

Rethinking Out-of-School-Time Relationships: Achievement, Self-Efficacy, and Social Status

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Abstract: The analysis describes how participation in outside-school-time (OST) activities and tutoring of the U.S. high school student population was associated with algebra achievement and mathematics self-efficacy. The complex dynamics between factors associated with OST and students' backgrounds were explored in detail with descriptive displays and regression models.

The survey analysis found that the probability of high school students participating in informal activities was associated with both family social status and prior (9th grade) achievement equally. Participating with a tutor was found not to be associated with student's algebra achievement and self-efficacy by 11th grade. Student participation in multiple OST activities (clubs, study groups, college preparation classes, and more) was positively associated with higher self-efficacy in mathematics but not with achievement. The resulting analysis provides insights that sharpen our understanding of how to describe the integration of student OST experiences and academic outcomes. The resulting empirical evidence lends support to the need for incorporating interactions between ability, social status, and study time in research studies intending to identify causal effects of extended study.

Keywords: Tutoring, out-of-school-time, social status, student achievement, attitudes, gain scores

Introduction

Most high school students take part in various out-of-school-time (OST) activities, both formal and informal. While not all OST programs aim to improve academic performance, many do, including private tutoring ("shadow education"), cram schools, academic coaching, college prep courses, afterschool clubs, study groups, museum trips, science competitions, online resources, and other uncatalogued activities (Stevenson & Baker, 1992; Bray, 1999, 2010; Baker, 2014; Bray; Kobakhidze & Suter, 2020). The accumulation of knowledge about OST participation has been hindered by the absence of a unified framework, making national and international data collection difficult (NRC, 2015). Research reviews conducted for OECD highlight the complexity of OST activities and the challenge of developing effective survey questions, as seen in the 2015 PISA survey, which included almost 200 categories related to students' extra study time (OECD, 2011a, 2011b; Suter, 2019).

The survey analysis presented in this paper applies a broad definition of OST to explore how different OST activities are associated with cognitive achievement and non-cognitive attitudes. Tutoring is analyzed separately from other OST activities to test whether the assumption

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that tutoring has a measurable impact on students' academic performance by researchers and parents is credible and supported by empirical evidence.

While research on the OST phenomenon has expanded over the past two decades, few studies have had sufficient statistical resources to build a comprehensive conceptual framework supported by empirical data (see, for instance, Kuger, 2016). This study continues that trend. It explores the consequences of academic achievement for students who received tutoring or engaged in other OST activities during secondary school, seeking to clarify how tutoring influences outcomes. Longitudinal studies in the U.S., like the High School Longitudinal Survey (HSLS:09), enable researchers to compare student performance over time and distinguish between pre-existing characteristics and changes resulting from OST participation. By analyzing student gain scores alongside yearly performance snapshots, this study aims to determine whether involvement in OST activities leads to measurable academic improvement (NCES, 2022; Willett, 1989).

Theory of Out-of-school-time

The expectation that participation in OST leads to higher student achievement is widely accepted, yet empirical evidence presents a more nuanced picture. Some studies of academic outcomes from tutoring or participation in other OST activities reported a positive association between OST participation and achievement gains (Vandell et al., 2007; Long, 2014). However, the effect sizes were small, particularly for private tutoring (Bray, 2014; Zhang et al., 2024). Comparing experience in OST settings with homework shows that homework hours have a much stronger association with achievement than OST participation (Suter, 2019). While OST experiences, such as tutoring, may not boost test scores directly, it often enhances motivation and attitude, supporting academic success indirectly. Studies show OST participation can increase self-efficacy—especially in group activities—and encourages engagement and identity formation. Participation in science OST programs is also linked to greater STEM interest.

A comprehensive theoretical model of how student engagement in OST activities is associated with cognitive achievement must distinguish between the factors that influence entry into these activities and the effects of these activities on students over time. The theoretical basis for this study is Carroll's time-based learning model, which posits that academic outcomes are influenced by a student's prior ability, the time spent on learning activities, and the quality of instructional support (Carroll, 1963, 1989). Carroll did not discuss family background as a factor influencing student outcomes. However, empirical research conducted after he initially developed his model of opportunity to learn has shown a strong association between family background and achievement that must be incorporated into any theoretical or empirical analysis.

Family status is known to have some influence on frequency of student participation in out-of-school-time (OST) activities (Buchmann & Park, 2009). The association between family social status and achievement is now an established fact (Coleman, 1966; Alexander et al., 2016) and its association with student participation in OST has been frequently noted. (Zhang & Liu, 2022; NRC, 2015; Huang, 2015; Wiseman, 2021; Entrich, 2021; Buchmann, et al, 2010a; Kobakhidze et al., 2023). A practical reason for an association between receiving tutoring and family status is that additional expenses are often required for these supplemental