2012 [$r = .25$] and 2013 [$r = .26$] the effect of motivation on student achievement was at a low level, whereas according to the studies published in 2014 [$r = .32$] and 2015 [$r = .31$] this effect was at a medium level.

The findings of the research supported the hypothesis $H_3$ which stated that the publication type of the research plays a moderator role in the effect of motivation on student achievement. According to the moderator analysis, the difference between the effect size of the various publication types was found to be statistically significant ($Q_b = 5.20$, $p < .01$). In this context, the effect of motivation on student achievement has a low level in both papers [$r = .29$] and dissertations [$r = .19$] which is the most significant finding of this study.

The results of moderator analysis supported the hypothesis $H_4$ which formulated that the country (culture) where the research was carried out plays a moderator role in the effect of motivation on student achievement. According to the moderator analysis, the effect size differences according to the country of the research were not found to be statistically significant ($Q_b = 5.46$, $p < .01$). In this context, the effect of motivation on student achievement in the studies conducted with data collected from a mixed culture (both environments) [$r = -.18$] was lower level than both a vertical collectivist culture [$r = .27$] and a horizontal individualistic culture [$r = .28$].

**Table 3.3** The findings of correlation between motivation and student achievement: meta-analysis results

| Valuables | *k* | *N* | *r* | *CI* (confidence interval) | | *Q* | $Q_b$ |
|---|---|---|---|---|---|---|---|
| | | | | Lover limit | Upper limit | | |
| Motivation | 205 | 772903 | 0.27* | 0.23 | 0.31 | 52891.21 | |
| **Moderate [Publication year]** | | | | | | | **4.32*** |
| 2010 year | 36 | 285261 | 0.27 | 0.16 | 0.36 | | |
| 2011 year | 33 | 57415 | 0.19 | 0.08 | 0.30 | | |
| 2012 year | 30 | 35560 | 0.25 | 0.13 | 0.35 | | |
| 2013 year | 34 | 308666 | 0.26 | 0.16 | 0.36 | | |
| 2014 year | 39 | 30548 | 0.32 | 0.23 | 0.41 | | |
| 2015 year | 33 | 55453 | 0.31 | 0.21 | 0.41 | | |
| **Moderate [Publication type]** | | | | | | | **5.20*** |
| Dissertations | 49 | 65730 | 0.19 | 0.11 | 0.27 | | |
| Articles | 156 | 707173 | 0.29 | 0.25 | 0.33 | | |
| **Moderate [Country (culture)]** | | | | | | | **5.46*** |
| Vertical collectivist | 61 | 300534 | 0.27 | 0.20 | 0.33 | | |
| Horizontal individualist | 142 | 456898 | 0.28 | 0.23 | 0.32 | | |
| Mixed culture | 2 | 15471 | −0.18 | −0.52 | 0.20 | | |
| **Moderate [School subject]** | | | | | | | **5.87*** |
| Academic | 87 | 62892 | 0.23 | 0.16 | 0.30 | | |
| Science | 18 | 47422 | 0.28 | 0.12 | 0.42 | | |
| Language | 19 | 8627 | 0.34 | 0.20 | 0.48 | | |
| Mathematic | 57 | 439444 | 0.32 | 0.23 | 0.40 | | |
| Reading | 21 | 204317 | 0.26 | 0.12 | 0.40 | | |
| Game | 1 | 5380 | 0.41 | −0.24 | 0.80 | | |
| Social Sciences | 2 | 4821 | −0.06 | −0.50 | 0.39 | | |
| **Moderate [Sample group]** | | | | | | | **15.8*** |
| Primary School | 13 | 21272 | 0.53 | 0.42 | 0.63 | | |
| Secondary School | 69 | 147751 | 0.28 | 0.21 | 0.34 | | |
| High School | 67 | 562819 | 0.26 | 0.20 | 0.32 | | |
| University | 59 | 30179 | 0.23 | 0.16 | 0.30 | | |
| Mixed | 6 | 10882 | 0.28 | 0.07 | 0.46 | | |

*$p < .01$

The outcomes of moderator analysis supported the hypothesis $H_5$ which formulated that the school subject in which the achievement was measured plays a moderator role in the effect of motivation on student achievement. According to the moderator analysis, the effect size differences between the school subject were found to be statistically significant ($Q_b = 5.87$, $p < .01$). The effect of motivation on

student achievement was at a medium level for language [$r = .34$], mathematic [$r = .32$] and game [$r = .41$] school subject, whereas it was at a low level for academic [$r = .23$], science [$r = .28$], social sciences [$r = -.06$] and reading [$r = .21$] school subjects.

Finally, the findings of the moderator analysis supported the hypothesis $H_6$ which formulated that the sample group plays a moderator role in the effect of motivation on student achievement. According to the moderator analysis, the effect size differences between the levels of education were found to be statistically significant ($Q_b = 15.8$, $p < .01$). In this regard, the effect of motivation on student achievement is high for primary school level [$r = .52$], whereas it is low for secondary school [$r = .25$], high school [$r = .26$], university [$r = .22$] and mixed culture [$r = .28$] levels. The most significant finding is that the highest effect size is seen at the studies conducted at primary school level.

## 3.4 Conclusion

This meta-analysis, which aimed to determine the effect size of motivation on student achievement, included 205 studies. In this research, the publication year, the publication type, the country (culture) where the research was carried out, the school subject in which the achievement was measured and the sample group were taken as moderator variables. The meta-analysis results showed that motivation has a low level positive effect on student achievement. In the literature, it is widely accepted that there are significant relationships between motivation and student achievement (Yazıcı and Altun 2013). In this regard, this finding supports the argument in the literature that there is a relationship between motivation and student achievement (Azizoğlu et al. 2015; Fini and Yousefzadeh 2011; McKenzie and Schweitzer 2001; Richardson et al. 2012; Sankaran and Bui 2001) and that motivation has an important role in student achievement (Karagüven 2012; Kaya 2013; Wolters and Rosenthal 2000).

The moderator analysis featuring the publication year showed that the effect size differences between years were significant. The highest effect was observed for studies published in 2014, whereas the lowest effect belongs to studies published in 2011. Similarly, the effect size differences of the other variables that were included in the moderator analysis, namely the country (culture) where the research was carried out and the school subject in which the achievement was measured, were significant either. Regarding the school subject, the highest effect size of motivation on student achievement was identified for game, language and mathematic. The examination of the effect sizes according to the country (culture) showed that the effect of motivation on student achievement varied among the vertical-collectivist and horizontal-individualistic cultures; both of them have a low effect. The finding that the country (culture) influence the relationship between motivation and achievement is in support of the study of Areepattamannil et al. (2011) which

showed that Indian students who migrated to Canada had a higher motivation and academic achievement level than Canadian students.

According to the findings obtained from moderator analysis featuring the sample group and publication type variables, it was concluded that the sample group and publication type play a moderator role in the effect size of motivation on student achievement. The examination of the effect sizes according to publication type showed that the effect of motivation on student achievement has been founded at low level in both papers and dissertations. Concerning the findings of the sample group moderator analysis, where the sample groups were considered separately, motivation has a positive and significant high effect on student achievement at primary school, whereas the effect of motivation is low at secondary school, high school, university and mixed groups which include participants from all levels. Eymur and Geban (2011) found that students had higher motivation and experienced less amotivation in their first years which supports the results of moderator analysis. On their part, Yazıcı and Altun (2013) emphasized that finding out how the relationship between motivation and achievement is shaped according to the sample group is an important research topic. In their study they stated that extrinsic motivation sources were more effective on academic achievement during the first stages of education, whereas intrinsic motivation sources became more effective during later stages; they have also mentioned that the importance of motivational sources may decrease or increase according to the sample group.

After all, the results about the effect of motivation on student achievement can be summarized as below:

- Motivation has a positive low level effect on student achievement [$r = .27$].
- Regarding moderator variables, the publication year, publication type, the country (culture) where the research was carried out, the school subject and sample group play a moderator role in the effect size of motivation on student achievement.

On the basis of the findings obtained from this study, it is argued that the importance of motivation, which plays a role in student achievement, varies according to the sample group. This meta-analysis study is therefore important in that it suggests that the studies which focus on the relationship between motivation and student achievement should investigate more deeply the changes according to the sample group. Finally, this research suggests that there is a need to conduct further qualitative studies and comparative meta-analyses including motivation types as another moderator variable.

## References

*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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