

Volunteering Among Pre-clinical Medical Students: Study of Its Association With Academic Performance Using Institutional Data.

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Research Article

Keywords: student volunteering, service-learning, academic performance, medical education

Posted Date: September 13th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-844975/v1>

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Version of Record: A version of this preprint was published at MedEdPublish on March 30th, 2022. See the published version at <https://doi.org/10.12688/mep.19105.1>.

Abstract

Background: Participating in volunteering activities during students' higher education experience is becoming more commonplace. Studies have noted that volunteering has a positive impact on the academic performance of undergraduate medical students. However, the majority of these studies rely on self-reported data like surveys, interviews, and journals. In this study, we leverage actual institutional data to examining the relationship between volunteering and academic performance among medical students in the pre-clinical phases of the Bachelor of Medicine and Bachelor of Surgery (MBBS) program. The current study also explores the factors that might influence the studied relationship.

Methods: A retrospective-longitudinal analysis was conducted in the College of Medicine at the Mohammed Bin Rashid University of Medicine and Health Sciences (MBRU) in Dubai, United Arab Emirates. Three years of volunteering records for three cohorts of undergraduate medical students enrolled in the MBBS program between 2016 – 2018 were reviewed and analyzed to complete this study. In addition, the correlation between the Annual Grade Point Average (AGPA) and volunteering was studied, and the regression coefficients for the two variables were observed across the three cohorts in each study year.

Results: Analysis of 153 undergraduate medical students' volunteering records revealed a significant positive relationship between the AGPA and the number of volunteering in year two. The correlation was insignificant in year one, year three, and across the three cohorts.

Conclusions: The association between academic performance and volunteering among undergraduate medical students appeared to be positive. However, this relationship differs across the pre-clinical study years in medical school and is likely influenced by factors that impact students' motivation towards volunteering. Therefore, having the volunteerism program embedded in curriculum planning and testing students' personality traits related to volunteering motivation, are aspects to be explored to enhance medical students' learning and professional development through volunteerism.

Background

Participating in volunteering activities during students' higher education experience is becoming more commonplace. Volunteering has been defined as “an intentional behavior, carried out without being a professional obligation and aimed at supporting, preserving and promoting social values, without waiting for any moral or material rewards from others”.¹ While opportunities for students to volunteer may come from places within the community; many volunteering opportunities are offered as part of the university setting itself. In their study of 2,309 undergraduate students, Astin and Sax noted that the majority (51.8%) of students who volunteered did so within their university.² Students volunteer for a variety of reasons, motives, and benefits. These can include a desire to acquire knowledge, develop new skills, participate in experiences that benefit their education and/or careers, and enhance their academic learning.^{1,2}

Volunteering has been shown to positively impact undergraduate medical students, contributing to better psychological health, wellness, and personal development.³⁻⁷ Medical students may participate in various volunteering activities such as providing direct clinical service in public health interventions, holding awareness sessions for the public, providing administrative support for local health authorities, or even volunteering for crisis response.^{8,9} In return, students gain distance from the many stressors of medical school. Studies noted that students' involvement in leading and organizing extracurricular activities resulted in lower burnout levels and helped develop stress management skills.^{4,10-12} Participating in volunteer community service projects has been noted to promote leadership and teaching skills, as well as helping to build student awareness of health needs in their community.⁴ Volunteering has also been shown to promote the development of competencies related to soft skills, such as improved communication, decision-making, social skills, and higher levels of empathy.^{5,10,13}

Within the formal academic environment, students studying to become health professionals must meet specific competencies based on skills, traits, and behaviors required to be an effective health professional. Competency-based frameworks, such as those laid out by the American Council for Graduate Medical Education (ACGME) and the CanMEDS framework from Royal College of Physicians and Surgeons of Canada, assess competencies that take a holistic look at practice, focusing not just on medical knowledge and skills but also interpersonal communication, data literacy, professionalism, leadership, and advocacy.^{6,7} Health professions programs have the challenge of integrating learning opportunities to help build these diverse competencies into an already packed curriculum. In addition, there exists the potential for volunteering activities to supplement the learning of competencies, enabling students to put their professional skills and knowledge to work for the community good while simultaneously promoting the development of competencies.

While volunteering has been shown to have positive benefits for students, it is essential to understand how volunteering may impact academic performance. Studies have noted that volunteering positively impacts academic performance, as indicated by improved overall Grade Point Average (GPA) and student success.¹²⁻¹⁴ As success in educational performance significantly affects students' self-esteem and motivation in higher education, educators and researchers need to identify and understand what factors impact academic performance.^{15,16}

This study will help to inform the literature on volunteering and how it might affect undergraduate medical students' academic performance. While preceding studies have reported findings in this area, most rely on self-reported data like surveys, interviews, and journals. This study is unique in that it leverages actual, institutional data to take a quantitative approach in examining the relationship between volunteering and academic performance across three cohorts of medical students in pre-clinical phases of the Bachelor of Medicine and Bachelor of Surgery (MBBS) program.

This research study aims to examine the association between volunteering and the academic performance of undergraduate medical students. Accordingly, our research questions are:

- What is the relationship between AGPA and student volunteering?

- What are the factors that influence the relationship between volunteering and AGPA?

Methods

Study context

During the five years in which the College of Medicine at the Mohammed Bin Rashid University of Medicine and Health Sciences (MBRU) in Dubai has been in existence, there has been a steady increase in the number and variety of volunteering activities offered to students studying in its MBBS program. The MBRU 6-year MBBS program is divided into a one-year basic sciences phase (year one), a two-year organ system phase (years two and three), and a three-year clinical sciences phase (years four, five, and six). Student progression to the next phase is subject to successful completion of the progression requirements and a minimum cumulative Grade Point Average (cGPA) at the end of the preceding phase. Although volunteering is not required for graduation, it is highly encouraged for students to give back to their community while building confidence and helping students develop competencies needed for their future practice as medical doctors. To examine how volunteering activities might be used to supplement the curriculum, it is first essential to understand the relationship between academic performance and volunteering and explore the factors that influence this relationship.

Study design

A retrospective-longitudinal analysis was conducted in the College of Medicine at the MBRU in Dubai, United Arab Emirates. The study population includes three cohorts of medical students enrolled in the MBBS program between 2016–2018. Since the study was intended to investigate the relationship between the medical students' academic performance and their level of engagement in volunteering, the study was conducted using a correlation research design.

Data collection

Three years of the volunteering records for the three cohorts of undergraduate medical students enrolled in the MBBS program at the MBRU between 2016–2018 were reviewed and analyzed to complete this study. The Annual Grade Point Average (AGPA) for each student was retrieved from the Student Information Self-Service (SIS), and the volunteering activities were retrieved from the student's volunteering record. AGPA and volunteerism data was prospectively collected. The confidentiality of information gathered from the participants' records was preserved. Ethical approval for the study was granted by the MBRU Institutional Review Board (Reference #: MBRU-IRB-2017-003).

Data Analysis

A quantitative approach was adopted as the study was based on variables measured with numbers and analyzed with statistical procedures. The measure of volunteering activities is the number of volunteering events recorded for each student, and the measure of academic performance is AGPA. Spearman's rho non-parametric test was used to measure the strength of association between the two variables, where the value $r = 1$ means a perfect positive correlation and the value $r = -1$ means a perfect negative correlation.

Data from the record were transferred to Microsoft Excel. Standard data entry and quality control procedures were used, including double entry, range and consistency checks, and manual review of outliers. All statistical analyses were performed using IBM-SPSS software (version 25.0). We also used linear regression analysis to estimate the relationships between the two variables. Regression coefficients for the two variables were observed across the three cohorts in each study year.

Results

This study reviewed the volunteering record of 153 medical students enrolled in the MBBS program at MBRU between 2016–2018. The ratio of females (n = 117, 76.5%) to males (n = 36, 23.5%) and the ratio of volunteering (132, 86.3%) to non-volunteering (21, 13.7%). Participants' characteristics are presented in Table 1.

Table 1
Description of the study sample by study year and cohort, n = 153

Study year	Cohort	Male	Female	UAE	Non-UAE	Non-volunteering	Volunteering	Total
Year 1	Total	36 (23.5%)	117 (76.5%)	50 (32.7%)	103 (67.3%)	21 (13.7%)	132 (86.3%)	153 (100%)
	First cohort	15 (27.8%)	39 (72.2%)	11 (20.4%)	43 (79.6%)	0 (0%)	54 (100%)	54 (100%)
	Second cohort	8 (21.6%)	29 (78.4%)	15 (40.5%)	22 (59.5%)	11 (29.7%)	26 (70.3%)	37 (100%)
	Third cohort	13 (21.0%)	49 (79.0%)	24 (38.7%)	38 (61.3%)	10 (16.1%)	52 (83.9%)	62 (100%)
Year 2	Total	23 (25.3%)	68 (74.7%)	26 (28.6%)	65 (71.4%)	24 (26.4%)	67 (73.6%)	91 (100%)
	First cohort	15 (27.8%)	39 (72.2%)	11 (20.4%)	43 (79.6%)	10 (18.5%)	44 (81.5%)	54 (100%)
	Second cohort	8 (21.6%)	29 (78.4%)	15 (40.5%)	22 (59.5%)	14 (37.8%)	23 (62.2%)	37 (100%)
Year 3	Total	15 (27.8%)	39 (72.2%)	11 (20.4%)	43 (79.6%)	5 (9.3%)	49 (90.7%)	54 (100%)
	First cohort	15 (27.8%)	39 (72.2%)	11 (20.4%)	43 (79.6%)	5 (9.3%)	49 (90.7%)	54 (100%)

Relationship between AGPA and volunteering

Generally, the volunteering activities made available for all students during the three academic years focused on interpersonal communication, professionalism, and leadership skills. Tables 2 and 3 display the statistical analysis performed to measure the strength of the relationship between volunteering and

academic performance using Spearman's rho non-parametric test. The measure of volunteering activities is the number of volunteering events recorded for each student, and the measure of academic performance is AGPA.

Table 2

Statistical analysis of the annual grade point and number of volunteering non-parametric correlations per study year

Study year		Correlation Coefficient	*Sig. (2-tailed)	Number of students	Number of offered activities
Spearman's rho non-parametric test					
Year1	AGPA/ Event	-0.024	0.769	153	87
Year2	AGPA/ Event	0.209	0.047	91	69
Year3	AGPA/ Event	0.194	0.159	54	47

Table 3

Statistical analysis of the annual grade point and the number of volunteering non-parametric correlations per cohort.

Cohort		Correlation Coefficient	*Sig. (2-tailed)	Number of students	Number of offered activities
Spearman's rho non-parametric test					
Cohort 1	AGPA/ Event	-0.062	0.654	54	87
Cohort 2	AGPA/ Event	0.236	0.430	37	69
Cohort 3	AGPA/ Event	0.160	0.215	62	47
AGPA: annual grade point average; Event: number of volunteering per student.					
*. Correlation is significant at the 0.05 level (2-tailed).					

The results in Table 2 revealed that significant positive relation between the AGPA and the number of volunteering was observed in year 2 records ($r = 0.209$; p-value is 0.047), in year 3 ($r = 0.194$; p-value is 0.159) the correlation was positive but insignificant and in year 1 ($r = -0.024$; p-value is 0.769) the result shows negative insignificant association. Furthermore, the correlation coefficient between the AGPA and number of volunteering activities was tested across the three cohorts and it was positive insignificant correlation in cohort 2 ($r = 0.236$; p-value is 0.430) and cohort 3 ($r = 0.160$; p-value is 0.215) while in cohort 1 there was negative insignificant correlation ($r = -0.062$; p-value is 0.654) (Table 3).

The correlation between the AGPA and the number of volunteering activities across the three cohorts and within different study years is demonstrated in the scatter plots, with the confidence levels for all

regressions are noted in the results (Figs. 1 and 2). The advantage of this form of analysis is that it allows us to observe and understand the effects of multicollinearity in the longitudinal data set.

Factors that influence the relationship between volunteering and AGPA

The results in Table 4 show that the mean for the UAE and non-UAE number of volunteering was 4.64 (\pm 0.79) and 7.41(\pm 0.68), respectively. This was statistically significant (p-value = 0.009). Also, the analysis shows that the mean for the female and male number of volunteering was 6.41 (\pm 0.62) and 6.81(\pm 1.06), respectively. This was statistically insignificant (p-value = 0.756).

Table 4
Descriptive Statistical analysis of the nationality/gender and number of volunteering.

a. Volunteering vs. gender						
	Gender	N	Mean	Std. Deviation	Std. Error Mean	*Sig.
No Volunteering	Female	117	6.4103	6.73277	.62245	p-value = 0.756
	Male	36	6.8056	6.37773	1.06295	

b. Volunteering vs. gender						
	Nationality	N	Mean	Std. Deviation	Std. Error Mean	*Sig.
No Volunteering	UAE	50	4.6400	5.60889	.79322	p-value = 0.009
	Non-UAE	103	7.4078	6.92174	.68202	

*P-value of 0.05 was used as a level of significant

The distribution of the total volunteering of the three cohorts between three AGPA categories is illustrated in Fig. 3. Students with optimal performance (AGPA 2.5–3.5) had a higher number of volunteering events than suboptimal performance students (AGPA < 2.5) and high-performance students (AGPA > 3.5). The number of volunteering events for students with suboptimal performance, optimal performance, and high performance is 148, 611, and 221, respectively.

Discussion

This study demonstrated the relationship between volunteering and academic performance, represented by AGPA, in the pre-clinical phase of undergraduate medical education. Unlike many previous studies that rely on student self-reported data, our study was able to use actual institutional data to understand this relationship. Another unique aspect of this research was conducted in the UAE, as much of the research on this topic reports findings from North America or Europe.

Relationship between volunteering and AGPA

The results of the current study suggested a positive correlation between AGPA and volunteering among medical students. However, this relationship differs across the three pre-clinical study years. In year one, the relationship was negative ($r = -0.024$), while in years two and three, the relationship was positive ($r = 0.209$ and $r = 0.194$ respectively). However, it was only significant in year two (p -value is 0.047). Our observation concurs with Tinto (1993), who studied students' decisions to volunteer and reported that the transition from high school to college might affect students' inclination to volunteer based on factors such as the consistency in norms and expectations between past environment and new ones and how well prepared students are to navigate participation and involvement in a new environment.¹⁷ First year in a medical college is usually a transition phase from high school to college where the uncertainty level among the students witnessed to be elevated.¹⁸ Students may not be immediately aware of the balance between academics and non-academics needed to maintain academic standing, with first years especially feeling this stress as they have the added pressure of ensuring they fulfill the progression requirement mandated in the degree plan of the MBBS program, where the student is required at the end of year one to achieve minimum AGPA to progress from phase 1 (year one) to phase 2 (years two and three).

As for the year one students, an insignificant negative correlation was reported in the first cohort ($r = -0.062$; p -value is 0.654). The students in Cohort 1 are unique in that they were the first cohort of students in the newly founded university, who are nicknamed "The Pioneers". There is a high likelihood that these students had the same degree, or even greater degree, of uncertainty, which could have reduced students' motivation to volunteer. This may aid to elucidate the obtained negative correlation between the two variables in year one and first cohort students. Cohort 1 also had access to a limited number of volunteering activities in the early years, with more competition over these limited slots, which could also explain the insignificant negative relationship between the two variables.

A positive insignificant correlation was observed across Cohort 2 and Cohort 3 ($r = 0.236$; p -value is 0.430 and $r = 0.160$; p -value is 0.215 respectively). The positive relationship in later cohorts and years two and three could support the claim that students are more assured of their environment after year one and feel more empowered to volunteer while maintaining achieved AGPA. Despite the assuring environment, the positive relationship was not significant, except in year two. Holdsworth (2010) explored how student motives to volunteer change over time, noting 'opportunity' as one motivation contributing to whether or not a student would volunteer their time. Opportunity "capture circumstances that students find themselves in" which includes commitments to external activities and having spare time.¹⁹ Year two is noteworthy because it is the only year of the first three years that does not have high stakes and a high-pressure end-of-year bar exam.

The types of volunteering activities could also be a factor. It is noteworthy that most activities available across the three study years were primarily focused on interpersonal and communication skills. Year three students may not find these activities of great interest as their motives for volunteering may shift towards activities that build hands-on skills in preparation for clinical placements. Skills building was noted as a motive in Holdsworth (2010), and Handy et al., (2010) described how often initial motives for students to

volunteer is to contribute to the development of their resume.^{19,20} Intergenerational interactions and community-oriented experiences can provide medical students with experiential learning opportunities beyond a traditional medical school curriculum.⁶ These experiences hone essential communication skills and promote an increased understanding of the contextual health problems faced by community members.⁶

Notably, a significant positive correlation between the two variables was observed in year two. Students are perhaps better oriented and aware of expectations, with more personal development in an assuring environment. They are also alleviated from stress related to having to sit a progression bar exam hence, they may be more willing to navigate participation and involvement in volunteering activities.

Influencing factors

Students on the higher and lower ends of academic performance, as expressed by AGPA, volunteered less frequently than students with optimal performance. Our results do not agree with the findings of previous literature, which suggested that students with higher levels of service/service-learning reported higher grades, attendance, and other academic success outcomes.^{21,22} Our results in Fig. 3 indicated that students with optimal performance are engaged in voluntary activities (AGPA 2.5–3.5; events 611) more than those with suboptimal performance (AGPA < 2.5; events 148) or high-performance students (AGPA > 3.5; events 221). Students with optimal academic performance and volunteering engagement may have the personality traits to build a work-life balance, hence they are expected to create a harmonious work-life integration that is critical to improving physical, emotional, and mental well-being and ultimately improvement of their career.²³ Students on the highest and lowest ends of academic performance demonstrated a low level of participation in volunteering probably because students with lower AGPAs are more concerned about their academic standing, whereas students with higher AGPAs are more focused on academic aspects. Types of volunteering activities could also have an impact on the students' motivation towards volunteering.

Characteristics of students who volunteer

The results of this study show that there is equal participation in volunteering from a gender perspective as both females and males have a similar level of involvement in volunteering activities (mean of volunteering number 6.41 ± 0.62 and 6.81 ± 1.06 respectively; p -value = 0.756), though the percentage of females (76.5%) among the studied population is far more than that of the males (23.5%). Additionally, the level of participation in volunteering activities among non-UAE nationals was significantly higher than that of the UAE nationals (mean of volunteering number 7.41 ± 0.68 and 4.64 ± 0.79 respectively; p -value = 0.009). Given the limited amount of research in this area using the UAE as a context, it is impossible to account for why non-UAE nationals volunteer more than UAE nationals. However, Astin & Sax found that the predisposing factor for volunteering was that the student had volunteered while in high school.² The UAE has a unique cultural landscape featuring a diversity of high school curriculum, with many attending private schools and some UAE nationals attending government schools. A further area of exploration could

include taking a deeper look at students' high school context to determine better if the student had previous volunteering experience or if certain high school curriculums promote volunteering more than others.

Limitations

This study has several limitations. First, any volunteering the student might have participated in outside of the university that was not reported to the university was not considered in the student's volunteering record. This might have introduced a shortage in the actual volunteering record of the students. Second, the data in this study constitutes a sample from a single medical school. It would be worthwhile to conduct follow-up studies that compare several programs across multiple institutions and extend the research to include the clinical phases of the medical program.

Volunteering is a long-term commitment that should be approached through a motivational orientation and provides significant practical implications for students.⁹ It has been described that an organization's reputation as well as a student's culture and dispositional factors such as personality traits, beliefs, and values, influence students decision to volunteer.⁸ A case study of students in the UK suggests that both students and stakeholders recognize that the promotion of volunteering should seek to align institutional practices to promote and support volunteering with young people's expectations and aspirations.²⁴ Previous research recommended preventing mandatory volunteerism in educational institutions as these policies tend to decrease future intentions to volunteer.¹¹

Future work

Further research directed to test students' personality traits related to volunteering motivation and motivational orientation (extrinsic/ intrinsic) are required to provide an indication of the functional motives that are most salient to students and inform in the design of a rewards system that could motivate students to volunteer further. Moreover, medical schools can seek to explore how volunteering opportunities can promote the development of competencies and values, such as encouraging intergenerational volunteerism by emphasizing a culture of community involvement; connecting students with volunteer opportunities that are in alignment with the phase of their educational development; and providing the guidance necessary to create new volunteer initiatives, including financial and promotional support. Exploring the development of an institutional infrastructure to promote student volunteerism would benefit the community population and help to empower and provide learning experiences for a vulnerable student population during times of extraordinary uncertainty, such as with the current COVID-19 pandemic. Further studies can inductively explore the extent of alignment between volunteering and degree plans to understand antecedents to academic performance (e.g., volunteering variables) that could play a moderating or mediating role in the correlation studied in this research.

Conclusions

This study reported a positive association between academic performance and volunteering among undergraduate medical students. However, this relationship differs across the pre-clinical study years in

medical school and is likely influenced by factors that impact students' motivation towards volunteering. Based on these findings, students' motivating factors towards volunteerism should receive more attention from educational institutions. Additionally, the institutional infrastructure to promote student volunteerism should be embedded in curriculum planning and assessment. More emphasis should be placed on the quality of involvement in extracurricular activities rather than the quantity. Research directed to test students' personality traits related to volunteering motivation is required to indicate the functional motives that are most salient to the students and guide in designing a rewards system that can motivate them to volunteer further.

Abbreviations

ACGME: American Council for Graduate Medical Education

MBRU: Mohammed Bin Rashid University of Medicine and Health Sciences

MBBS: Bachelor of Medicine and Bachelor of Surgery

GPA: Grade Point Average

AGPA: Annual Grade Point Average

SIS: Student Information Self-Service

AY: Academic Year

Declarations

Ethics approval and consent to participate

The Mohammed Bin Rashid University of Medicine and Health Sciences Institutional Review Board (MBRU-IRB) reviewed and approved the present study (MBRU-IRB-2020-042). Further clarification can be obtained from the MBRU-IRB at irb@mbru.ac.ae.

All methods were performed following the relevant guidelines and regulations (Declaration of Helsinki). No students were enrolled for this study hence informed consent was waived off by the MBRU-IRP. The data presented in this study is the student feedback that is collected end of each simulation session and usually conducted for all courses and the pre/post assessment conducted as part of the course assessment plan. No questionnaire or survey was separately created or designed for this study. This was indicated in the IRB application that was submitted to MBRU-IRB, which approved the waiver.

Consent for publication

Not Applicable.

Availability of data and materials

The datasets generated and/or analyzed during the current study are not publicly available. However, they form a part of the student assessment record and feedback for an individual course at MBRU but are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

No funding was obtained for this study.

Authors' contributions

Laila Alsuwaidi assisted with study design and interpretation of the data, had full access to the study data, assumes responsibility for the integrity of the data and the accuracy of the analysis, and drafted the manuscript. Leigh Powell assisted with the interpretation of the data and drafted the manuscript. Deena Alhashmi contributed to the final editing of the manuscript. Amar Hassan conducted the statistical analyses. Nabil Zary assisted with the interpretation of the data and contributed to the final editing of the manuscript. All authors read and approved the final manuscript.

Acknowledgments

We express our sincere gratitude to Dr. Alawi Alsheikh-Ali, Professor of Cardiovascular and Founding Dean of the College of Medicine, MBRU for reviewing the manuscript and providing valuable comments. We also thank the MBRU members who contributed to the student volunteering record keeping, including Manar Abdullah and Rasha Al Ali from Student Services and Registration Department.

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Figures

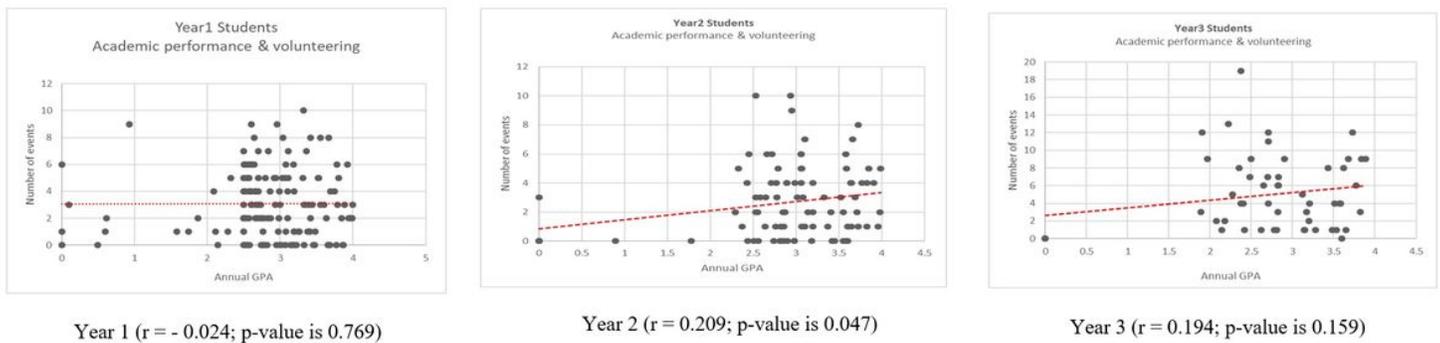


Figure 1

Correlation of annual grade point and number of volunteering for year 1, year 2, and year 3 students

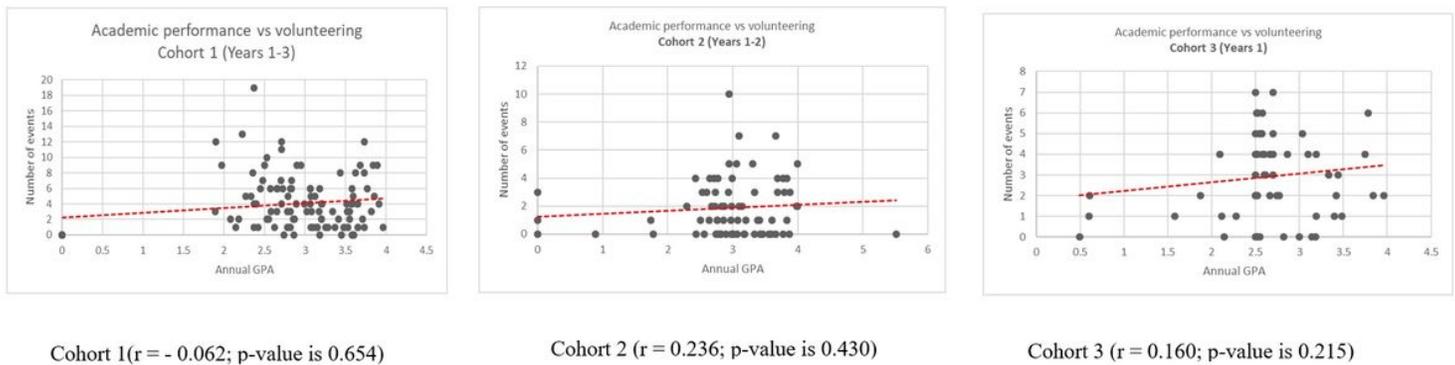


Figure 2

Correlation of annual grade point and number of volunteering for Cohort 1, Cohort 2, and Cohort 3 students

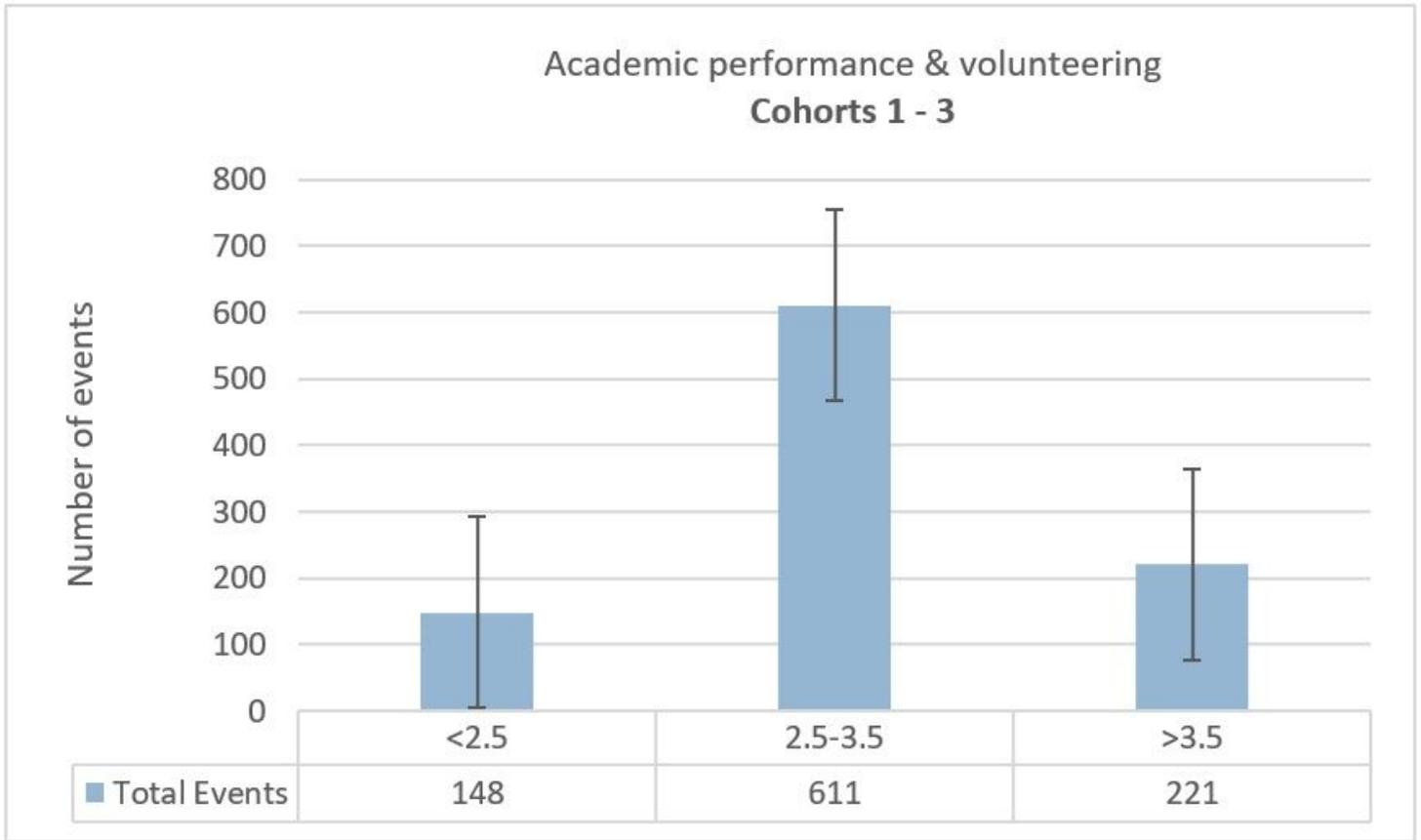


Figure 3

Bar chart illustrates the spread of the three cohorts' data between three annual Average Grade Point categories