Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Extracurricular Activities as a Protective Factor Against School Victimization: A Decisive Role of Nuanced Differences

Maria Novikova
National Research University Higher School of Economics
Pavel Azyrkin
National Research University Higher School of Economics
Alina Fedoriaieva
National Research University Higher School of Economics
Ivan Ivanov
iyivanov@hse.ru

National Research University Higher School of Economics

Research Article

Keywords: social capital theory, social capital, extracurricular activities, bullying, victimization, school

Posted Date: June 8th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-9485702/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

Background.

Bullying victimization remains a persistent threat to adolescent well-being, yet evidence on the role of extracurricular activities in reducing this risk is inconsistent. This study examines whether participation in extracurricular activities is associated with lower levels of school bullying victimization and explores how specific characteristics of participation shape this relationship through the lens of social capital.

Methods.

The study draws on a nationally representative sample of 10,766 adolescents aged 11–15 in Russia. A two-stage quasi-experimental design was applied within the potential outcomes framework to estimate the average treatment effect on participants. Propensity score methods, including nearest neighbor matching and covariate balancing weighting, were used to adjust for pre-existing differences in gender, age, socioeconomic status, school location, and academic achievement. Balance diagnostics confirmed adequate covariate adjustment. Regression models were used to assess heterogeneous effects across types and formats of extracurricular participation.

Results.

After adjustment, overall participation in extracurricular activities was not significantly associated with bullying victimization. However, substantial heterogeneity was observed. Participation in school-based activities, group formats, and sport-related programs was consistently associated with lower levels of victimization compared to their respective alternatives. The magnitude of these associations ranged from small to moderate but remained robust across model specifications.

Conclusions.

The findings suggest that extracurricular participation alone does not function as a universal protective factor against bullying. Instead, its potential depends on specific contextual and structural features that facilitate the development of social ties within the school environment. These results help reconcile inconsistencies in prior research and indicate that prevention efforts should focus not only on increasing participation but also on promoting forms of engagement that strengthen social integration and collective norms among adolescents.

Introduction

Violence remains one of the main problems in educational institutions worldwide (Greene, 2005; Poling, Smith, 2022; UNESCO, 2022). Bullying is the most common form of violence in educational settings.

According to a 2026 OECD global report, 20% of adolescents get victimized at least few times a month (OECD, 2026). In Russia school bullying is widely prevalent, with 18 to 41 percent of students having experienced at least one type of bullying victimization in the past month (Author et al., 2021).

Bullying is a persistent and harmful behavior involving unwanted actions by students or school staff that cause physical, emotional or social damage to individuals and the school community (Norman, Heaney, Donoghue, 2025). Bullying behavior is defined by three main criteria: intentionality, repetition, and power imbalance (Smith, 2016). Imbalances in power stem from differences in physical strength, social status within the class or turning to account the knowledge of student's vulnerabilities to cause harm. (Menesini, Salmivalli, 2017). Until recently, the number of allies was also conceptualized as a component of power imbalance – assuming that a student's higher status is reinforced by a larger number of bystanders who support them. However, recent work has shown that, contrary to expectations, a greater number of defenders did not necessarily predict a decline in victimization (Richters et al, 2026).

School bullying has wide-ranging and substantial consequences for physical, academic, mental, and emotional well-being, both in the short and long term (Wolke, Lereya, 2013; Bogart et al., 2014; Armitage, 2021; Han, Ye, Zhong, 2025). These extensive and well-documented negative consequences have prompted the establishment of comprehensive anti-bullying initiatives at both international and national levels. Among the most widely implemented and empirically validated bullying prevention and intervention programs are the KiVa program (Finland), Olweus Bullying Prevention Program (Norway), Positive Behavioral Interventions and Supports (USA) (Author et al., 2020). According to the evidence of a recent large-scale meta-analysis, anti-bullying programs have a modest but statistically significant effect, reducing bullying perpetration by an average of 18–19% and victimization by 15–16% (Gaffney, Ttofı, Farrington, 2021).

Anti-bullying programs are grounded in the principle of enhancing protective factors while mitigating the impact of risk factors that contribute to the emergence and persistence of bullying behavior. Among the most robust protective factors against bullying and cyberbullying are self-oriented personal competencies, low levels of technology use, strong academic performance, and other-oriented social competencies (Zych, Farrington, Ttofı, 2019). Enhancement of individual's capability of positive social interaction (i.e., parental supervision), connectedness and bonding acts as a significant protective factor, mitigating the negative effects of bullying on adolescents' mental health (Man, Liu, Xue, 2022).

Thus, effective anti-bullying interventions should promote the development of social skills and bonds. However, most part of these programs are implemented within schools, where opportunities to broaden students' social ties may be constrained. Extracurricular experiences – even those without explicit anti-bullying components – may help reduce the risk of victimization at school if they are designed to strengthen social ties and build social capital.

Extracurricular Activities and Bullying Victimization

Protective educational factors against victimization have been studied predominantly in relation to school-based learning processes, while far less attention being given to extracurricular activities (ECAs), both within and outside the school setting. The limited body of existing research yields contradictory findings, reflecting a mixed effect of extracurricular education on both victimization and bullying perpetration. Several studies confirmed that children who attend ECAs are less likely to be bullied at school (Haegele et al., 2020; Riese et al., 2015). Hence, multivariate analysis adjusted for age, gender, race, and socioeconomic status showed that participating in sports combined with non-sports activities or only in non-sports activities was associated with a lower likelihood of school bullying, with the highest risk of victimization for those students who did not participate in any ECA (Riese et al., 2015). Findings from a recent study indicate that participation in sports and other ECAs is negatively associated with victimization among early adolescents, whereas engagement in organized lessons and community services is negatively associated with bullying perpetration among middle adolescents (Hong et al., 2022). The possible explanation is that extracurricular education develops social and communication skills, both directly and indirectly, the lack of which can predict higher risk of victimisation (Veenstra et al., 2007). Research indicates that sports-related ECAs may exert the strongest influence on the likelihood of victimization. At the same time, no link is detected between ECAs-involvement and school bullying perpetration (Haegele et al., 2020). The effects of ECAs on reducing of the bullying risk have their limitations (Matjasko et al., 2019): only moderate participation in school-based ECAs (non-exceeding 3–4 hours per week) provides a supportive context for bullying prevention.

Yet, participation in ECA can be as well associated with the increased risk for physical, verbal, and relational bullying victimization (but decreased risk for verbal victimization) in middle and high school students (Sheridan et al., 2022). A. Peguero's work states that students who participated in three or more extracurricular activities or participated in interscholastic sports competitions were more likely to be bullied at school than students who did not attend such ECAs (Peguero, 2014). The domain of extracurricular education (sports, arts, technical, natural sciences, humanities, etc.) can be crucial for the effects on student’s behavior (Feldman, Matjasko, 2005). For instance, participants of children's music ensembles and theatre clubs are more likely to be bullied (35%) than those who are not involved in any extracurricular activities (28%) (Elpus, Carter, 2016).

Overall, the evidence suggests that the effects of ECAs on bullying victimization are mixed and highly dependent on the domain of activity, intensity of participation, and individual characteristics of an adolescent. These contradictions highlight the need for further research that applies diverse theoretical frameworks for understanding of the mechanisms of the transfer of ECAs-associated experience into school victimization context. Moreover, the major body of research is performed within correlational designs, leaving room for experiments and quasi-experiments which can shed light on the influence of ECAs-involvement on bullying victimization.

Social Capital as a Pathway Linking Extracurricular Participation and School Victimization

The mixed results in the existing literature make the mechanisms of the reduction in school victimization via ECAs-involvement even of a greater interest. One of the possible explanations is that the beneficial effects of ECAs operate through the enhancement of social capital. Social capital has been identified as a significant protective factor against bullying and victimization (Holt, Espelage, 2007; Evans, Smokowski, 2015; Jenkins, Fredrick, 2017).

Social capital refers to the benefits derived from social relationships (Putnam, 2000). It includes access to information, social connections, status, and support, and individuals actively strive to accumulate it. Social capital exists in bonding, bridging, and linking forms, each with the potential to either perpetuate or reduce inequities in access to resources, while also influencing youth behaviors such as cooperation, exclusion, and prosocial engagement (Scales et al., 2020). Bonding social capital is common in homogenous, uniform groups and helps to bond their members, which leads to a sense of cohesion and connectedness. Hence, extracurricular activities conducted within the school, due to the stable composition of participants, common practices and norms of interaction, provide students with access to enhancing bonding social capital. Bridging social capital is specific to open and diverse groups or communities that bring together people from different socio-demographic, religious, ethnic, and economic backgrounds. It is assumed that out-of-school ECAs create conditions for the building of bridging social capital, as students from different social and cultural backgrounds meet and interact in such groups.

In the current study, social capital is understood as the resources accessible through adolescents' social relationships. ECAs offer adolescents valuable opportunities to build social networks, strengthen trust, and enhance their sense of belonging, thereby contributing to the development of social capital. Research shows that young people involved in ECAs report higher levels of bonding and bridging social capital, intergenerational harmony, social support, and civic engagement than their non-participating peers (Flanagan et al., 2015; Acar, Yigit, 2023). A recent qualitative meta-synthesis further demonstrates that organized activities – including extracurricular programs, after-school initiatives, and youth development projects – foster supportive relationships and provide access to resources that promote adolescents' educational and career goals (Boat et al., 2024). The results of the other study suggest that participation in sports-related ECAs among Hispanic middle school students is positively associated with particular aspects of social capital, such as stronger feelings of school membership and greater peer prosocial orientation, whereas non-sports activities did not show similar associations, highlighting the importance of examining the specific domain of ECAs-involvement (Villarreal, Gonzalez, 2016).

The Russian Context of Extracurricular Activities

The Russian system of extracurricular education is deeply rooted in the Soviet legacy, which established a tradition of broad participation in after-school clubs ("kruzhki"), youth centers, and specialized organizations (Author, 2022). This heritage persists nowadays: national surveys indicate the majority of students being engaged in any form of ECAs, with the participation widely perceived as a part of the educational norm (Kosaretsky et al., 2019). The infrastructure combines municipal centers of children's

creativity, sports schools, and music and art academies with school-based extracurricular activities, which remain the most accessible and widespread.

Recent national concepts and policy frameworks emphasize ECAs as an integral element of education rather than optional enrichment. This institutional model contrasts with Western community-based approaches, relying instead on centralized, state-driven provision (Author et al., 2023). Programs are often highly “school-like” in content and organization, focusing on discipline, measurable outcomes, and alignment with broader educational goals (Author et al., 2025).

Despite their formalized structure, ECAs in Russia contribute to building both bonding and bridging social capital. They strengthen peer networks and provide opportunities for interaction across diverse social backgrounds (Flanagan et al., 2015; Acar & Yigit, 2023). However, the effects on peer victimization are context-dependent. Studies suggest that participation in sports activities tends to enhance resilience and peer status, thereby lowering risks of bullying, while involvement in cultural or artistic clubs may expose children to new hierarchies and forms of competition (Elpus, Carter, 2016; Hong et al., 2022).

Aim of the Study

The present study attempts to analyze the effects of context-dependent adolescents’ participation in ECAs on the likelihood of their victimization in the school environment using social capital theory to explain these associations and employing a quasi-experimental research design.

Method

Participants and Data Collection

The study sample consisted of 10,766 middle school students from Russia, aged 11 to 15 years (M = 12.9, Mdn = 13.0). The sample included slightly more females (n = 6,152; 57.1%) than males (n = 4,614; 42.9%).

Regarding residential background, just over half of the participants lived in urban areas (52.1%, n = 5,614), while 47.9% (n = 5,152) resided in rural settings. This distribution is more balanced than the general Russian population, which is approximately 75% urban.

Half of the participants came from families where neither parent holding a university degree (n = 5,473, 50.8%). The remaining participants were nearly equally divided between those with at least one parent with a university degree (n = 2,625, 24.4%) and those in an intermediate category (n = 2,616, 24.3%). A small number of participants (0.5%, n = 52) missed data on this variable.

A majority of adolescents (58.1%, n = 6,255) reported participating in at least one extracurricular activity, while 41.9% (n = 4,511) reported no participation in any ECA. Participation Rates in Specific Types of

Extracurricular Activities Among Middle School Students (Ages 11–15; N = 10,766) are presented in Table 1.

Table 1
Participation Rates in Specific Types of Extracurricular Activities Among Middle School Students (Ages 11–15; N = 10,766)

Extracurricular Activity Type	***Participation (n)***	***Participation Rate (%)***
Sports (eca_sport)	***3,984***	***37.01***
Arts (e.g., music, theater, dance; eca_art)	***2,483***	***23.06***
Volunteering (eca_vol)	*428*	*3.98*
School Clubs (eca_sch)	*312*	*2.90*
Foreign Language (eca_flang)	*581*	*5.40*
Technology/IT (eca_tech)	*301*	*2.80*
Tourism/Cultural Tours (eca_tour)	*199*	*1.85*
Crafts/Handicrafts (eca_craft)	*185*	*1.72*
Science/STEM (eca_sci)	*141*	*1.31*

Note. eca = extracurricular activity. Participation is coded as 1 (yes) and 0 (no). Total N = 10,766. Percentages are calculated as the proportion of participants (coded 1) relative to the full sample. Activities are presented in descending order of participation rate for readability.

Over 62% of students (62.6%, n = 6,737) reported experiencing at least one form of bullying victimization during the past month at school. The mean score on a general bullying scale was 2.94 (SD = 3.79). Descriptive statistics for specific bullying types (e.g., physical, verbal, relational) are presented in Table 2.

Table 2
Prevalence and Frequency of Bullying Victimization Among Middle School Students (Ages 11–15; N = 10,766)

Data collection was carried out via the online survey platform Anketolog.ru during a designated time period within the school setting. The procedure took place in the physical presence of a teacher; however, no direct supervision or monitoring of students' responses was implemented.

Respondents were asked a series of questions regarding the characteristics of their engagement in extracurricular activities. Specifically, the survey included items assessing:

- the domain of extracurricular participation (sport-related vs. non-sports)
- the location of the activities (school-based vs. out-of-school)
- the format of participation (group-based vs. individual instruction).

Respondents completed the School Bullying Questionnaire (Author et al., 2021), which assesses students' involvement in different types of bullying (social, verbal, and physical) as well as their participation in various roles (perpetrator, bystander, and victim). In the present study, a shortened version of the instrument was administered. The brief form included two items for each type of bullying and assessed only the victim role. An excerpt from the instruction read: «Please recall whether any of the following happened to you at school during the past month (excluding holidays)?».

Data Analysis Procedure

Analytic Strategy and Causal Framework

This study employed a two-stage quasi-experimental design to estimate the protective effect of ECAs-participation against bullying victimization. The primary causal estimand is the average treatment effect on the treated (ATT)—the expected difference in bullying scores for students in a specific ECA type compared to their counterfactual outcomes: had they participated in another ECA type or did not participate in ECA activities at all. Analyses were conducted within Rubin's potential outcomes framework (Rubin, 1974), assuming conditional independence given observed covariates, stable unit treatment value, and common support. Sensitivity analyses (E-values) assessed robustness to unmeasured confounding.

The analytic strategy proceeded in two stages: (1) estimating the protective effect of any ECA-participation (vs. non-participation), and (2) among participants only, comparing subtypes of ECAs-engagement (school-based vs. out-of-school; sport-based vs. non-sport; group-based vs. individual) to assess heterogeneity.

Sample and Covariates

The analytic sample was derived from a nationally representative cross-sectional survey of Russian adolescents. All models conditioned on pre-treatment covariates: sex (binary), age (continuous), parental education (ordinal, standardized), school location (urban/rural), and average academic mark (continuous, standardized). Missing data were minimal (< 2%) and handled via listwise deletion after confirming missingness was unrelated to key variables (Little's MCAR test, $p = 0.154$).

Propensity Score Estimation and Matching

For each comparison, propensity scores were estimated using logistic regression modeling the probability of treatment assignment as a function of all five covariates. Two complementary approaches were implemented using the MatchIt (v4.5.0) and WeightIt (v0.14.2) packages in R:

Nearest Neighbor Matching (NNM) with replacement, using a caliper of 0.2 standard deviations of the logit propensity score (Austin, 2011). Matching ratios were 1:1 for all comparisons except group vs. individual (1:2) due to treatment-control imbalance.

Covariate Balancing Propensity Score (CBPS) weighting, which directly optimizes covariate balance while estimating ATT weights (Imai & Ratkovic, 2014). Extreme weights were trimmed at the 99th percentile where necessary.

Balance Assessment and Outcome Modeling

Balance was assessed using standardized mean differences (SMDs), requiring post-matching/weighting SMDs < 0.1 for all covariates (Stuart, 2010). Units outside the common support region were excluded from NNM but retained in CBPS with down-weighting. Complete tables with balance statistics can be found in Appendix, Table 3.

Table 3
Balance Statistics Across Extracurricular Activity Type Comparisons

Comparison	***Method***	***N (T/C)***	***Mean |SMD| Pre***	***Mean |SMD| Post***	***Max |SMD| Post***	***% Variance Ratios 0.8–1.25***	***Overlap Coefficient***
School vs. Other	***NNM***	***1894/3925***	***.127***	***.008***	***.015***	***100%***	***.89***
School vs. Other	***CBPS***	***1894/3925***	***.127***	***.000***	***.001***	***100%***	***.89***
Sport vs. Other	*NNM*	*3984/2271*	*.245*	*.042*	*.085*	*95%*	*.76*
Sport vs. Other	*CBPS*	*3984/2271*	*.245*	*.011*	*.025*	*98%*	*.76*
Group vs. Individual	*NNM*	*5180/557*	*.181*	*.035*	*.072*	*92%*	*.68*
Group vs. Individual	*CBPS*	*5180/557*	*.181*	*.022*	*.048*	*96%*	*.68*

Note. N (T/C) = number of participants in treatment and control groups; SMD = standardized mean difference; Pre = before adjustment; Post = after adjustment; NNM = nearest neighbor matching; CBPS = covariate balancing propensity score weighting. All post-adjustment mean absolute SMD values < .10 indicate adequate covariate balance (Stuart, 2010). Overlap coefficients > .50 indicate sufficient common support between groups (Pastore, 2018). Variance ratios between 0.8 and 1.25 suggest balanced distributions beyond the mean.

Treatment effects on the continuous bullying score (gen_bul) were estimated via regression, adjusting for all covariates to address residual imbalance and incorporating matching or CBPS weights. Robust standard errors (HC3) accounted for heteroskedasticity and matched-pair structure. Effects were reported as ATT estimates with 95% confidence intervals.

Robustness and Sensitivity Analyses

Robustness was assessed through: (a) alternative matching algorithms (optimal full matching, subclassification); (b) weight trimming at the 95th and 99th percentiles; (c) testing for heterogeneous treatment effects by propensity score quintiles; and (d) E-value analysis to quantify the strength of unmeasured confounding needed to explain away observed effects (VanderWeele & Ding, 2017). All analyses adhered to current methodological standards for propensity score applications in educational research (Caliendo & Kopeinig, 2008; Harder et al., 2010).

Results

Stage 1 – Overall Effect of ECA Participation

The average treatment effect on the treated (ATT) of any extracurricular activity participation on general bullying victimization was estimated using two complementary propensity score weighting approaches: inverse probability of treatment weighting (IPTW) with a logistic regression model and covariate balancing propensity score (CBPS) weighting. Both methods targeted the ATT estimand and adjusted for five pre-treatment confounders: sex, age, parental education, school location (urban vs. rural), and academic performance (GPA).

Balance and Common Support

Both weighting strategies achieved excellent covariate balance. Prior to adjustment, standardized mean differences (SMDs) across covariates ranged from 0.02 to 0.51, indicating moderate baseline imbalance. Absolute mean differences in covariate balance before and after adjustment are presented in Appendix, Fig. 1–2. After weighting:

- IPTW (GLM) reduced the mean absolute SMD from 0.221 to 0.014, with all post-weighting SMDs below the conventional threshold of 0.1 (maximum |SMD| = 0.032).
- CBPS achieved near-perfect balance, reducing the mean absolute SMD to 0.0003 (maximum |SMD| = 0.0026), with all covariates balanced to machine precision.

Variance ratios indicated negligible residual imbalance. Propensity score distributions showed complete overlap between ECAs-participants (n = 6,255) and non-participants (n = 4,091), with both groups spanning the full range of estimated propensity scores (0.22 to 0.83). Consequently, no observations were excluded due to lack of common support.

Effective sample sizes (ESS) remained high for both methods – 8,981 (83.4% of total N) for IPTW and 8,847 (82.2%) for CBPS - indicating minimal information loss due to weighting. No extreme weights (> 10) were observed in either approach.

Treatment Effect Estimates

Both methods yielded substantively null and statistically non-significant effects of ECA participation on bullying victimization:

- IPTW: ATT = -0.041, 95% CI [-0.197, 0.114], p = 0.602
- CBPS: ATT = -0.040, 95% CI [-0.196, 0.116], p = 0.615

The point estimates suggest a negligible reduction in bullying scores (on a scale where lower values indicate less victimization) among ECAs participants compared to otherwise similar non-participants – a difference equivalent to approximately 1% of a standard deviation (SD = 3.792). The confidence intervals comfortably include zero and rule out even small protective effects (e.g., > 0.2 SD).

Sensitivity to Unmeasured Confounding

E-value analysis confirmed that the observed null effects are highly sensitive to potential unmeasured confounding - but this sensitivity is expected given the near-zero magnitude of the estimated effects. Specifically:

- An unmeasured confounder would need to be associated with both ECAs-participation and bullying by a risk ratio of only 1.01 to fully explain away the observed ATT.
- However, because the confidence intervals cross the null, the E-value for the boundary of the CI is effectively 1.00, indicating that even infinitesimal unmeasured bias could account for the results.

Given the excellent observed covariate balance and consistency across estimation strategies, these findings suggest that- after adjusting for key sociodemographic and academic factors- overall ECA participation is not meaningfully associated with reduced bullying victimization in this sample.

Stage 2 – Heterogeneous Effects by ECA Type

Among adolescents engaged in extracurricular activities (N = 5,737–6,255 depending on comparison), whether the protective association with bullying victimization varied by activity type was examined—specifically: (1) school-based vs. non-school ECAs, (2) sport-related vs. non-sport ECAs, and (3) group-based vs. individual-only ECAs. For each comparison, two complementary propensity score methods—nearest neighbor matching (NNM) with a caliper of 0.2 SD and covariate balancing propensity score (CBPS) weighting—were implemented, and balance, common support, and robustness were assessed. All models were adjusted for sex, age, socioeconomic status, school location, and academic performance.

School-Based vs. Non-School ECAs

Of 5,819 ECA participants, 1,894 (32.6%) participated in school-based ECAs. Both NNM and CBPS achieved excellent covariate balance (post-adjustment mean |SMD| ≤ 0.01, see Table 3). Absolute mean differences in covariate balance before and after adjustment are presented in Appendix, Fig. 3.

Methodological Context: The discrepancy between NNM (-0.361) and CBPS (-0.712) ATT estimates reflects different uses of the control group. NNM uses only the most similar controls (n = 1,894 matched pairs), while CBPS uses all controls with varying weights, giving more influence to dissimilar controls with high bullying scores (mean bullying score for high-weight controls = 3.42 vs. 2.89 for low-weight controls).

The estimated protective effect was consistently negative, though its magnitude varied. These findings support the hypothesis that school-based activities act as a protective factor.

- NNM: ATT = -0.361, 95% CI [-0.638, -0.083], p = 0.011 (equivalent to 9.5% of SD)
- CBPS: ATT = -0.712, 95% CI [-0.920, -0.503], p < 0.001 (equivalent to 18.8% of SD)

Heterogeneous treatment effects were evident: the benefit of school-based participation intensified among students with higher propensity scores (i.e., those most likely to attend school-based ECAs), ranging from negligible (-0.005, p = 0.97) in the lowest quintile to substantial (-0.937, p < 0.001) in the highest quintile. Linear trend test across quintiles indicates p = 0.003.

E-value analysis indicated moderate robustness (E-values = 1.09–1.19), consistent with modest effect sizes that could be explained by unmeasured confounding of low-to-moderate strength. An unmeasured confounder would need to increase the odds of both school-based ECA participation and bullying reduction by 9–19% to explain away the effect.

Sport-Based vs. Non-Sport ECAs

Among 6,255 ECAs-participants, 3,984 (63.7%) reported sport involvement. Despite notable baseline imbalance (e.g., 54% male in sport vs. 22% in non-sport groups), both methods achieved near-perfect post-adjustment balance (mean |SMD| ≤ 0.011, see Table 3). Absolute mean differences in covariate balance before and after adjustment are presented in Appendix, Fig. 4. Protective effects were statistically significant across specifications:

- NNM: ATT = -0.521, 95% CI [-0.871, -0.171], p = 0.0035 (equivalent to 13.7% of SD)
- CBPS: ATT = -0.423, 95% CI [-0.677, -0.169], p = 0.0011 (equivalent to 11.2% of SD)

These findings suggest that students engaged in sport-related ECAs tend to exhibit lower bullying victimisation scores compared to those participating in non-sport activities, indicating a potential protective association. E-values ranged from 1.11 to 1.13, demonstrating weak-to-moderate robustness.

Group-Based vs. Individual-Only ECAs

This comparison was restricted to students participating exclusively in either group (n = 5,180) or individual formats (n = 557). Balance was achieved (mean |SMD| ≤ 0.025, see Table 3), though the extreme treatment-to-control ratio (9.3:1) necessitated careful weighting with replacement in NNM (average 1:2.1 matching ratio) and weight trimming in CBPS at the 99th percentile. Absolute mean differences in covariate balance before and after adjustment are presented in Appendix, Fig. 5.

- NNM: ATT = -0.420, 95% CI [-0.844, 0.004], p = 0.052 (equivalent to 11.1% of SD)
- CBPS: ATT = -0.714, 95% CI [-1.092, -0.336], p < 0.001 (equivalent to 18.8% of SD)

A protective effect against bullying victimization was conferred by participation in group-based activities relative to individual-only activities, as evidenced by the analysis. Quintile analyses revealed consistently negative effects (-0.217 to -1.009 across quintiles), though the interaction with propensity score was not statistically significant (p = 0.617). E-values (1.11–1.19) again suggested moderate robustness, reflecting effect sizes vulnerable to modest unmeasured bias.

Synthesis Across Comparisons

All three ECAs-involvement characteristics – school-based setting, sport-related domain, and group format – were associated with reduced school bullying victimization relative to their counterparts, even after rigorous adjustment. While point estimates varied between methods (with CBPS generally yielding larger effects due to inclusion of dissimilar controls), directional consistency and statistical significance (except for the marginal NNM result in the group comparison) support the conclusion that not all ECAs are equally protective.

Summary of Effect Estimates Across Comparisons is presented in Table 4.

Table 4
Summary of Effect Estimates Across Comparisons

Comparison	Method	ATT	95% CI	% of SD	E-value
School vs Other	NNM	-0.361	[-0.638, -0.083]	9.5%	1.09
School vs Other	CBPS	-0.712	[-0.920, -0.503]	18.8%	1.19
Sport vs Other	NNM	-0.521	[-0.871, -0.171]	13.7%	1.13
Sport vs Other	CBPS	-0.423	[-0.677, -0.169]	11.2%	1.11
Group vs Individual	NNM	-0.420	[-0.844, 0.004]	11.1%	1.11
Group vs Individual	CBPS	-0.714	[-1.092, -0.336]	18.8%	1.19
Note: Negative ATT values indicate protective effects (reduced bullying). SD = 3.792.					

Discussion

In contrast to a number of studies that have assessed associations between participation in extracurricular education and the risk of school victimization, the current research sought to clarify the directionality of this relationship. It was shown that, after controlling for sociodemographic variables (gender, age, parents' education, size of locality, and academic achievement), the effect is not significant; in other words, the mere fact of attending ECAs does not affect the possibility for a student to become a victim of bullying at school.

At the same time, extracurricular education is highly heterogeneous in terms of formats, and it was assumed that the specific form of participation may shape how it relates to children's peer relationships at school. Therefore the effects of different formats (restricting analyses to the subsample of children who participated in extracurricular education) were examined. Several ECAs-involvement characteristics functioned as protective factors against school victimization: attendance of school-based ECAs (as opposed to out-of-school programs), participation in group-format activities, and participation in sports-related activities.

The effect of participation specifically in school-based ECA (relative to community-based programs) is a novel finding. One can assume that attending school-based clubs may even increase the risk of victimization, for those, who are more likely to be victimized, due to spending more time at school during the day (and having more interactions with possible perpetrators) (Peguero, 2008). Moreover, it has been recently shown, that ECAs environment itself obtains a certain risk of bullying victimization (Author et al., 2026). What might account for the positive effects of school-based ECAs resulting in reducing of victimization risk then? Although school-based activities take place in the same physical space as formal instruction (where children spend most of their day), they constitute a distinct educational environment that differs in, among other things, the socio-psychological structure and composition of the peer group. ECAs-groups are often multi-age and include students from different grades and classes. Extracurricular sessions involve regular, structured interaction, providing opportunities for students to expand their social networks. Bridging social capital may increase insofar as students connect with peers from groups that extend well beyond the boundaries of their usual classroom interactions. For students who are typically defined as victims within the in-class groups, school-based ECAs establish lateral social connections, which break the local class hierarchy and form new in-groups.

In addition, in school-based ECAs students may develop ties with peers who occupy higher positions in the school status hierarchy. In social network terms, if a child is positioned at the periphery of the interaction network, participation in a school-based ECA may allow them to move closer to the network's center by increasing the number of contacts – and, consequently, the pool of potential defenders or allies under conditions of bullying risk. Such a target becomes less attractive to an aggressor because bullying is "costlier" in terms of potential resource loss, including diminished affiliation and friendship from significant peers. Thus, social capital can be converted into the possibility of attaining defense by the victim only if it is gained in the same environment where the perpetrator operates.

Finally, school-based ECA may activate both key mechanisms of friendship formation – selection and influence (Veenstra, Huitsing, 2021). ECA-participants tend to be similar in interests and/or abilities, making it easier for students to find like-minded peers than in a heterogeneous classroom; this reflects selection based on similarity. At the same time, shared, structured educational activity creates joint experiences through which students influence one another, potentially increasing similarity over time and strengthening ties.

In school-based ECAs, instruction is often provided by the same teachers whom students interact with during regular lessons. However, the ECAs context changes not only the content delivered, but also the organization of teacher-student interaction. In formal classroom settings, the adult role often centers on classroom management, whereas ECAs provide a context for pedagogical leadership. It is plausible that students' social capital also increases via relationships with teachers; similarly to victimizing someone having ties with higher-status peers, bullying a student who is viewed favorably by a teacher may be perceived as too costly.

Thus, involvement into school-based ECAs fulfills its protective potential against victimization not through engagement per se, but due to its embeddedness into the broader institutional environment of school. Despite the seeming similarity, the mechanisms of this effect might differ from the all-day schools, which also hold the protective potential (Seidlitz, A., & Zierow, L., 2025). All-day schools offer more educators' attention and more structured students' time, though the change of educational situation (as it happens in school-based ECAs in comparison to regular lessons) is not necessary.

The other two protective factors identified – sports-related activities and group format – appear closely intertwined. In Russian schools, most sports activities involve team-based game sports and are therefore organized in groups (teams), whereas individual sports (e.g., figure skating) are typically based out-of-school or offered as private instruction.

The protective role of sports-related ECAs has been documented in prior work (Haegele et al., 2020; Riese et al., 2015). One important distinction of ECAs is that, unlike regular lessons – where students may complete requirements with minimal effort – ECAs are typically intrinsically challenging. This characteristic is arguably most salient in team sports: at the individual level, the student is engaged in the challenge of improving performance, which matters for not "letting the team down," while the team as a whole confronts the challenge of competing against increasingly strong opponents. If the instructional climate of the section is more supportive than harsh, meeting these challenges may help students build resilience that, in the broader school context, reduces the risk of victimization. Group interaction, in turn, provides opportunities to practice social interaction skills (which victims of bullying often lack) in a supervised micro-context.

Additionally, in the Russian cultural context (as in many others), regular participation in sports is itself a status-enhancing signal. As suggested by previous studies (Spady, 1970; Broh, 2002), interscholastic sports athletes were perceived by other students and school administrators to have relatively higher social status as well as to be physical stronger (Peguero, 2008). Targeting a higher-status student is

therefore more likely to entail undesirable social or institutional consequences for the aggressor (Sheridan et al., 2022).

Limitations and Future Research

Along with methodologically conscientiousness for an observational dataset and substantive usefulness, the research has several limitations. First, the study relies on a cross-sectional survey design, which inherently limits temporal ordering between exposure and outcome. Second, it cannot rule out confounding by factors that plausibly influence both ECA engagement and victimization (e.g., prior victimization, school climate, differential access to high-quality programs, etc.). Third, ECA participation is heterogeneous by design, and while study addresses this by comparing different formats and domains of ECA-involvement, these categories still compress meaningful differences in intensity, duration, and program quality. Thus, future research should focus on designs that control for baseline victimization and time-invariant individual differences (e.g. longitudinal designs). Also, as the social capital enhancement is addressed as a crucial mechanism underlying the protective effect of ECA-involvement, measurement of the proposed mediators directly (bonding/bridging/linking social capital, perceived peer support, teacher connectedness etc.) seems to be a natural future step in research.

Abbreviations

organization for economic co-operation and development (OECD)

extracurricular activities (ECA)

average treatment effect on the treated (ATT)

nearest neighbor matching (NNM)

inverse probability of treatment weighting (IPTW)

covariate balancing propensity score (CBPS)

effective sample sizes (ESS)

standardized mean differences (SMD)

academic performance (GPA)

Declarations

Ethics approval and consent to participate

All participants were provided with a comprehensive study description and provided informed consent online. The study was approved by the Commission for the Ethical Evaluation of Empirical Research

Projects of the Department of Psychology of the HSE University at a meeting on November 28, 2024 in accordance with the procedure established at the HSE University, and was conducted in accordance with the principles outlined in the Helsinki Declaration.

Consent for publication

Not applicable.

Availability of data and materials

The data will be made available for special purposes only upon request to the corresponding authors.

Competing Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding.

This work/article is an output of a research project implemented as part of the Basic Research Program at the National Research University Higher School of Economics (HSE University).

Authors' contributions

Maria Novikova: investigation, data interpretation, writing original draft. Pavel Azyrkin: conceptualization, analytical framework, investigation and coordination of the empirical data collection process. Alina Fedoriaieva: formal data analysis. Ivan Ivanov: supervision, writing-review & editing.

Acknowledgements

Not applicable.

References

1. Acar E, Yigit MF. Beyond the classroom: Exploring the relationship between extracurriculars, social capital, and academic achievement. J Educ Pract. 2023;14(15):101–7.
2. Armitage R. Bullying in children: impact on child health. BMJ Paediatrics Open. 2021. https://doi.org/10.1136/bmjpo-2020-000939. 5.
3. Austin PC. An Introduction to Propensity Score Methods for Reducing the Effects of Confounding in Observational Studies. Multivar Behav Res. 2011;46(3):399–424. https://doi.org/10.1080/00273171.2011.568786.
4. Boat A, Poparad H, Seward M, Scales P, Syvertsen A. The Role of Organized Activities in Supporting Youth Social Capital Development: A Qualitative Meta-Synthesis. Adolesc Res Rev. 2024;9:543–62. https://doi.org/10.1007/s40894-024-00235-1.

5. Bogart L, Elliott M, Klein D, Tortolero S, Mrug S, Peskin M, Davies S, Schink E, Schuster M. Peer Victimization in Fifth Grade and Health in Tenth Grade. Pediatrics. 2014;133:440–7. https://doi.org/10.1542/peds.2013-3510.
6. Broh BA. Linking extracurricular programming to academic achievement: Who benefits and why? Sociology of education; 2002. pp. 69–95.
7. Caliendo M, Kopeinig S. Some practical guidance for the implementation of propensity score matching. J Economic Surveys. 2008;22(1):31–72.
8. Elpus K, Carter BA. Bullying victimization among music ensemble and theatre students in the United States. J Res Music Educ. 2016;64(3):322–43. https://doi.org/10.1177/0022429416658642.
9. Evans C, Smokowski P. Prosocial Bystander Behavior in Bullying Dynamics: Assessing the Impact of Social Capital. J Youth Adolesc. 2015;44:2289–307. https://doi.org/10.1007/s10964-015-0338-5.
10. Eyuboglu M, Eyuboglu D, Pala S, Oktar D, Demirtaş Z, Arslantaş D, Unsal A. Traditional school bullying and cyberbullying: Prevalence, the effect on mental health problems and self-harm behavior. Psychiatry Res. 2021;297. https://doi.org/10.1016/j.psychres.2021.113730.
11. Feldman AF, Matjasko JL. The role of school-based extracurricular activities in adolescent development: A comprehensive review and future directions. Rev Educ Res. 2005;75(2):159–210. https://doi.org/10.3102/00346543075002159.
12. Flanagan C, Kim T, Collura J, Kopish M. Community Service and Adolescents' Social Capital. J Res Adolescence. 2015;25:295–309. https://doi.org/10.1111/JORA.12137.
13. Gaffney H, Ttofi M, Farrington D. Effectiveness of school-based programs to reduce bullying perpetration and victimization: An updated systematic review and meta-analysis. Campbell Syst Reviews. 2021;17. https://doi.org/10.1002/CL2.1143.
14. Greene MB. (2005). Reducing Violence and Aggression in Schools. Trauma, Violence, & Abuse, 6(3), 236–253. https://doi.org/10.1177/1524838005277406 (Original work published 2005).
15. Haegele JA, Aigner C, Healy S. Extracurricular activities and bullying among children and adolescents with disabilities. Matern Child Health J. 2020;24:1103–12. https://doi.org/10.1007/s10995-019-02866-6.
16. Han Z, Ye Z, Zhong B. School bullying and mental health among adolescents: a narrative review. Translational Pediatr. 2025;14:463–72. https://doi.org/10.21037/tp-2024-512.
17. Harder VS, Stuart EA, Anthony JC. Propensity score techniques and the assessment of measured covariate balance to test causal associations in psychological research. Psychol Methods. 2010;15(3):234–49. https://doi.org/10.1037/a0019623.
18. Holt M, Espelage D. Perceived social support among bullies, victims, and bully-victims. J Youth Adolesc. 2007;36:984–94. https://doi.org/10.1007/S10964-006-9153-3.
19. Hong J, Song E, Tan K, Peguero A, Sohn Y, Espelage D. Extracurricular activities and bullying perpetration and victimisation in early and middle adolescence. J Psychologists Counsellors Schools. 2022;33:134–45. https://doi.org/10.1017/jgc.2022.8.

20. Jenkins L, Fredrick S. Social Capital and Bystander Behavior in Bullying: Internalizing Problems as a Barrier to Prosocial Intervention. J Youth Adolesc. 2017;46:757–71. https://doi.org/10.1007/s10964-017-0637-0.
21. Kosaretsky SG, Goshin ME, Belikov AA, Kudryavtseva MA, Evstigneeva NV, Zhulyabina NM, Yankevich SV. *Dopolnitel'noe obrazovanie detey v Rossii: Edinoe i mnogoobraznoe* [Supplementary education for children in Russia: Unified and diverse]. Moscow: National Research University – Higher School of Economics; 2019.
22. Man X, Liu J, Xue Z. Effects of Bullying Forms on Adolescent Mental Health and Protective Factors: A Global Cross-Regional Research Based on 65 Countries. Int J Environ Res Public Health. 2022;19. https://doi.org/10.3390/ijerph19042374.
23. Matjasko JL, Ramaswamy M. All things in moderation? Threshold effects in adolescent extracurricular participation intensity and behavioral problems. J Sch Health. 2019;89(2):79–87. https://doi.org/10.1111/josh.12735.
24. Menesini E, Salmivalli C. Bullying in schools: the state of knowledge and effective interventions. Psychol health Med. 2017;22(sup1):240–53.
25. Norman JOH, Heaney D, Donoghue C. Considering a More Inclusive Definition of Bullying: Implications for a Whole-Education Approach to Bullying. School Bullying and the Legacy of Dan Olweus; 2025. pp. 191–206.
26. OECD. (2026), Bullying in education: Prevalence, impact and responses across countries, OECD Education Working Papers, No. 341, OECD Publishing, Paris. https://doi.org/10.1787/d9f8bd9f-en
27. Peguero AA. Bullying victimization and extracurricular activity. J School Violence. 2008;7(3):71–85. https://doi.org/10.1080/15388220801902305.
28. Poling D, Smith S. Perceptions About Verbal Aggression: Survey of Secondary Students With Emotional and Behavioral Disorders. J Emotional Behav Disorders. 2022;31:14–26. https://doi.org/10.1177/10634266221076463.
29. Richters S, van Zalk MHW, Veenstra R, Laninga-Wijnen L. The role of defenders' and victims' popularity in the effectiveness of defending in bullying interactions: A longitudinal social network study. J Res Adolescence. 2026;36:e70126. https://doi.org/10.1111/jora.70126.
30. Riese A, Gjelsvik A, Ranney ML. Extracurricular activities and bullying perpetration: Results from a nationally representative sample. J Sch Health. 2015;85(8):544–51. https://doi.org/10.1111/josh.12250.
31. Samara M, Da Silva Nascimento B, El-Asam A, Hammuda S, Khattab N. How Can Bullying Victimisation Lead to Lower Academic Achievement? A Systematic Review and Meta-Analysis of the Mediating Role of Cognitive-Motivational Factors. Int J Environ Res Public Health. 2021;18. https://doi.org/10.3390/ijerph18052209.
32. Scales PC, Boat AA, Pekel K. Defining and measuring social capital for young people: A practical review of the literature on resource-full relationships. Report for the Bill & Melinda Gates Foundation). Search Institute; 2020.

33. Seidlitz A, Zierow L. Longer days, better performance? The impact of all-day primary schools in Germany. Econ Educ Rev. 2025;107:102659.
34. Sheridan S, Clary L, Webb L, Stuart E, Mendelson T. Associations of extracurricular activity participation with bullying victimization among U.S. middle and high school students: A nationally representative sample. J School Violence. 2022;21:475–90. https://doi.org/10.1080/15388220.2022.2114487.
35. Smith P. Bullying: Definition, Types, Causes, Consequences and Intervention. Soc Pers Psychol Compass. 2016;10:519–32. https://doi.org/10.1111/SPC3.12266.
36. Spady WG. (1970). Lament for the letterman: Effects of peer status and extracurricular activities on goals and achievement. American Journal of Sociology, 75(4, Part 2), 680–702.
37. Ttofi MM, Eisner M, Bradshaw CP. Bullying prevention: Assessing existing meta-evaluations. In: Bruinsma G, Weisburd D, editors. Encyclopaedia of criminology and criminal justice. Springer; 2014. pp. 231–42.
38. UNESCO. UNESCO strategy on education for health and well-being. UNESCO Publishing. 2022. https://doi.org/10.54675/MSST2323.
39. VanderWeele TJ, Ding P. Sensitivity analysis in observational research: introducing the E-value. Ann Intern Med. 2017;167(4):268–74.
40. Veenstra R, Huitsing G. Social network approaches to bullying and victimization. The Wiley Blackwell handbook of bullying. Wiley-Blackwell; 2021. pp. 196–214.
41. Veenstra R, Lindenberg S, Zijlstra BJ, De Winter AF, Verhulst FC, Ormel J. The dyadic nature of bullying and victimization: Testing a dual-perspective theory. Child Dev. 2007;78(6):1843–54. https://doi.org/10.1111/j.1467-8624.2007.01102.x.
42. Villarreal V, Gonzalez J. Extracurricular activity participation of Hispanic students: Implications for social capital outcomes. Int J School Educational Psychol. 2016;4:201–12. https://doi.org/10.1080/21683603.2015.1119092.
43. Wolke D, Lereya S. Long-term effects of bullying. Arch Dis Child. 2013;100:879–85. https://doi.org/10.1136/archdischild-2014-306667.
44. Zych I, Farrington D, Ttofi M. Protective factors against bullying and cyberbullying: A systematic review of meta-analyses. Aggress Violent Beh. 2019. https://doi.org/10.1016/J.AVB.2018.06.008.

Table 2

Table 2 is available in the Supplementary Files section.

Figures

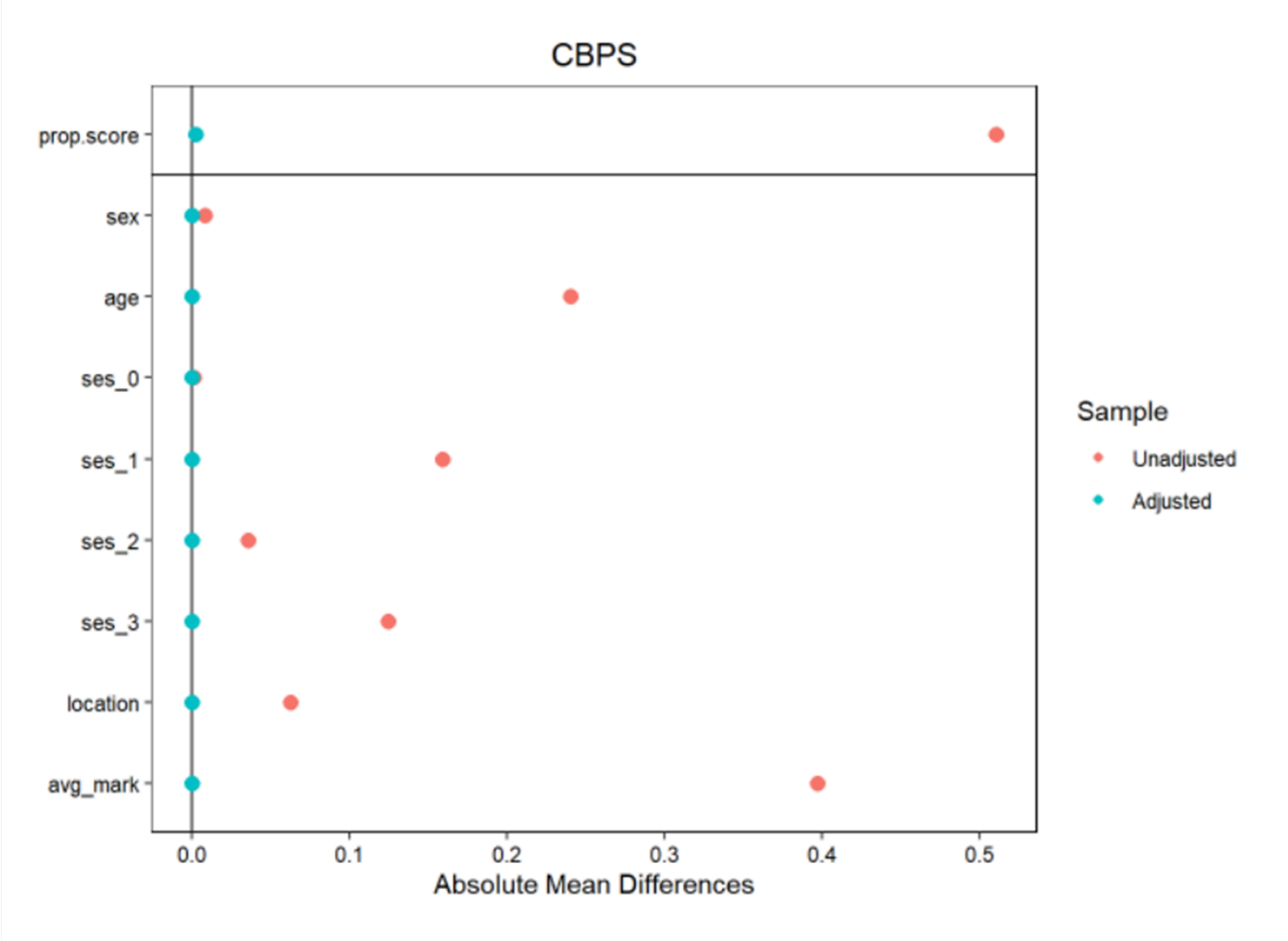


Figure 1

Absolute Mean Differences in Covariate Balance Before and After Adjustment Using Covariate Balancing Propensity Score (CBPS). ECA participation VS No participation.

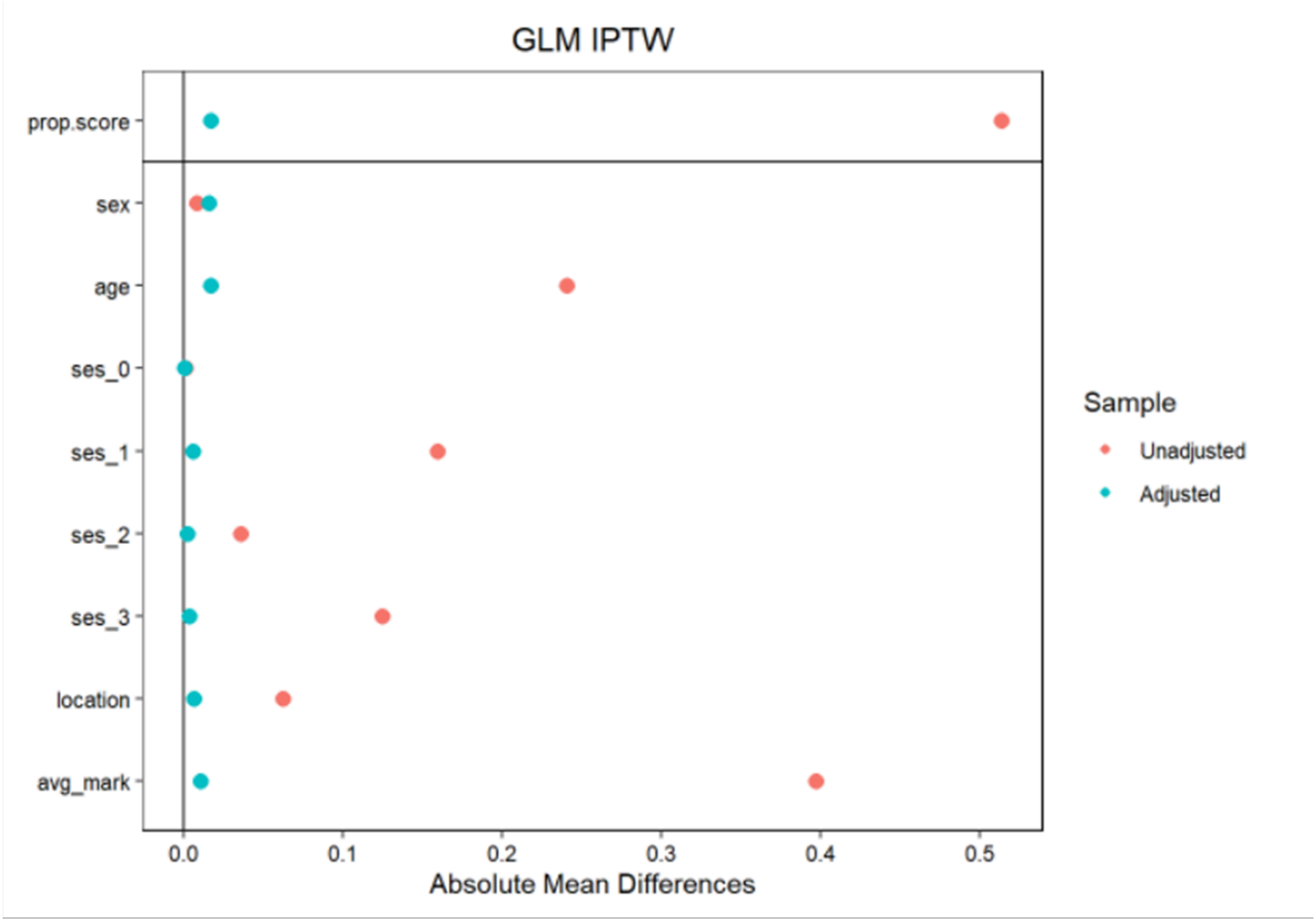


Figure 2

Absolute Mean Differences in Covariate Balance Before and After Adjustment Using Generalized Linear Model with Inverse Probability of Treatment Weighting (GLM IPTW). ECA participation VS No participation

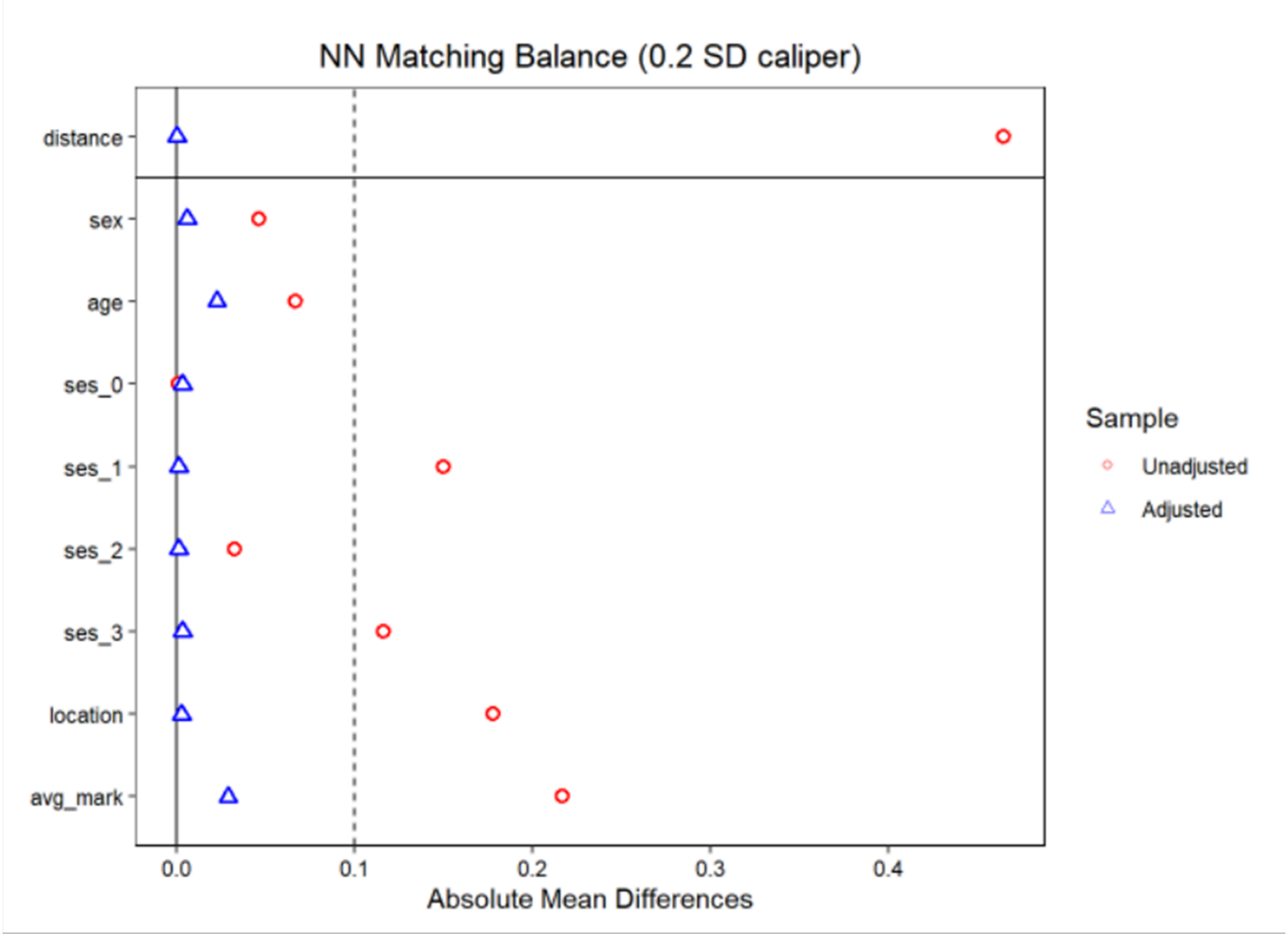


Figure 3

Mean Differences in Covariate Balance Before and After Adjustment Using Nearest Neighbor Matching for School-Based vs. Other Extracurricular Activities (ECA)

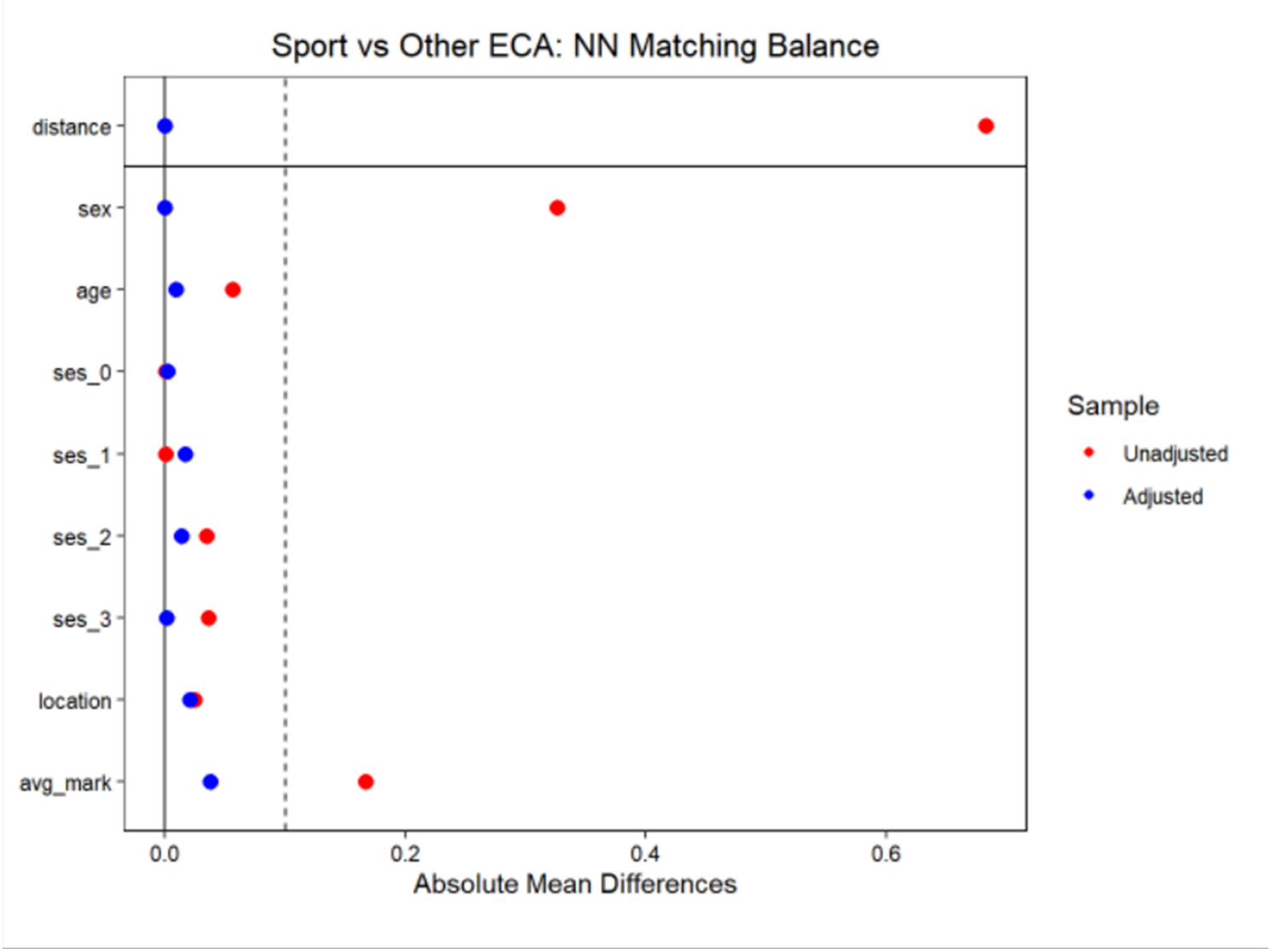


Figure 4

Mean Differences in Covariate Balance Before and After Adjustment Using Nearest Neighbor Matching for Sport-Based vs. Other Extracurricular Activities (ECA)

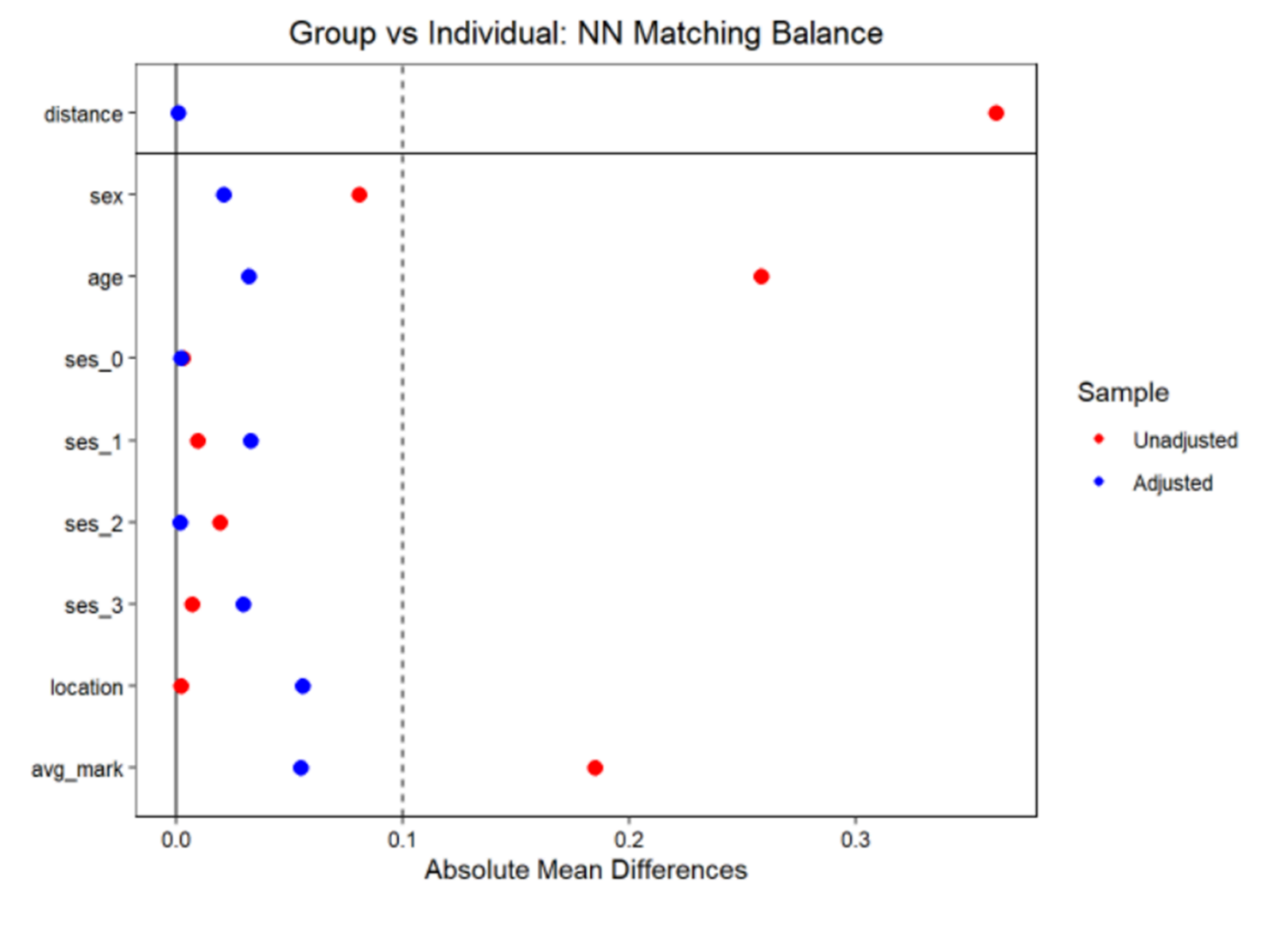


Figure 5

Mean Differences in Covariate Balance Before and After Adjustment Using Nearest Neighbor Matching for Group-Based vs. Individual Extracurricular Activities (ECA)

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Table2.docx