

Andrew W. Mellon Faculty Renewal Grant Application for Professional Development: Final Report

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Name of project/event: Training on NICHD Database Utilization for Children's After-School Activities

Date(s) of Project: 04/01/08 – 04/01/09

Amount Awarded: \$1,100

The original goal of the proposed professional development project was to secure funding to cover expenses related to: (1) obtaining access to the NICHD database for the purpose of conducting research on the impact of children's and adolescents' after-school activities on cognitive development, social adjustment and emotional well-being; and (2) attending an advanced training on the utilization of the database. Thanks to the generous funding received by the Andrew W. Mellon Foundation, I was able to attend a training in the utilization of the Educational Longitudinal Study of 2002 (ELS:2002) and purchase software, which facilitated to a great extent the analysis of the available data.

The Educational Longitudinal Study of 2002 (ELS: 2002) is one of the richest national longitudinal databases, made available for use to researchers and emerging scholars by the National Center for Education Statistics and the American Educational Research Association. The ELS: 2002 is one of the most comprehensive longitudinal studies of approximately 16,000 adolescents as they transition to adulthood. The study gleans information about demographic, family, school characteristics, as well as adolescents' cognitive, social and emotional attributes and growth over time through surveys, structured interviews and observations. Due to the complexity of the study design and the multitude of variables involved, a comprehensive training in the data set utilization is periodically offered on a competitive basis to interested researchers and emerging scholars by the American Educational Research Association in conjunction with the National Center for Education Statistics. I had the opportunity to attend one of the institutes, which thoroughly examined issues pertaining to data collection and analysis. Its goal was to train

researchers in independent use so that they are able to pursue original scholarship and publications.

Although the training was on the utilization of a database, different from the one for which funding was originally sought (namely NICHD), the original goal and objectives of the project were met. The project activities involved: (1) obtaining access to the ELS:2002 dataset; (2) attending a day long AERA training institute in San Diego, CA; (3) analyzing the data; and (4) working collaboratively with undergraduate students at Furman in preparation of a number of conference proposals and manuscripts, soon to be submitted for publication. Not only did I have an opportunity to attend the training in the utilization of ELS: 2002, but I was also able to purchase two software programs, which were indispensable in the process of analyzing the available data.

The end product of the project activities consisted of three research reports, entitled "*The Long-term Impact of Sports Participation in Adolescence*", "*The Long-term Effects of Math Self-efficacy: Evidence from the Education Longitudinal Study of 2002*", and "*Participation in Organized Activities and School Achievement in Adolescence: Evidence from Propensity Scores Analysis*". As a first preliminary step, all three reports have been submitted for conference presentations at two prestigious national conferences; these include: The *American Educational Research Association* and the *Society for Research in Adolescence*. The research reports will be soon extended and disseminated in the form of journal publications in outlets such as the *Journal of Research on Adolescence*, *Journal of Adolescence*, and *Journal of Experimental Education*.

Receiving a grant from the Mellon foundation had an impact on Furman University, to the extent to which it provided additional opportunities to engage undergraduate students in research, as well as to make the emerging scholars at Furman and the Furman community at large aware of the availability of professional development options and support for faculty and staff, beyond what is currently in place in our institution. Throughout the duration of the project, I had a chance to work closely with two undergraduate students, whose help and assistance were instrumental in completing several extensive literature searches and reviews related to the project's scope. Furman University is committed to undergraduate research. In this sense, the project was consistent with our institution's mission of engaging students in research opportunities and the manner, in which the project was completed, demonstrates our dedication to student-faculty collaboration.

Due to the limited scope of the project, a formal evaluation of the project activities was not conducted. It should be noted, however, that the outcomes and the overall success of the project could be tangentially evaluated by the amount of scholarly work produced as a result of the funding. I have attached a proposal for a conference presentation, which has been recently submitted for a review and a possible presentation at the next annual meeting of the American Educational Research Association in Denver, Colorado. It could be used as further evidence of the project goals' completion.

Statement for the ACS Faculty Renewal website

Dr. Temi Bidjerano, Assistant Professor of Education at Furman University, received an Andrew W. Mellon Faculty Renewal Grant to gain access and training in the utilization of a nationally representative dataset in order to conduct original research on the impact of adolescents' out-of-school time on their cognitive development, social adjustment and emotional well-being. The received financial support was not only beneficial to her continuous professional development, allowing opportunities for sustaining a promising research agenda, conference presentations and publications, but it also provided her with a chance to mentor and engage in research undergraduate students from the Department of Education at Furman University. The project activities, for which support was provided, resulted in a number of faculty-student presentations at conferences such as the annual meetings of the *American Educational Research Association* and the *Society for Research in Adolescence*.

Participation in Organized Activities and School Achievement in Adolescence: Evidence from Propensity Scores Analysis

In recent years, educational researchers and psychologists have witnessed an increased interest in the study of participation in organized activities and its impact on cognitive, emotional, and social functioning. The preponderance of scientific evidence points to a positive relationship between optimal involvement in organized activities and school achievement, emotional and social adjustment (Eccles, 2005; Mahoney & Cairns, 1997). A number of studies have found associations between organized activity participation and indices of achievement, as well as social and emotional adjustment. Previous research on the consequences of organized activity participation has been criticized, however, on the grounds that (a) it has failed to provide adequate control for self-selection bias; (2) it has utilized non-representative samples of participants; (3) and it has been predominantly cross-sectional in nature. The purpose of the study is threefold. Firstly, the study's aim is to cross-validate findings from previous research by utilizing a nationally representative sample of adolescents. Secondly, by focusing on changes over time, the study provides a look at the long term consequences of organized activity participation. Thirdly, the purpose of the study is to establish the viability of previously reported findings regarding the ramifications of the participation in organized activities by using propensity score methods that allow for adjustment for self-selection biases.

Theoretical Framework

Organized extracurricular activities are construed as “experiential niches” or “learning environments...with specific rules, scripts and goals” (Larson & Verma, 1999, p.702) and as such, they might have either positive or negative consequences for youth development. (Carpenter, Huston, & Spera, 1989; Dunn, Kinney, & Hofferth, 2003; Eccles, Barber, Stone, & Hunt, 2003; Eccles & Gootman, 2002; Larson & Verma, 1999). They afford opportunities for psychosocial growth and the development of competencies. Participation in organized activities cultivates qualities such as ability to take initiative and self-regulation in terms of planning, monitoring and evaluating the attainment of specific personal goals

(Larson & Verma). In addition, participation in such activities can strengthen adolescents' sense of belonging to school by connecting them to peers and adults with similar interests and characteristics (Fredricks & Eccles, 2006). For some youth, participation in organized activities is perceived as enjoyable and intrinsically motivating (Larson & Kleiber, 1993). For others, it is considered a resume building experience, which guarantees competitive advantage for admission in institutions of higher education and access to merit-based scholarships (Luthar, Shoum, & Brown, 2006).

Previous research, conducted predominately with Caucasian samples of children and adolescents, provides evidence that participation in organized after-school activities is linked to improved well-being. Several longitudinal studies have examined the long-term associations between participation in organized activities and a host of variables related to achievement, motivation and social adjustment (Marsh & Kleitman, 2003; Eccles et al., 2003; Eccles & Barber, 1999). Participation in music, arts and in service organizations and various clubs after school, predicts positive changes in school achievement self-esteem over time (Cooper, Valentine, Nye & Lindsay, 1999; Broh, 2002; Fredricks & Eccles, 2006; Eccles & Barber, 1999, Larson, 1994). Compared to students who do not participate in organized activities, the participants in at least one organized activity show improved achievement, self-esteem and sense of belonging over time (Eccles et al., 2003). Moreover, involvement in volunteer activities, clubs and organizations may serve as a protective factor against drug, alcohol and substance use later in life (Eccles et al., 2003). Research also indicates that adolescents with extracurricular involvement in one or more activities show lower rates of early school dropout and criminal arrests (Mahoney, 2000; Mahoney & Cairns, 1997); particularly so, if the adolescents have been identified as being at risk of drop out in middle school (Mahoney & Cairns, 1997).

Methods and Techniques

Despite the compelling evidence, a common problem in previous research is its non-experimental nature; it has relied heavily on observational cross-sectional data derived from non-representative samples, which limit cause-effect inferences. As such, it does not provide adequate control for self-selection bias. Few studies have taken into account that participants in organized activities are different

from non-participants with respect to a variety of prior characteristics such as gender, age, ethnicity, family background characteristics, socio-economic status, motivational beliefs, reasons for participation, expectations for educational attainment to name a few. Youth who are likely to participate in organized activities do not only come from wealthier families that place a greater emphasis on academic competence and achievement, but they might also have different motivational beliefs to engage in school work. School level variables such as availability of organized activities, type of school (coeducational or single gender), urbanicity, and poverty level could be also identified as factors that play a role in the youths' intentions and rates of participation.

Propensity score analysis (PSA), one of the methods for adjusting for preexisting group differences and self-selection bias, is a form of matching that allows causal inferences in the context of non-experimental, observational data (Rosenbaum & Robin, 1983). Participants and non-participants in organized activities could be matched with respect to a composite variable, a propensity score, which is the estimated probability of being a participant in organized activity as a function of numerous observed covariates. Unlike multiple regression—the standard method used in previous research to control over different extraneous variables—the PSA can take into account numerous covariates simultaneously (D'Agostino, 1998) without regards to multicollinearity, which often arise when many related control variables are utilized.

The purpose of the current study was to investigate the relationship between organized activity participation and school achievement, as well as the likelihood of dropping out of school, by analyzing data from a nationally representative sample of adolescents from the U.S. The following research question was addressed: What is the effect of participation in organized activities in the sophomore year of high school on student achievement two years later?

Data Sources and Analysis

The study uses data from the Education Longitudinal Study of 2002. Data were collected from approximately 16,000 high school students, their parents, teachers, and schools in 2002, 2004, and 2006. The current study utilizes data from the first two waves of data collection, which involved 6,823 students.

Based on weighted analyses, the sample comprises 1% American Indian/Alaska native, 10% Asian, 13% African American, 15% Hispanic, 5% Multiracial, and 56% Caucasian students.

The propensity score method utilizes terminology from randomized experiments, which divides the measures into three types: *confounding covariates*, *treatment* and *outcomes*.

Confounding covariates are associated with both the selection into treatment group and outcome, and therefore could be used to construct a propensity score and control for self-selection bias. The following school, family and individual covariates were included in the analysis: type of school (coeducational vs. single gender); school control (public vs. private); school's urbanicity; poverty level of the school; school size; school's offering of organized activities; student socio-economic status; family composition; student race; student gender; number of siblings; parental expectations for educational attainment; language spoken at home; student expectations for educational attainment; student perceptions of the importance of grades; student intrinsic motivation; student extrinsic motivation; student amotivation; student interest in schooling; student disability status; whether the student has been retained in the past; number of times the student has changed schools; rate of student detention; rate of student absenteeism; hours spent on homework per week; hours spent reading per week; hours spent watching TV per week; and hours spent playing videogames per week.

The *treatment variable* of interest was participation in at least one organized activity in the sophomore year of high school. The variable was derived from several questions in the student questionnaire administered in the sophomore year of high school, which asked the respondent to indicate whether he/she has participated in organized activities such as school band, school play, student government, student honor society, student yearbook, service clubs, academic clubs, hobby groups and vocational clubs.

The *outcome variable* in the analysis was the student achievement in the senior year, measured by math and reading composite score.

The analytic procedure consisted of three steps. *First*, we estimated a student's propensity of receiving a treatment (i.e., being a participant in at least one organized activity in the sophomore year) as

a function of school, family and student background characteristics. *Second*, we stratified the sample of adolescents into five strata, according to their estimated probability of participation in at least one organized activity. Since the cases falling in each stratum (both participants and non-participants) have the same distributions on the observed covariates, we were able to estimate the within-stratum mean differences in achievement in the senior year between participants and non-participants in organized activities in the sophomore year. *Lastly*, we carried out a multiple regression of the effect of participation in the sophomore year on achievement in the senior year, controlling for prior achievement and propensity scores.

Results

Step 1. As a preliminary step, we examined differences in the chosen covariates between the treatment and control groups. Table 1 displays the means and the standard deviations of the background variables for the two groups. As expected, there were statistically significant differences between participants and non-participants in organized activities. Using logistic regression, we modeled the probability of being part of the treatment or the control group as a function of the 29 background characteristics. In general, a student was more likely to have participated in at least one organized activity if he/she was female, Caucasian, coming from a more affluent family with higher parental expectations for educational attainment. Adolescents with higher intrinsic motivation, interest in school and expectations for educational attainments, as well as with lower extrinsic motivation, were also more likely to be in the treatment condition. Participants in at least one organized activity tended to have lower absenteeism, to spend more time reading, doing homework and less time watching TV. In addition, students from smaller urban and suburban schools were more likely to participate in organized activities.

Step 2. We divided the sample into 5 strata based on the estimated propensity scores of participation. Table 2 shows the distribution of participants and non-participants within each stratum. A balance with respect to the distribution of covariates within each stratum was achieved, as shown in Table 3. Statistical hypotheses testing, involving treatment as a predictor of each covariate and controlling for stratum membership showed no statistically significant treatment versus control differences in 97% of the

29 covariates. The only exception occurred with the variable of student expectations for educational attainment, on which within strata balance was not achieved. Adolescents, who attend organized activities, differ from adolescents who do not only in terms of expectations for educational attainment.

Step 3. Treatment effects. To estimate the treatment effect on achievement we conducted a three-step hierarchical multiple regression, the results of which are displayed in Table 4. After step 1, with treatment in the equation, $R^2=.05$, $F(1, 6166) = 319.18$, $p<.001$. When the propensity scores were added to the prediction, $R^2=.13$, $F(2, 6166) = 445.04$, $p<.001$. Prior achievement (Step 3) predicted test scores in the senior year above and beyond that afforded by treatment and propensity scores— $R^2=.79$, $F(3, 6166) = 7748.68$, $p<.001$. The analysis was supplemented by five independent samples t-tests, for which in each stratum, the treatment was used as a grouping variable and the senior year achievement was the outcome. The results indicated that within each stratum, participation in organized activities in the sophomore year is strongly associated with subsequent achievement. Figure 1 shows the results for the average achievement scores in the senior year based on stratum of organized school attendees versus non-attendees, controlling for prior achievement.

Significance of the Study

The examination of the after-school contexts experienced by adolescents is not only an area of extensive research but it has also become an important policy issue. In the era of school budgetary constraints and fiscal problems, concerns have been raised about the utility of various school sponsored activities and programs. This study utilized a relatively new analytic procedure—the propensity score method—to establish the robustness of previous findings regarding the relationship between organized activity participation and achievement. By establishing adequate control over selection bias and utilizing a nationally representative sample of adolescents, we were able to confirm that participation in organized activities has beneficial effects in terms of achievement. Although previous research has identified selection bias as a potential challenge, none of the earlier studies has attempted to establish a causal link between participation and outcomes through the use of rigorous analytic techniques. The study provides direct evidence that when participants and non-participants are fully matched with respect to numerous

covariates (such as school level characteristics, family variables and individual level attributes, which are often confounded with activity participation), the net effect of activity participation remains notable.

In conclusion, the social context of activity participation could have a powerful role in molding adolescents' developmental pathways. Persistence and effort, self-regulatory skills, opportunities to achieve personally meaningful goals, as well as to establish relationships with individuals with similar interests and skills, are often cultivated in the context of organized activity participation; as such, the participation in organized activities could have important ramifications for the youth's future.

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Table 1. *Preliminary Differences between Participants and Non-participants in Organized Activities*

Variable name	Treatment		Control		t	χ^2
	M	SD	M	SD		
School control						150.03**
Public	.39	.18	.40	.21		
Catholic	.07	.01	.05	.01		
Other private	.06	.02	.03	.01		
School type						83.93*
Coeducational	.49	.20	.46	.21		
All female	.02	.01	.01	.00		
All male	.01	.01	.01	.01		
School urbanicity						21.75**
Urban	.17	.13	.16	.13		
Suburban	.25	.12	.23	.11		
Rural	.10	.05	.08	.04		
Poverty level of the school	2.94	1.89	3.33	1.94	11.70**	
School size	3.20	1.84	3.66	1.88	15.19**	
School offerings of organized activities	16.57	8.23	16.28	8.02	2.08*	
Student socio-economic status	.29	.65	.05	.61	21.29**	
Family composition						138.87**
Mother and father	.33	.12	.26	.13		
Mother and male guardian	.06	.02	.07	.03		
Father and female guardian	.01	.00	.02	.01		
Two guardians	.01	.00	.01	.01		
Mother only	.08	.03	.09	.05		
Father only	.01	.00	.02	.01		
Female guardian only	.01	.00	.01	.00		
Male guardian only	.00	.00	.00	.00		
Lives with student less than half time	.00	.00	.00	.00		
Race						271.91**
American Indian	.00	.00	.01	.00		
Asian	.05	.02	.04	.02		
African American	.06	.03	.07	.04		
Hispanic, no race specified	.02	.01	.04	.02		
Hispanic, race specified	.03	.01	.05	.2		
Multiracial	.03	.01	.02	.01		
Caucasian	.32	.19	.26	.18		
Gender						524.94**
Male	.21	.11	.29	.10		
Female	.31	.12	.19	.12		
Times student changed schools	1.19	1.44	1.31	1.49	4.53*	
Student retained						89.00**
Yes	.05	.03	.07	.05		
No	.49	.14	.39	.17		
Student has disability						36.47**
Yes	.05	.03	.06	.03		

No	.49	.15	.40	.23	
Student held a job					1.12
Yes	.20	.18	.18	.17	
No	.33	.20	.30	.20	
Number of siblings	2.20	1.49	2.39	1.55	6.95**
Parental expectations	5.54	1.20	5.24	1.31	14.31**
Language spoken at home					45.75**
English	.44	.23	.39	.29	
Other	.07	.04	.09	.05	
Student expectations	5.49	1.30	4.89	1.48	24.85**
Importance of grades	3.49	.68	3.26	.77	19.07**
Student intrinsic motivation	4.87	1.34	4.24	1.33	20.65**
Student extrinsic motivation	4.61	1.44	4.87	1.61	9.91**
Student amotivation	7.04	1.61	7.38	1.68	12.62**
Interest in school	2.22	.56	2.03	.58	18.99**
Student detention	3.19	.75	3.36	.99	11.05**
Student absenteeism	5.98	2.18	6.65	2.55	16.64**
Hours spent on homework	7.04	6.35	4.98	5.35	20.80**
Hours spent reading	3.07	4.02	2.34	3.62	18.99**
Hours spent watching TV	3.96	1.83	4.07	1.90	3.45**
Hours spent playing video/ computer games	2.76	1.95	3.17	1.99	11.98**

Table 2. *Stratum Membership: Frequency and Percentages*

Strata	<i>Treatment</i>		<i>Control</i>		N
	n	%	n	%	
1	399	29	975	71	1374
2	662	48.6	700	51.4	1362
3	793	58.3	568	41.7	1361
4	942	69.2	419	30.8	1361
5	1157	84.8	208	15.2	1365
Total	3953	57.9	2870	42.1	6823

Table 3. *Balance within Strata*

<i>Dependent variable</i>	<i>Type of regression</i>	<i>Results for treatment (Participation in Organized Activities)</i>		
		<i>B</i>	<i>SE</i>	<i>P</i>
School control	Nominal			
Public		.06	.09	.52
Catholic		.02	.11	.86
School type	Nominal			
Coeducational		.03	.13	.84
All female		-.03	.22	.97
School urbanicity	Nominal			
Urban		.00	.08	.97
Suburban		.01	.07	.94
Poverty level of the school	Multiple	-.03	.05	.56
School size	Multiple	-.03	.05	.53
School offerings of organized activities	Multiple	-.03	.21	.87
Socio-economic status	Multiple	.02	.02	.26
Family composition	Nominal			
Mother and father		-.03	.31	.92
Mother and male guardian		-.02	.31	.96
Father and female guardian		.01	.35	.98
Two guardians		.07	.38	.86
Mother only		.01	.32	.97
Father only		-.01	.35	.97
Female guardian only		.04	.43	.93
Male guardian only		.14	.78	.86
Race	Nominal			
American Indian		.01	.32	.97
Asian		-.03	.11	.97
African American		-.01	.09	.94
Hispanic, no race specified		.11	.13	.38
Hispanic, race specified		.03	.11	.79
Multiracial		-.00	.12	.97
Gender	Logistic	-.05	.06	.46
Times student changed school	Multiple	-.02	.04	.54
Student retained	Logistic	.08	.10	.43
Student has disability	Logistic	.04	.10	.66
Student held a job	Logistic	-.00	.05	.96
Number of siblings	Multiple	-.01	.04	.82
Parent expectations	Multiple	.03	.03	.24
Language spoken at home	Logistic	-.02	.08	.85
<i>Student Expectations</i>	<i>Multiple</i>	<i>.06</i>	<i>.03</i>	<i>.04</i>
Importance of grades	Multiple	.02	.02	.23
Student intrinsic motivation	Multiple	-.05	.05	.27
Student extrinsic motivation	Multiple	-.04	.04	.34
Student amotivation	Multiple	-.03	.04	.53

Interest in school	Multiple	.02	.01	.30
Student detention	Logistic	-.02	.02	.19
Student absenteeism	Multiple	-.08	.05	.17
Hours spent on homework	Multiple	.13	.15	.38
Hours spent reading	Multiple	.04	.10	.71
Hours spent watching TV	Multiple	-.03	.05	.53
Hours spent playing video/computer games	Multiple	-.02	.04	.53

Table 4. *Summary of Hierarchical Regression Analysis for Variables Predicting Academic Achievement.*

Predictors	Step 1			Step 2			Step 3		
	B	β	ΔR^2	B	β	ΔR^2	B	β	ΔR^2
Treatment (Participation vs. none)	4.21*	.22*		2.01*	.11*		.41*	.02*	
Propensity Score				14.98*	.30*		2.39*	.05*	
Prior achievement							.89*	.87*	
			.05			.08			.71

Note. Total $R^2 = .79^{**}$ * $p < .001$.

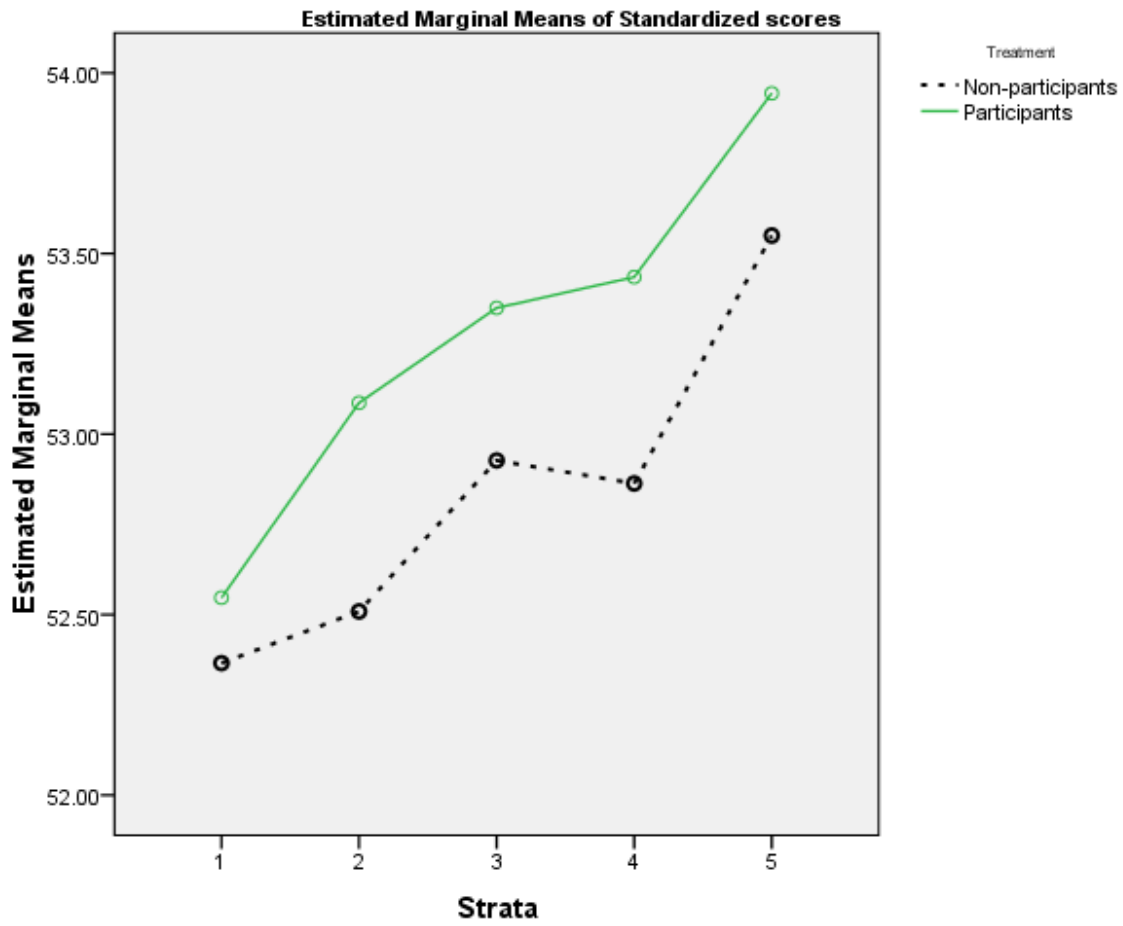


Figure 1. Achievement in the senior year of high school of participants and non-participants in organized activities in the sophomore year.