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Learning the Hard Way: The Effect of Violent Conflict on Student Academic Achievement

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ABSTRACT

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We study the effect of the Israeli-Palestinian conflict on the probability to pass the final high-school exam for Palestinian students in the West Bank during the Second Intifada (2000-2006). By exploiting within-school variation in the number of conflict-related Palestinian fatalities during the academic year, we show that the conflict reduces the probability to pass the final exam and to be admitted to the university. We also provide evidence of the heterogeneous effects of the conflict in terms of ability of the student and type of violent event the student is exposed to. Finally, we discuss possible transmission mechanisms explaining our main result.

JEL Classification: I20, 012, O15, F51

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1) Introduction

Differences in academic achievement play a crucial role in explaining individual and across-countries differences in earnings and economic well-being (Card, 1999; Hanushek and Woessmann, 2011). Individual academic achievement can be influenced by several factors such as personal, household and school characteristics as well as local and national socio-economic conditions (Glewwe and Kremer, 2006). In this paper, we investigate one potentially important but little studied determinant of academic achievement, namely be living and attending school in a locality affected by a violent conflict.

Recent research on the micro-level effects of violent conflicts has provided robust evidence of the negative impact of conflicts on the quantity of education as measured by different educational outcomes, namely school enrollment, school attendance and school attainment (Buvinic et al., 2013; Leon, 2012; Justino, 2012; UNESCO, 2011). Yet, there are still significant knowledge gaps concerning both the effects of the conflict on the quality of education as measured by academic achievement and the mechanisms underlying such possible effects, in particular for high-school students. Answering these questions is important because the quality of education – more than quantity – is a predictor of future income earning, especially when university entrance is determined by high-school final exam performance. Moreover, learning about the effects of conflict on high-school students is crucial to better understand the impact of a violent conflict on the development perspectives of an economy because those students represent large part of the future human capital of the country.

While the relevance of these questions is clear, to the best of our knowledge there are no studies on the effects of a violent conflict on the quality of high-school education. The main reason for that is a dearth of data. First, violent conflicts often happen in developing countries where collecting data on academic achievement is very difficult. The conflict usually only makes that even more so. Second, the identification of the effect of conflict on the quality of education requires detailed data to measure conflict intensity. These are seldom available.

This paper provides the first empirical analysis of the effects of a violent conflict on the quality of education for high-school students as measured by their academic achievement. Specifically, we study the effect of the Israeli-Palestinian conflict on the individual result at school-leaving exam (Tawjihi General Examination) for all the high-school students in the

West Bank during the Second Intifada (2000-2006), a period of intensified violence between the Israel Defense Forces (IDF) and the Palestinians.[1] The Tawjihi General Examination is a crucial test for any Palestinian student since its result determines not only whether or not the student obtains the high-school diploma but also - depending on the exam score - the possibility to be admitted to the university in Palestine and abroad. Our results show that the conflict significantly reduces the student's probability to pass the final exam and to get the minimum test score needed for the admission to the university. Moreover, we provide suggestive evidence about the role of two mechanisms in explaining the negative effect of the conflict on individual academic achievement. The first mechanism is the negative effect of the conflict on the quality of the school learning environment. The second is the conflict-induced worsening in the psychological well-being of the student due to the exposure to conflict-related violence.

The characteristics of our data allow us to overcome the main limitations of previous analysis. In our empirical analysis we combine three datasets. The first contains unique data on the individual test score at the final high-school exam (Tawjihi General Examination) for the whole population of male and female students enrolled in the Arts (Adabi) and the Scientific (Elmi) curricula in high-schools in the West Bank for all academic years of the Second Intifada (2000-2006). The second dataset contains information on the characteristics of the schools such as number of students, number of teachers, average size of the class and average overcrowding in the classroom. The third one contains detailed information on all conflict-related Palestinian fatalities happened during the Second Intifada. These include the age, gender and nationality of the victim, the date and locality and of the event and a brief description of the circumstances of the event. These comprehensive conflict dataset allows us to construct an accurate measure of conflict intensity at the locality level for each year of the conflict.

The Israeli-Palestinian conflict is one of the longest and (still today) politically most relevant conflicts in the world and provides a very suitable context for the analysis of the effects of a violent conflict on academic achievement of high-school students for different reasons. First, the high-school enrollment rate in the West Bank is quite high by international standards,

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[1] The First Intifada - the name given to the first Palestinian uprising against the Israeli occupation of the Palestinian Territories - lasted from December 1987 until 1993.

which allows us to have a large population to analyze.[2] Second, the Israeli-Palestinian conflict - while with different peaks and downs – can be considered as a low-intensity one as compared to most other violent conflicts. This implies that the functioning of the basic elements of the economy (such as the education system) were never interrupted in the West Bank, in contrast with what happens in countries affected by extreme violent conflicts and genocide episodes. Third, it is a conflict characterized by significant time and geographical variation in violence for which detailed information is available.

Our analysis proceeds in two steps. As a first step, we estimate the effect of the conflict on individual result at the high-school final exam. To this end, we use the spatial and time variation in conflict intensity - as measured by locality-level number of all Palestinian fatalities caused by the Israeli Defence Forces (IDF) during the academic year - to identify the effect of the Israeli-Palestinian conflict on individual academic achievement. By exploiting the within-school variation over time in the number of fatalities, we show that the conflict reduces the probability to pass the exam and to get into university. We provide evidence that these results are not due to migration choices, sample selection or reverse causality. Finally, we show that these results are robust to placebo tests, to different samples and econometric models, and to different proxies used to measure conflict intensity and academic achievement. Next, we document the heterogeneity in the effect of the conflict. Among these results, two are particularly interesting. First, we find evidence of a heterogeneous effect of the conflict depending on the ability level of the student, with the high-ability students being less negatively affected than the low-ability ones. Second, we find that the magnitude of effect of the conflict on academic achievement is not only related to the intensity of the conflict but also to the type of violent event to which the student is exposed to. It turns out that the impact of the conflict on student performance is different depending on the characteristics of the victim of the violence (adult or young) and by whom caused the fatality (IDF or the Palestinians, etc.).

The second step in our analysis is to look for possible transmission mechanisms that explain why the conflict has a negative effect on academic achievement. We find two potential candidates for this role. As a first mechanism, we show that the conflict negatively affects the quality of the school learning environment as proxied by school characteristics such as the

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[2] In 2006, the Net Enrolment Ratio (NER) in secondary school in the West Bank was 81% (UNESCO, 2007).

average classroom size, the students/teacher ratio and the average overcrowding in the class. Next we show how the conflict-induced changes in these characteristics are in turn correlated with lower probability to pass at the final exam. The second mechanism we explore is the worsening in the psychological well-being of the students due to their exposure to conflict-related violence. We show that the effect of the conflict is stronger if the fatalities happen closer in time to the date of the exam and the more similar the student is to the victim. Both these results suggest a possible psychological component in the explanation of the negative effect of the conflict on academic achievement and are coherent with the clinical and psychological literature on the effects of the Israeli-Palestinian conflict on Palestinian adolescents.

Our paper is related to three different strands of literature. The first one is the literature on the microeconomic effects of violent conflicts on education (see Blattman and Miguel (2010) and Justino (2012) for a review of the literature). The empirical evidence indicates that the effects of violent conflicts on education are highly heterogeneous. The sign and magnitude of the effects depend, among other elements, on the characteristics of the country and of the conflict, on the age, gender and ability of the student and on the education outcome considered (see for instance Blattman and Annan, 2010; Chamarbagwala and Morán, 2010; de Groot and Goksel, 2011; Leon, 2012; Justino et al., 2013; Kibris, 2014; Rodriguez and Sanchez, 2012; Shemyakina, 2011; Valente, 2013). The second is the large literature on the determinants of academic achievement (see for instance, Angrist and Lavy, 1999; Åslund et al., 2011; Duflo et al. 2011; Goux, and Maurin, 2007; Houtenville and Conway, 2008; Hoxby, 2000; Newhouse and Beegle, 2006; Rivkin et al., 2005). Only few contributions have looked at the relation between school and neighbourhood violence and students' academic performance (see Grogger, 1997; McGarvey et al., 2006). The negative association they find is explained by the violence-induced increase in stress and psychological disorders suffered by the students (see Aizer (2008) for a review and a critique). Using detailed individual data, Monteiro and Rocha (2013) find a negative effect of gang violence in Brazilian favelas on math tests score for primary school students. Favela violence is also positively correlated with higher teacher absenteeism, principal turnover, and number of school closing days suggesting that school supply is an important mechanism explaining the effect of the violence by drug gangs on student achievement. The results from this literature are relevant to our analysis to the extent to which exposure to neighbourhood violence can be assimilated to exposure to a

situation of low-intensity but continuous conflict as the one experienced by Palestinian students during the Second Intifada. Finally, our paper is related to the literature on the socio-economic effects of the Israeli-Palestinian conflict. These studies have documented the negative impact of the Second Intifada on the Palestinian economy (Mansour, 2010; Miaari and Sauer, 2011; Cali and Miaari, 2013; Amodio and Di Maio, 2014), on the working of the education system (Right to Education Monitor, 2004; Pedersen et al., 2001; Sletten and Pedersen, 2003; Nicolai, 2007; Forced Migration Review, 2009) and on school attendance of Palestinian primary school students (Al Kafri, 2003; Di Maio and Nandi, 2013).

Our paper contributes to the literature in several ways. First, we provide the first analysis of the impact of a violent conflict on individual academic achievement of high-school students. While the majority of previous studies looked at the effect of the conflict on quantity of education (*extensive margin*), as measured by education enrolment, attendance or attainment, we are the first to consider the impact of a violent conflict on the quality of education (*intensive margin*), as measured by the test-score results at the school-leaving examination. Second, we provide novel evidence of the individual-level heterogeneity of the effects of the conflict. Our unique dataset allow us to explore aspects that previous studies having as unit of analysis school-level observations could not consider. In particular, we can explore the effect on individual academic achievement of being exposed to different types of violence. Third, we provide evidence on the existence of two specific mechanisms explaining the impact of the conflict on academic achievement. Understanding the channels through which the conflict impact on the student is crucial since it is a necessary precondition to the design of any policy intervention aiming at mitigating the impact of the conflict. Fourth, our paper - by focusing on high-education rather than as most commonly done on primary one - is one of the few studies looking at the effects of a violent conflict on those individuals representing the larger component of the future human capital of a country and thus expected to play a crucial role in the development prospects of the economy. Fifth, by using different measures of conflict intensity, our analysis shows that the type of violent event to which the student is exposed to influence the magnitude of the effect of the conflict on her academic achievement. Finally, our paper is a novel contribution to the literature analysing the effects of the Israeli-Palestinian conflict being the first to look at the impact of the conflict on higher-education in the West Bank.

The paper proceeds as follows. The next section provides some background on the Israeli-Palestinian conflict and on the Second Intifada. It also discusses the main characteristics of the secondary education system and of the Tawjihi General Examination in the West Bank. Section 3 describes the data. Section 4 discusses the econometric model and the identification strategy. Section 5 presents the regression analysis and the results. Section 6 discusses the possible transmission mechanisms behind our main results. Section 7 concludes.

2) Background

The Israeli-Palestinian conflict is one of the longest - having started in 1948, and most politically relevant conflicts in the world. As a result of the Six Days War in 1967, the West Bank and the Gaza Strip (previously part of Jordan and Egypt, respectively) were occupied by Israel. In 1993, the Oslo Accord created the Palestinian National Authority (PNA) and for the first time Palestinians had the control over some civilian matters (e.g. education, health and taxation) in both the West Bank and the Gaza Strip. Israel maintained the control over the strategic issues of security, foreign trade and border controls.

The Second Intifada (also called the Al-Aqsa Intifada) started in September 2000, ending the relatively peaceful period that followed the Oslo Accord. The Second Intifada has been a violent revolt against the Israeli occupation characterised by frequent clashes between Palestinians and the IDF.[3] During that period, numerous violent actions were perpetrated by both the Palestinians and the IDF including the killings of civilian and Palestinians militants in the OPT, Palestinian suicide attacks in Israel, assassination of Palestinians leaders in Palestine and demolitions of Palestinian houses by the IDF. Among other measures, IDF has also imposed days of closures of the borders between Israel and the OPT and used check-points to restrict the movement of goods and people within the West Bank and the Gaza Strip (Cali and Miaari, 2013). Given the nature of the conflict, it is not surprising that the number of fatalities has been highly asymmetrical. Between 2000 and 2006, Palestinians killed 234 Israeli civilians and 226 IDF soldiers while the IDF caused more than four thousand

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[3] For a detailed description of the different period of violence during the Second Intifada see (Jager and Paserman (2008).

Palestinian fatalities (B'Tselem, 2007). While the intensity of violence varied over time and localities, the conflict situation has persisted during the whole period.

Since the Oslo Accord, the education system in the OPT is managed by the Palestinian Ministry of Education and Higher Education (MoEHE). In the West Bank (WB), education is compulsory for ten years starting at age of six.[4] At the end of the 10th grade, the student chooses if she wants to attend two additional years of school. There are two curricula between which high-school students can choose: Arts (Adabi) and Scientific (Elmi). There are no differences as for the conditions to get into one or the other curriculum. For instance, the geographical distribution of the schools offering each curriculum is fairly homogenous (World Bank, 2011) and the fee to be paid is the same (27 USD *per year*). This suggests that students can equally choose either one of the two high-school curriculum.[5]

At the end of these two years, all students take a final exam called Tawjihi General Examination. The exam takes place at the end of the academic year (end of June) on the same day in all schools in the WB under exactly the same conditions. The exam is different for the Arts and the Scientific curriculum in terms of both subjects and for the weight given to each subject in the total test score.[6] The exam is graded by an external commission nominated by the MoEHE.[7] There are four possible outcomes: 1) *Pass Exam*: the student got 50% (of the grade) or more in all the subjects; 2) *Incomplete*: the student got less than 50% (of the grade) in one or more subjects; 3) *Fail*: the student who was *Incomplete* the previous year got less than 50% in one or more subjects; 4) *Mahrom:* the student did not attend the exam or the student took the exam but she counterfeited during the exam.

While to get the high-school diploma is sufficient to pass the final exam, the actual test score result is important because it determines the likehood of being accepted in a university in Palestine or abroad. In the WB, the minimum score at the Tawjihi General Examination

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[4] The education system is divided into three levels: elementary school from the 1st grade till the 6th grade; middle school from the 7th till the 10th; and high school (secondary school) from the 11th grade till 12th grade. For a detailed analysis of the Palestinian education system and of its recent evolution see Nicolai (2007).

[5] One difference between the two curriculum is that graduates with a scientific (Elmi) Tawjihi Certificate may apply for all majors at the university, whereas graduates with an arts (Adabi) Tawjihi Certificate are limited in their choice to majors taught in the faculty of arts, economics, business administration and law.

[6] See Appendix 1 for details.

[7] There is a strong incentive mechanism for the teachers to prepare the students at their best. The teacher whose students had a particularly poor performance in a specific subject compared with other subjects in the same school are transferred or turned back to lower grade. It follows that a negative exam result for the student is against the interest of the teacher.

required for the admission to the university is 65% while there are higher minimum test scores for the admission to some specific majors. For instance, the minimum test score for the admission to Engineering is 85% which is also the score required for the admission as a foreign student to most of the universities in other Middle East countries.

3) Data

Our analysis combines several datasets coming from different sources. The first dataset includes unique data on the individual test scores in all subjects at the high-school final exam (Tawjihi General Examination) for the whole population of Palestinian students enrolled in the final year of the Arts and the Scientific curricula in the West Bank for all the academic years between 2000 and 2006. These data are provided by the Palestinian Ministry of Education and Higher Education (MoEHE). The dataset also includes information on the age, gender and religion of the student and the curriculum (Arts/Scientific), the identification number and the locality[8] of the school the student is enrolled into.

Table 1 reports descriptive statistics for the 138,135 students included in our analysis. Female students are the majority of the total student population (55%), have higher average test scores at the final exam and also a higher probability to pass the exam with respect to male students.

Table 1: Gender distribution, average test score and percentage of high-school students passing the final exam in the West Bank during the Second Intifada

	Average test score	Pass	Number of Students
Males	602	68%	62,532
Female	672	78%	75,603
All students	640	72%	138,135

Note: Authors' calculations based on MoEHE data. *Average test score* is the average total test score at the final exam. *Pass* is the share of students that passes the exam. A student passes the exam if she gets at least 50% of the subject's maximum grade in all the subjects (i.e. 500).

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[8] The locality is the smallest administrative unit used by the Palestinian Central Bureau of Statistics (PCBS). There are 284 localities in the West Bank

The second dataset - also provided by the MoEHE - includes information on the characteristics of the 555 high-schools in the West Bank. These are: the locality of the school, the type of curriculum offered (Arts/Scientific) [9], the number of students, the number of teachers, the average size of the classrooms and the average overcrowding in the classroom.[10] Table 2 reports the descriptive statistics for these variables. We merge the dataset on school characteristics with the dataset containing the individual test scores by the identification number of the school which is present in both datasets.

Table 2: Descriptive statistics of the characteristics of the high-schools in the West Bank during the Second Intifada.

Variable	Observations	Mean	Std. Dev.	Min	Max
Number of Students	3830	449.1	177.1	10.0	1733.0
Number of Teachers	3830	24.5	8.2	2.3	104.5
Average Size of the Classroom	3830	40.1	9.5	11.3	246.2
Average Overcrowding in the Class	3830	1.5	0.6	0.6	11.3

Note: Authors' calculations based on MoEHE data. *Number of Students* and *Number of Teachers* are measured at the school level. *Average Size of the Classroom* is the school-level average size of the classroom measured in squared meters. *Average Overcrowding in the Class* is the ratio between average number of students per class and average size of the classroom at the school level. *Mean* is the mean of the corresponding variable computed over the Second Intifada (2000-2006) period. *Std.Dev* is the standard deviation of the variable computed over the Second Intifada period. *Min* and *Max* are the minimum and the maximum value of the variable computed over the Second Intifada period.

The third dataset contains information on all the Palestinian fatalities occurred during the Second Intifada. These data are collected by the Israeli NGO B'Tselem and are considered accurate and reliable by both the Israelis and the Palestinians (Mansour and Rees, 2012). For each Palestinian fatality, the dataset indicates the name, the age, the gender of the victim, the location of the event and a description of the circumstances of the event. Using the available information for each fatality, we construct our main variable to measure conflict intensity as the total number of *all* Palestinians killed by Israeli Defence Forces (IDF) in each locality

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[9] Of these 555 schools, 274 offer both the Arts and the Scientific curricula, 260 only the Arts one and 21 only the Scientific one. The dataset also provides information on a set of school-level characteristics among which:

[10] The average size of the classroom is the school-level average size of the classroom measured in squared meters. The average overcrowding in the classroom is the ratio between the school-level average size of the classroom and the school-level average number of students per class.

during each academic year.[11] We merge our conflict intensity variable with the other two datasets using the information on the locality of the event.

Table 3 reports the descriptive statistics for Palestinian fatalities occurred between the beginning of the Second Intifada in September 2000 and June 2006 (the end of the 2005/2006 academic year).[12] The total number of Palestinian fatalities during the period under consideration is 1495, the yearly average number at the locality level is 1.1, standard deviation is 5.8 and the maximum is 105.

Table 3: Descriptive statistics for Palestinian fatalities in the West Bank during the Second Intifada

	Fatalities	Mean	SD	Max
Academic year 2000-2001	224	1.2	3.9	31
Academic year 2001-2002	592	2.8	1.2	105
Academic year 2002-2003	273	1.2	5.4	52
Academic year 2003-2004	176	0.7	3.7	41
Academic year 2004-2005	116	0.4	2.4	26
Academic year 2005-2006	114	0.4	2.1	23
All periods	1495	1.1	5.8	105

Note: Authors' calculations based on the B'Tselem dataset. *Fatalities* is the total number of Palestinians fatalities occurred during the corresponding period. *Mean* is the average number of Palestinian fatalities at the locality level for the corresponding period. *SD* is the standard deviation of the number of Palestinian fatalities at the locality level for the corresponding period. *Max* is the highest number of fatalities occurred at the locality level during the corresponding period.

The information present in the B'Tselem dataset allows us to identify three specific types of Palestinian fatalities. These are: 1) young Palestinians fatalities (less than 18 years old); 2) Palestinians not taking part in the hostilities killed by the IDF; 3) Palestinians killed by

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[11] Previous studies on the Israeli-Palestinian conflict have used a variety of variables as proxy of the conflict intensity: number of closure days, number of Palestinian suicide bombings in Israel, number of district-level Palestinian fatalities, etc. With respect to those, the number of Palestinian fatalities measured at the locality level (which is the finest level of disaggregation for administrative data in Palestine) provides a significantly more accurate measure of conflict intensity.

[12] The Second Intifada began on September 29th, 2000 but there is no official end of it. While some indicate year 2005, the violence continued on both sides throughout 2006. In fact, the number of Palestinian fatalities in 2006 had been three times the ones in 2005 (B'Tselem, 2007). Since our results are not affected by this choice (results available upon request from the Authors), our analysis also includes year 2006

Palestinians. We use these to construct alternative measures of conflict intensity at the locality level.

Finally, we use the Palestinian Labour Forces Surveys (LFS) for the period 2000-2006 provided by the Palestinian Central Bureau of Statistics (PCBS) to compute various economic variables such as district-level wage, low-skilled wage and unemployment rate. We use these variables to explore the relation between conflict intensity and local-level economic conditions.

4) Econometric model and identification strategy

As we have discussed in the Introduction, *a priori* the direction of the effect of the conflict on students' academic achievement is not obvious. On the one hand, the conflict may negatively affect the performance of the student at the final exam for several reasons: for instance, the conflict may make more difficult the learning process (by deteriorating the quality of the school environment or by causing psychological distress on the student) or may reduce the incentives to study (by increasing the value of the student's outside options or reducing that of education). On the other hand, the conflict may provide a strong incentive to increase the study effort and to improve academic performance in the attempt, for instance, to get into the best universities in the country or having the opportunity to study abroad. Moreover, it is also possible that the effect of the conflict is heterogeneous across students and that the sign and magnitude of the impact indeed depends on some individual characteristics such as ability. Only a rigorous empirical analysis can discriminate between these different theoretical predictions.

In order to estimate the effect of the conflict on individual academic achievement, we use the following model:

$$result_{islt} = a + b * fatalities_{lt} + X'_{ist} * c + \mu_c + \gamma_s + \partial_t + u_{ijlt} \qquad (1)$$

where $result_{islt}$ is the education outcome of interest (pass exam, total test score, admission to university, etc.) for individual i enrolled in the last year of high-school s in locality l in academic year t. Our variable of interest is $fatalities_{lt}$, which is the number of Palestinian

fatalities occurred in school locality l during the academic year t. In the following analysis, we use different alternative ways of measuring conflict intensity. In our baseline estimation, it is measured as the number of *all* Palestinian fatalities caused by the IDF in school locality l during the academic year t. X_{ist} is a vector of (invariant) individual characteristics, such as gender and religion. Because the age at which the final exam is take varies significantly across individuals, we include a birth-cohort fixed effects (μ_c) to control for any shock common to all students born in the same year. We also include school-level fixed effects (γ_s) and academic-year fixed effects (∂_t). School-level fixed effects control for unobservable time-invariant differences across schools that may influence student performance at the final exam. Moreover, they allow us - differently from what can be done cross-section studies - to control for time-invariant characteristics of the school locality that may influence both the level of conflict intensity and student's performance. The set of academic-year fixed effects accounts for differences in the content and difficulty of the final exam in different years. The academic-year fixed effects also control for the influence on student exam result of all the time-varying macro-economic conditions such as labour market conditions and national education policies. Finally, u_{ijlt} is the error term.

Using a repeated cross section of the results at the high-school final exam from 2000 to 2006 in the West Bank, our identification strategy exploits the within school variation over time in the locality-level number of Palestinian fatalities occurred during the academic year in which the student takes the exam. Our identifying strategy is valid if, given the school and the time fixed effects and after controlling for observable individual characteristics, the within-school variation in conflict intensity over time is orthogonal to any other determinant of student's result at the final-exam.

We can think of four possible reasons why our assumption may not hold. The first thread to our identification strategy is an omitted variable bias. That would be the case if changes in some time-variant characteristics at the locality level were correlated with both conflict intensity and academic achievement. For instance, our identification strategy would be invalid if the geographical and temporal variations in conflict intensity were related to the economic conditions of the locality the school belongs to. Available empirical evidence suggests that this is not the case. To begin, measures of conflict intensity such as the number of closure

days[13] or the severity of internal mobility restrictions imposed by IDF within the OPT are not predicted by the Palestinian labor market conditions (Di Maio and Nandi, 2013; Cali and Miaari, 2013).[14] To show that also our measure of conflict intensity, e.g. the number of all Palestinians fatalities at the locality level, is not related to the local economic conditions, we regress that on previous year local labour market conditions using the following model:

$$fatalities_{lt} = a + e_{dt} * X_{d,t-1} + v_l + \partial_t + u_{dt} \qquad (2)$$

where $fatalities_{lt}$ is the number of all Palestinian fatalities occurred in the locality in academic year t; $X_{d,t-1}$ is a vector of previous year district-level economic conditions[15] (average wage, low-skilled average wage[16] and unemployment rate); v_l and ∂_t are locality and academic year fixed effects, respectively. u_{dt} is the error term. In addition, we also regress the number of fatalities on the same year district-level economic conditions. Results reported in Appendix Table A3 show that the total and the per-capita number of Palestinian fatalities[17] at the locality level are not predicted by local economic conditions in the previous academic year and are not correlated with same year economic conditions. These results also suggest that the number of Palestinian fatalities cannot be interpreted as to be the outcome of IDF actions adopted as a reaction to Palestinian violence caused by the worsening in the local economic conditions. As a matter of fact, predicting location and severity of the IDF violence during the Second Intifada was in fact very difficult for non-combatants living in the West Bank (Mansour and Rees, 2012). Moreover, the behaviour of the Israeli soldiers during their security activities and the type of measures imposed on Palestinians were quite unforeseeable by the villagers (Pedersen et al., 2001).[18] In fact, the Israeli-Palestinian conflict, differently

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[13] During closure days the borders between the WB and Israel and between GS and Israel are closed and all movements of labor and goods are banned. The (temporary) ban applies also to permit-holders Palestinian workers employed in Israel (see Di Maio and Nandi, 2013).

[14] Miaari et al. (2014) show that in the period 2000-2002 the closures of borders between Israel and the West Bank reduced employment level of Palestinian working in Israel and that this in turn affected the variation in the number of Palestinian fatalities.

[15] We are forced to use district-level economic variables because economic data at a finer level of disaggregation are not available for most of the localities for the period under consideration.

[16] We use this variable as a proxy for the student's opportunity cost of being in school.

[17] The per-capita number of fatalities at the locality level is computed dividing the number of fatalities at the locality level occurred during the academic year divided by the locality-level population in 1997. Year 1997 is the only pre-Second Intifada year for which population data at the locality level are available.

[18] Previous research has analysed the possibility that the behaviour of both sides of the conflict during the Second Intifada could be modeled as a reaction to the violence against them, i.e. the cycle-of-violence hypothesis. The studies that have empirically tested this view - which was quite popular in the public opinion - in fact reached different conclusions (see Jaeger and Paserman, 2008; Haushofer et al., 2010). While those studies offer important insights on the characteristics of the Second Intifada, it should be anyway noted that empirical

from most other violent conflicts, is characterised by a low-intensity but constant tension that at any moment may explode and lead to a violent event. This is also confirmed by the fact that, as it emerges from the analysis of the information recorded in the B'Tselem dataset, in several cases Palestinian fatalities are not the result of military actions but instead the dramatic (often unintended) consequence of the routine military controlling activities conducted by the IDF in the WB.[19]

A second thread to our identification strategy comes from the fact that students may respond to an increase in conflict intensity by changing residential location. If the moving students are the higher-ability ones, the negative effect of the conflict on exam results would be just due to the mobility decision of these students moving away from schools in high-conflict localities. The available empirical evidence suggests that this is not the case. In fact during the Second Intifada internal and external mobility has been extremely difficult in the WB (see for instance, World Bank, 2007).[20] Mansour and Rees (2012) argue that the mobility restrictions have been in place with little interruption throughout the Second Intifada made making difficult for most families to migrate. In fact, there is no evidence of significant out-migration from the West Bank during the al-Aqsa Intifada (CIA, 2008). While we cannot directly test the mobility decision of the students and of their families, there is indirect empirical evidence showing that Palestinian mobility has been extremely low in the period under consideration. Using data from the LFS, Cali and Miaari (2013) show that after observing workers for a period of six months only 120 workers (out of 48,000) changed locality of residence. From this evidence, we conclude that, in the context of the Second Intifada, migration and internal mobility decisions of students should not be a threat to our identification strategy.

Third, it is possible that the intensity of the conflict affects the characteristics of the pool of students attending the finale exam. This would be the case if, for instance, students that in

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validity of the cycle-of-violence hypothesis is not directly relevant for our argument because those studies look at the dynamics of the *total* number of Palestinian (and Israeli) fatalities during the Second Intifada and not their geographical distribution in each year which is instead the source of variation in conflict intensity we use in our analysis.

[19] For instance, examples taken from the B'Tselem dataset of Palestinian fatalities caused by the Israeli Defence Forces (IDF) include the following: [name omitted] 38 year-old killed by gunfire near Ein Beit al-Maa while sitting near his house during an army operation; [name omitted] 16 year-old, killed in Ramallah by gunfire while walking in the street during an army operation in the area.

[20] World Bank (2007) reports that "administrative restrictions, rooted in military orders associated with the occupation of the West Bank and the Gaza Strip are used to restrict Palestinian access to large segments of the territories [...] Permit policies limit the freedom of Palestinians to move home, obtain work, invest, [...] move about outside of their municipal jurisdiction."

absence of the conflict would have dropped out instead remained in school because the conflict reduced their out-of-school occupational opportunities. In this case then the lower average academic performance in a locality characterized by higher conflict intensity would just be the result of the conflict lowering the average quality of students enrolled in schools in those localities by making them stay in school rather than drop-out. Regression results show that conflict does not increase the percentage of dropouts at the locality nor at the school level (see Appendix Table A2). These findings allow us to exclude that our main result is due to a sample selection induced by the conflict.

Finally, our identification strategy would be invalidated by the presence of reverse causality, i.e. students' academic achievement determines the level of conflict intensity. As suggested by Rodriguez and Sanchez (2012), in a context of violent conflict, being a drop out or failing the final exam may increase rebellion in an adolescent. In turn, this may contribute to increase the number of demonstrations, the level of violence and possibly the number of the consequent conflict-related fatalities. This argument implies that for our estimation strategy to be valid, we need to exclude that the locality-level rate of drop-out or the (average) students' academic performance influence the locality-level number of Palestinian fatalities. Regressing the locality-level number of fatalities on the locality-level percentage of drop-out in the current and the previous year and on the percentage of *Fail*[21] in the current and the previous year we find that these relations are never significant (see Appendix Table A3 for detailed results). These results thus indicate that the possibility of reverse causality is not supported by the data.

In conclusion, we argue that the evidence discussed in this section suggests that, conditional upon time and school fixed effects, the remaining variation in the number of Palestinian fatalities is plausibly idiosyncratic. It follows that, by using the number of Palestinian fatalities at the locality level as a proxy for the intensity of the conflict, we will be able to estimate the causal effect of Israeli-Palestinian conflict on the academic achievement of high-school Palestinian students in the West Bank during the Second Intifada.

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[21] Recall that *Fail* is the outcome of the final exam when a student who was *Incomplete* the previous year gets less than 50% in one or more subjects.

5) Results

5.1) The impact of the conflict on the result at the final exam

In our baseline specification of model (1), we use as dependent variable *Pass Exam*, a dummy variable which takes value 1 if the student passes the final exam (i.e. she got at least 50% of the maximum grade in all subjects) and 0 otherwise. As for the variable $fatalities_{lt}$ we use the total number of all Palestinian fatalities in locality l caused by the IDF during the academic year t. Since we observe a repeated cross section of exam results for every year from 2000 to 2006, the parameter b in model (1) measures the effect of the conflict on student academic achievement exploiting the within-school variation in the locality-level number of Palestinian fatalities occurred in each academic year. All regressions are estimated using OLS with robust standard errors clustered at the locality level, the level at which we measure conflict intensity.

Table 4 reports the within-school estimates of the effect of the conflict on the individual probability to pass the exam. Column 1 shows the result for our baseline specification which only includes birth-cohort, school and year fixed effects. The estimated coefficient thus captures the difference in the probability to pass the final exam for students enrolled in the same school in different years which is only due to the difference in the number of Palestinian fatalities occurred in that locality during the academic year. The results show that the effect of the conflict on the probability to pass the exam is negative and highly significant. The higher the intensity of the conflict in the locality of the school the lower the probability that the student passes the exam. Computing the average magnitude of our within-school estimates of the effect of the conflict, it results that one standard deviation increase in the number of fatalities occurred during the academic year at the locality level (17.2) reduces by 0.007 percentage points the probability to pass the exam which is equivalent to a 1% reduction the probability to pass the exam with respect to the mean (0.72).

Table 4: The effect of the Israeli-Palestinian conflict on the probability to pass the high-school final exam for Palestinian students in the West Bank during the Second Intifada

	(1)	(2)	(3)	(4)
	Pass Exam	Pass Exam	Pass Exam	Pass Exam
Number of Fatalities	-0.0004 ***	-0.0004 ***	-0.0004 ***	-0.0004 ***
	0.0001	0.0001	0.0001	0.0001
Male		-0.0790 ***	-0.0792 ***	-0.0790 ***
		0.0110	0.0110	0.0110
Christian			-0.0346 *	-0.0345 *
			0.0179	0.0179
Late			-0.0774 ***	-0.0773 ***
			0.0112	0.0112
District-level economic controls	no	no	no	yes
Birth-Cohort fixed effects	yes	yes	yes	yes
School fixed effects	yes	yes	yes	yes
Academic year fixed effects	yes	yes	yes	yes
Number of observations	138,135	138,135	138,135	138,135

Note: OLS regression results for equation (1). For all regressions the dependent variable is *Pass Exam*, a dummy variable which takes value 1 if the student has passed the final exam and 0 otherwise. *Fatalities* is the number of all conflict-related Palestinian fatalities caused by the Israeli Defence Forces at the locality level during the academic year. *Male* is a dummy which takes value 1 if the student is male and zero otherwise. *Christian* is a dummy which takes value 1 if the student is Christian and 0 otherwise. *Late* is a continuous variable that measures the difference between the year in which the student was expected to take the exam and the actual year in which she takes the exam. *District-level economic controls* include district-level average wage, district-level low-skilled wage, district level unemployment rate. All regressions include school, birth-cohort and time fixed effects. In each regression, a constant is included but not shown. Robust standard errors in parenthesis are clustered at the locality level. ***, **,* means significant at 1%, 5% and 10%

The negative effect of the conflict on final exam results is robust to the inclusion of several control variables. In Table 4 column (2), we control for the gender of the student (*Male*) while in column (3) we add other student's individual characteristics such as religion (*Christian*) and a variable that measures the difference between the year in which the student actually takes the exam and the year in which she should have taken it (*Late*).[22] The coefficient of the variable *Male* is negative, indicating that the probability to pass the exam is lower for male students. Not surprisingly, the coefficient of the variable *Late* is negative and highly significant suggesting that the older the student the lower the probability to pass the exam.

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[22] The dataset provided by the MoEHE does not include information on the socio-economic conditions of the student. While this is a limitation of the dataset, we argue this problem is somehow less severe that it may appear at first because our sample comprises students enrolled in non-mandatory high-school. This implies that the information content of the socio-economic condition of the student is in this context somehow less relevant compared to other cases: indeed the variance in household income for high-school students is very likely to be much smaller than in the case, for instance, of primary school students.

Finally, in column (4), we include a set of district–level economic variables[23], such as the district-level average wage; low-skilled wage and unemployment rate, to control for time-varying local economic conditions and the student outside options. As shown by the coefficient of the variable $fatalities_{lt}$, the inclusion of all these controls does not change the magnitude and significance of the negative effect of the conflict on the probability to pass the exam. In the next section we provide evidence that our results are also robust to placebo tests, different econometric models and selection of the sample.

5.2) Robustness checks

Our results are robust to a number of checks. First, we conduct a placebo test on timing. We estimate model (1) including as measure of conflict intensity the locality-level number of Palestinian fatalities in the next academic year. Results (see Appendix Table A4) show that the coefficient of the fatalities is zero and it is not significant. Next, we estimate our model (1) using as proxy for measuring the intensity of the conflict the *per-capita* number of Palestinian fatalities at the locality level occurred during the academic year.[24] The results (see Appendix Table A5) confirm that the effect of the conflict on individual academic achievement is negative and highly significant. Finally, we estimate a probit version of model (1) in order to take into account the non-linearity of the exam outcome. The results (not shown) confirm that higher conflict intensity during the academic year reduces the probability to pass the final exam.

We also check our results by modifying the estimation sample. In particular, we estimate our baseline model restricting the sample to only students living in larger localities. These are students for whom is more likely that it holds true our assumption that the locality where they live and that of the school they attend is the same.[25] We do this check employing two different methods. First, we estimate our baseline model excluding from the sample small localities, i.e. with less than 200 observations. Results (see Appendix Table A6, column a) are not different with respect to our main specification. Second, we exclude from the sample the localities that

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[23] We include district-level economic variables as controls because locality-level economic data are not available for the period under consideration.

[24]. The per-capita number of fatalities at the locality level is computed as in footnote 17.

[25] Note that we are forced to make this assumption because the dataset on individual exam results does not provide the place of residence of the student.

are in the first quartile of the distribution of the population size. Again, results do not change: the conflict significantly reduces the probability to pass the final exam in the WB (see Appendix Table A6, column b).

5.3) Additional results

5.3.1) Alternative measures of academic achievement

We now consider two alternative measures of academic achievement. We estimate again model (1) using for $result_{ijlt}$ respectively: 1) *University,* a dummy variable which takes value 1 if the student gets at least the minimum score for the admission to university (i.e. 65% of the maximum score) and 0 otherwise; 2) *UniversityAbroad,* a dummy variable which takes value 1 if the student gets at least the minimum score required for the admission by universities in other Middle East countries by Palestinian universities to enter the engineering major (i.e. 85% of the maximum score) and 0 otherwise.

Results reported in Table 5 column 1 show that the conflict reduces the probability of the student to achieve the minimum test score required for the admission to the university. It is interesting to note that this negative effect is smaller than the effect of the conflict on the probability to pass the exam (compare these results with Table 4). Results in column 2 instead indicate that the conflict does not reduce the probability to achieve the minimum test score necessary for the admission to the universities abroad or to the engineering major in Palestinian universities. We interpret this result as suggesting that the effect of the conflict is heterogeneous across levels of academic abilities with the best-quality students being not affected by the conflict.[26] Interestingly, this result is in line with the findings in de Groot and Goksel (2011) that the impact of conflict on education depends on the location of an individual within the educational distribution. In our case, while higher conflict intensity significantly reduces both the average probability to pass the exam and - to a lesser extent - to get into the university, it does not affect the performance of students that are in the highest quartile of the test score distribution.

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[26] While we cannot exclude the possibility that these are also the wealthiest students (see also footnote 20), we note that it would be difficult to reconcile this with the fact that the effect of the conflict is larger for students enrolled in (expensive) private schools rather than in public ones (results available upon request).

Table 5: The effect of the Israeli-Palestinian conflict on academic achievement for Palestinian students in the West Bank during the Second Intifada: alternative measures of academic achievement

	(1) University	(2) UniversityAbroad
Number of Fatalities	-0.0003 *	0.0000
	0.0002	0.0002
Male	-0.1323 ***	-0.0998 ***
	0.0156	0.0114
Cohort fixed effects	yes	yes
School fixed effects	yes	yes
Academic year fixed effects	yes	yes
No. of observations	138,135	138,135

Note: OLS regression results for equation (1) in which the dependent variable for each regression is reported in the top of each column. *University* is a dummy variable which takes value 1 is the student total score at the exam is higher than the minimum score necessary to be admitted to the university (65%) and 0 otherwise. *UniversityAbroad* is a dummy variable which takes value 1 if the student total score at the exam is higher than the minimum score necessary to be admitted to universities in other Middle East countries and to the engineering major at Palestinian universities (85%) and 0 otherwise. *Fatalities* is the number of all conflict-related Palestinian fatalities caused by the Israeli Defence Forces at the locality level during the academic year. *Male* is a dummy which takes value 1 if the student is male and 0 otherwise. In each regression, a constant is included but not shown. Robust standard errors in parenthesis are clustered at the locality level. ***, **,* means significant at 1%, 5% and 10%.

5.3.2) Alternative measures of conflict intensity

Until this point in the analysis, we have used as measure of the intensity of the conflict the locality-level total number of *all* Palestinian fatalities caused by the IDF during the academic year. Our data on Palestinian fatalities also include information about the age of the victim and a description of the circumstances of the fatality. We use this additional information to construct three alternative measures of conflict intensity.

Table 6 reports the results of estimating model (1) using for the variable $fatalities_{lt}$ each time one of these alternative measures of conflict intensity. The first is the total number of young (less than 18 years old) Palestinian fatalities occurred in the locality during the academic year. As shown in column 1, the negative effect of the conflict on individual academic achievement turns out to be significantly larger than in baseline model. The fact that the number of young killed in the locality has a more negative effect (as compared with the total number of fatalities) on the probability to pass the exam suggests that the exposure to this type of shock is particularly traumatic for the student, probably because she may be

experiencing some kind of self-identification process. We interpret this as an indication of the possible role of the psychological component in the explanation of the negative effect of the conflict on student performance (see on this also Section 6.2).

The second alternative measure of conflict intensity is given by the locality-level number of Palestinian not taking part in the hostilities killed by the IDF. Results in column 2 show that the negative impact of conflict on the probability to pass the final exam when we use this alternative measure of conflict intensity is larger than in the baseline model. This result is in line with the psychological literature which indicates that the feeling that anybody could be injured is a strong a predictor of depressive-like states and likely to have a negative impact on student learning activity (see Giancan et al. (2007) and also Section 6.2). Interestingly, this result can also be interpreted as an additional robustness check of our main result because the level of unpredictability of these fatalities (both in in terms of number and localization) is even higher than in the case of fatalities including all Palestinians.[27]

The last alterative measure of conflict intensity is given by the number of Palestinian killed by Palestinians for reasons related to the Second Intifada. Conflicts between different political entities are often characterised also by an increase in the violence *within* the confronting groups. The Israeli-Palestinian conflict is not an exception in this sense. The results reported in column 3 show that the negative effect of these fatalities on individual academic achievement is larger than in the baseline model. One possible interpretation of this result is that students are more shocked when the conflict-induced violence takes place between people belonging to their own group. Finally, we explore the possibility that also the motivation for this within-group violence matters. Interestingly, when we consider as measure of conflict intensity only the number of Palestinian killed by Palestinians because accused of having collaborated with the IDF, the negative effect of the conflict on individual academic achievement is slightly reduced (results not shown) even if it is still much larger than in the baseline case.

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[27] Examples – included in the B'Tselem dataset - of Palestinian killed by the IDF but who were not taking part in the hostilities are for instance: [name omitted] 32-years old, killed near Ramallah by gunfire when hiking with relatives on hills near the a-Tira neighborhood of Ramallah; without warning, soldiers opened fire at them from about 500 meters away; [name omitted] 15 year-old killed near Kfar Dan by gunfire. Shot in the back by Border Police who passed by in a jeep. Testimony given to B'Tselem indicates the street was quiet and the officers were not in danger. [name omitted] 25 year-old, killed near Nablus by gunfire while serving customers in his butchery.

Table 6: The effect of the Israeli-Palestinian conflict on the probability to pass the high-school final exam for Palestinian students in the West Bank during the Second Intifada: alternative measures of conflict intensity

	(1) Pass exam	(2) Pass exam	(3) Pass exam
Number of Young Fatalities	-0.0025 **		
	(0.0011)		
Number of Palestinians killed while not fighting		-0.0006 **	
		(0.0003)	
Number of Palestinians killed by Palestinians			-0.0037 ***
			(0.0011)
Birth-Cohort fixed effects	yes	yes	yes
School fixed effects	yes	yes	yes
Academic year fixed effects	yes	yes	yes
No. of Observations	138,135	138,135	138,135

Note: OLS regression results for equation (1). The dependent variable is *Pass Exam*, a dummy which takes value 1 if the student has passed the final exam and 0 otherwise. For each regression, the definition for the variable $Fatalities_{lt}$ is reported in the corresponding line. See also the text for details on the variables construction. All regressions include school, birth cohort and time fixed effects. In each regression, a constant and a control for *Male* are included but not shown. Robust standard errors in parenthesis are clustered at the locality level. ***, **,* means significant at 1%, 5% and 10%.

Taken together these results suggest that the psychological impact of being exposed to violence is potentially important in understanding the reason why the conflict reduces individual academic achievement. This one of the possible transmission mechanisms we explore in the next section.

6) Possible transmission mechanisms

A violent conflict can affect individual academic achievement through several transmission mechanisms (see Introduction). In this section, we discuss in detail two mechanisms that appear to be particularly relevant in the context of the Israeli-Palestinian conflict. The first mechanism is the conflict-induced change in the quality of the learning conditions at school. We explore the possibility that the conflict negatively impacts on student's result at the final test by worsening the quality of her learning environment. The second mechanism is related to the impact of the conflict on student psychological well-being. Here the hypothesis is that the

exposure to conflict-related violence negatively affects the cognitive and the academic-related capabilities of the student.

6.1) Changes in the quality of the school-level learning conditions

The quality of the school is crucial to any student learning activity. To measure that, we use three variables commonly used in the literature and that are included in our dataset on school characteristics. These are: *Average Size of the Classroom, Students/Teacher Ratio*[28] and *Average Overcrowding in the Classroom.* In this section, we first provide evidence on the effect of the conflict on this set of (time-variant) school characteristics that determine the quality of the learning environment for the students. Next, we show how those characteristics are correlated with student performance at the final exam.

To estimate the effect of the conflict on school characteristics, we use the following model:

$$s_{jlt} = \alpha + \beta * fatalities_{lt} + \gamma_s + \partial_t + u_{jlt} \qquad (2)$$

where and s_{jlt} represents, for school *j* in locality *l* in year *t,* one of the following school characteristics: *Average Size of the Classroom*, *Students/Teacher Ratio*, *Average Overcrowding in the Classroom* and $fatalities_{lt}$ is the locality-level number of all Palestinian fatalities in academic year *t*. We also include a full set of school-level fixed effects (γ_s) and academic-year fixed effects (∂_t). Table 8 reports the impact of the conflict on the quality of the learning environment as proxied by the school characteristics we have considered. The conflict reduces the S*tudents/Teacher Ratio* while it increases the *Average Overcrowding in the Classroom.*[29]

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[28] The *Students/Teacher Ratio* is defined as the school-level ratio between the number of students and the number of teachers.

[29] Additional regressions (not shown but available upon request) indicate that the *Student/Teacher Ratio* decreases because the conflict reduces both the number of students and the number of teachers but the former decreases more. At the same time, the conflict reduces the number of classes in the school and the total size of school flat (even if the effect of the conflict on each of this variable separately is not significant at the conventional levels). It follows that the combined effect of the reduction in the number of classes and in the room available for the students (and maybe other changes in the school organization of the teaching that we cannot capture with our data) explain the contemporaneous reduction in the *Students/Teacher Ratio* and increase in the *Average Overcrowding in the Classroom*.

Table 8: The effect of the Israeli-Palestinian conflict on the quality of the school learning conditions in the West Bank during the Second Intifada

	(1) Average Size of the Classroom	(2) Students/Teacher Ratio	(3) Average Overcrowding in Classroom
Number of Fatalities	0.0097	-0.0248 ***	0.0031 ***
	0.0103	0.0056	0.0006
School fixed effects	yes	yes	yes
Academic year fixed effects	yes	yes	yes
Number of observations	3,830	3,830	3,830

Note: OLS regression results for equation (2) in which the dependent variable s_{jlt} for each regression is reported in the first line of the table. *Fatalities* is the number of all conflict-related Palestinian fatalities caused by the IDF at the locality level in the academic year. *Average Size of the Classroom* is the school-level average size of the classroom measured in squared meters. *Students/Teacher Ratio* is the school-level ratio between the number of students and the number of teachers. *Average Overcrowding in the Classroom* is the ratio between the school-level average size of the classroom and the school-level average number of students per class. All regressions include school and time fixed effects. In each regression, a constant is included but not shown. Robust standard errors in parenthesis are clustered at the locality level. ***, **,* means significant at 1%, 5% and 10%.

Next, we test whether these school characteristics - which contribute to determine the quality of the learning environment for the students - are related to the students' performance at the final exam. To this end, we estimate the following model:

$$Pass\ Exam_{ijlt} = a + \boldsymbol{S}'_{jlt} * \vartheta + \gamma_s + \partial_t + u_{ijlt} \qquad (3)$$

where $Pass\ Exam_{ijlt}$, is a dummy variable which takes value 1 if the student passes the final exam and 0 otherwise and $\boldsymbol{S}'_{jlt}$ includes the following school characteristics: *Average Size of the Classroom*, *Students/Teacher Ratio*, *Average Overcrowding in the Classroom*. As in model (1), we also include a full set of birth-cohort, school and academic year fixed effects.

Table 9 column 1 shows that the probability to pass the exam is positively correlated with the *Average Class Size* and negatively with the *Average Class Overcrowding* while it is not correlated with the *Student/Teacher Ratio*.[30] The results are robust to the inclusion of individual-level controls and district-level economic conditions controls (columns 2 and 3). Reading together the results from Table 8 and Table 9 suggests that the conflict-induced

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[30] This result is in line with the evidence discussed in Hanushek (2003) showing that among 276 studies 72% finds an insignificant effect of the student-teacher ratio on student performance 14% found positive and statistically significant effect while another 14% found negative and statistically significant effect.

increase in the *Average Class Overcrowding* is a possible transmission mechanism explaining the negative effect of the conflict on student's result at the final exam.[31]

Table 9: The quality of the school learning conditions and probability to pass the exam for Palestinian students in the West Bank during the Second Intifada

	(1) Pass Exam		(2) Pass Exam		(3) Pass Exam	
Average Size of the Classroom	0.0015	***	0.0015	**	0.0015	**
	0.0005		0.0006		0.0006	
Student/Teachers Ratio	-0.0010		-0.0011		-0.0010	
	0.0014		0.0015		0.0014	
Average Class Overcrowding	-0.0325	***	-0.0324	**	-0.0319	**
	0.0099		0.0127		0.0127	
District-level economic conditions	no		no		yes	
Individual–level controls	no		yes		yes	
School fixed effect	yes		yes		yes	
Academic year fixed effects	yes		yes		yes	
Number of observations	138,135		138,135		138,135	

Note: OLS regression results for equation (3). For all regressions the dependent variable is *Pass Exam*, a dummy variable which takes value 1 if the student has passed the final exam and 0 otherwise. Individual-level controls are *Male, Christian* and *Late*. District-level economic controls include district-level average wage, district-level low-skilled wage, district level unemployment rate. All regressions include school, birth-cohort and time fixed effects. In each regression, a constant is included but not shown. Robust standard errors in parenthesis are clustered at the locality level. ***, **,* means significant at 1%, 5% and 10%.

6.2) Changes in the psychological well-being of the student

The psychological and medical literature suggest that another possible mechanism explaining the negative effect of the conflict on exam results is through its impact on the psychological well-being of the student. While our dataset does not allow for a direct test,[32] in the following we provide indirect evidence of the existence of this mechanism. The idea is that the student performance at exam may be influenced not only by the quality of the learning environment she experienced during the academic year but also by the events happening close in time to

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[31] While the literature on the relationship between overcrowding and student learning is quite limited (McMullen and Rouse, 2012), there is some evidence, particularly in high-poverty schools, that overcrowding can have an adverse impact on learning. For instance, New York public schools teachers report that crowding affects their ability to facilitate classroom activities, alters their instructional techniques, and leads to burnout (Rivera-Batiz and Marti, 1995).

[32] To the best of our knowledge, the only two studies that have empirically tested the psychological effects of a violent conflict have both explored the relation between exposure to the conflict and depression (Do and Iyer, 2012; Swee, 2009).

the exam day. To this end, we now estimate model (1) using as measure of conflict intensity the locality-level number of Palestinian fatalities in the month before the day of the exam. Results (reported in Appendix Table A7) show that the effect of the close-to-the-exam conflict intensity on academic achievement is highly significant, negative and larger with respect to the baseline case. The results are robust to the inclusion of individual characteristic and local economic conditions controls. Separate regression by gender indicates that the effect is stronger for boys rather than for girls, even if the difference is not significant at the conventional levels. Interestingly, the effect is null if we consider conflict intensity as measured by the number of fatalities occurred two or three months before the exam (see Appendix Table 7). These results thus provide support to the idea that the negative impact on the conflict intensity on the psychological well-being of the student is another possible mechanism explaining the negative effect of the number of fatalities on the exam results.

Our results are in line with the numerous medical and psychological studies on the effects of the conflict on the Palestinian population. The psychological and clinical research has documented high levels of emotional and behavioural problems and of PTSD (Post-Traumatic Stress Disorders) in both children and adolescents in Palestine (Mataria et al., 2009; Thabet et al., 2002) with the latter being at more elevated risk to suffer from psychological diseases (Dubow et al., 2009). Palestinian adolescents exposed to greater conflict-related violence reported higher levels of depression, and more PTSD symptoms (Abdeen e al. 2008; Al-Krenawi et al., 2009). Giancaman et al. (2007) find that the experience of conflict-related violence is a strong predictor of depressive-like states which in turn may impact on academic performance.[33] For instance, Petersen et al. (2001) argue that periods with heavy shelling and attacks directly affect student concentration on her schoolwork, making the preparation for the final exam more difficult. The conflict also directly affects the exam taking. A teacher says: "All day planes were flying above our heads. [...] It disturbed the students a lot, and many had problems to concentrate over the exams." (Pedersen et al, 2001). Interestingly, the psychological and clinical literature suggest the existence of a gender-specific effect of the

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[33] Petersen et al. (2001) provide numerous interviews describing a very difficult situation in Palestinian schools. For instance, the principal of a school says: "When the students come to school they are very often afraid, sometimes they have not slept because there has been shooting or bombing during the night. […] Sometimes the Israeli soldiers shoot after the students when they go to school. [...] Students and teachers in our school have martyrs and injured in their families". Forced Migration Review (2009) reports that in many schools the photos of children and youths killed by Israeli soldiers are prominently displayed. These posters of 'martyrs' - as they are commonly referred to - become the theme of long discussions in the classroom making the Intifada part of every school day. As one teacher says: "His body is in the classroom, his mind is in the street".

conflict related to differences in the intensity of conflict exposure, with boys being more affected than girls (Khamis, 2005; Giacaman et al., 2007). Moreover, as discussed in Section 5.3.2, a psychological-based explanation could help in understanding why the exposure to different types of conflict-related violence (young fatalities, Palestinian killed while not involved in hostiles with the IDF, Palestinians killed by Palestinians) have different impacts on individual academic achievement. In fact, the result that the effect of the conflict is stronger the more similar to the student is to the victim and the closer in time the fatalities are to the date of the exam do suggest the importance of the psychological channel in explaining the negative effect of the conflict on the probability to pass the final exam. We conclude that there is substantial evidence indicating that the conflict negatively impacts on the academic achievement of Palestinian students also by affecting their psychological well-being.

7) Concluding remarks

In this paper we have analyzed the effect of a violent conflict on academic achievement of high-school students. In particular, we have studied the effects of the Second Intifada on the individual test scores at the school-leaving exam (Tawjin General Examination) for the whole population of Palestinian students enrolled in the Arts and the Scientific curriculum in the high-schools in the West Bank during the period 2000-2006. Our results showed that the conflict reduces in significant way the probability to pass the exam and the probability to be admitted to the university. We also found that the magnitude of the effect of the conflict on academic achievement varies with the ability level of the student and the type of violent event to which the student is exposed to. Next, we have discussed two transmission mechanisms that may explain why the conflict negatively affects individual academic achievement. As for the first, we have provided suggestive evidence that the conflict negatively affects the quality of the school learning environment. Next, we have showed that the school-level characteristics we used to proxy for the quality of the learning environment are in turn negatively correlated with the student result at the final exam. As for the second mechanism, we have argued that the exposure to conflict-related violence reduces the student performance at the final exam by negatively affecting her psychological well-being. To support this view, we have shown that the level of conflict intensity shortly before the exam has a strong impact on the exam result. We also showed how our results are confirmed by the clinical and

psychological literature on the effects of the Israeli-Palestinian conflict which correlates the psychological distress caused by living in a conflict-affected environment with worse academic achievement.

These results suggest that the conflict may affect both the learning process and the performance at the exam. The two mechanisms through which the conflict negatively affects academic achievement are indeed very different. The first one - worsening in the quality of school supply – it is likely to take some time to have an impact. Also, it is relatively easy to identify the measures needed to counter its effects (e.g. increasing the number of classrooms and teachers). The second mechanism - worsening in the psychological well-being of the student – has instead an immediate impact. Moreover, it is much less straightforward to identify which measures could be used to hinder its working and reduce its effects. This suggests that to be effective policies to mitigate the negative effects of the conflict should include both types of interventions.

Two are the main contribution of this paper to the literature. First, it provides additional evidence of the heterogeneous consequences of a violent conflict on education depending on the type of violent event, the educational outcome and the characteristics of the individual considered. Second, this is the first paper to study the impact of a violent conflict on the quality of education by analysing its effect on the academic achievement of high-school students. Analysing how academic achievement is affected by a violent conflict is particularly important because that measure of educational outcome is more strongly related to social and economic well-being than other measures such as school enrolment or attendance (Hanusehek and Woessmann, 2011). Understanding the effects of conflict on the academic achievement of high-school students is even more relevant because those individuals represent the larger component of the future human capital of the country and thus play a crucial role in the development prospects of the economy.

By showing that the Israeli-Palestinian conflict reduces for Palestinian students the probability to complete high-school and the probability to be admitted to the university, we have documented the existence of another channel - which complements others previously identified in the literature - through which the conflict negatively affects the potential for economic development in the West Bank. In fact, as suggested by Justino (2012), negative shocks to education are likely to lead to significant and long-lasting detrimental effects on the

adolescents' labour market opportunities. While our data do not to allow us to estimate the long-run effects of the lower academic achievement for Palestinian high-school students or that of their lower university enrolment rate, available evidence from other countries indicate that those may be large. This suggests that this negative effect is an additional cost to be added the numerous others already documented (short-run) costs of the Israeli-Palestinian conflict.

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Appendix 1

List of subjects and maximum grade for each subject at the final exam in the Art and Scientific curriculum.

The subjects, the maximum grade and the weight given to each subject in the final exam score differ by curriculum.

In the Arts curriculum the subjects and their maximum grade are as follows: Islamic education (maximum grade 100), Arabic (300), English (280), History (120), Mathematics (100), Geography (100), and Scientific culture (100). The total score is calculated by summing the grades for the following subjects: Arabic, English, History, Mathematics and the highest two grades between two of the remaining subjects (Geography, Islam education and Scientific culture). The total maximum test score is: 1000. In the Scientific curriculum, the subjects and the maximum grade are as follows: Islamic education (100), Arabic (200), English (200), Mathematics (240), Physics (160), Chemistry (100) and Biology (100). The total score is calculated by sum of the grades for the following subjects: Arabic, English, Mathematics, Physics, and the highest score of any other two subjects (Islamic education, Chemistry, Biology). While only two of the optional subjects are considered in the final test score all subjects must be passed. The total maximum test score is: 1000.

Tables for the results not shown in the paper

Table A1: Local economic conditions in the previous academic year and intensity of the Israeli-Palestinian conflict during the Second Intifada in the West Bank

	Number of Fatalities	Number of Fatalities	No. Per Capita Fatalities	No. Per Capita Fatalities
District wage [t-1]	-0.014		-0.000	
	(0.022)		(0.000)	
Low-skilled district wage [t-1]	0.006		-0.000	
	(0.014)		(0.000)	
District unemployment [t-1]	-0.015		0.000	
	(0.020)		(0.000)	
District wage		-0.018		0.000
		(0.026)		(0.000)
Low-skilled district wage		0.003		-0.000
		(0.014)		(0.000)
District unemployment		-0.014		-0.000
		(0.037)		(0.000)
Locality fixed effects	yes	yes	yes	yes
Academic year fixed effects	yes	yes	yes	yes
No. Observations	1,208	1,403	1,200	1,393

Note: OLS regression results for model (2). *Fatalities* is the total number of all conflict-related Palestinian fatalities caused by the Israeli Defence Forces at the locality district level during the academic year. *Per-capita fatalities* is the total number of all conflict-related Palestinian fatalities caused by the Israeli Defence Forces at the locality district level during the academic year divided by the locality population. In each regression, a constant and locality and academic year fixed effects are included but not shown. Standard errors in parenthesis are robust. ***, **,* means significant at 1%, 5% and 10%.

Table A2: The effect of the Israeli-Palestinian conflict on the school-level percentage of drop-out during the Second Intifada in the West Bank

	All Schools	Arts curriculum	Scientific curriculum
	Percentage of drop out	Percentage of drop out	Percentage of drop out
Number of Fatalities	0.0000	-0.0001	0.0001
	0.0001	0.0001	0.0001
School fixed effects	yes	yes	yes
Academic year fixed effects	yes	yes	yes
No. Observations	3,828	2,556	1,272

Note: OLS regression results. In each regression the dependent variable is *Percentage of drop out* which is the school-level percentage of drop-out in the academic year. *Conflict intensity* is the number of all conflict-related Palestinian fatalities caused by the Israeli Defence Forces at the locality level during the academic year. Controls[a] include the same set of controls used in equation (4). In each regression, a constant is included but not shown. Standard errors in parenthesis are robust. ***, **,* means significant at 1%, 5% and 10% level.

Table A3: Reverse causality: percentage of drop-out, percentage of *Fail* and number of Palestinian fatalities during the Secondo Intifada in the West Bank

	Number of Fatalities	Number of Fatalities	Number of Fatalities	Number of Fatalities
Locality-level percentage of drop-out [t-1]	-2.662			
	2.571			
Locality-level percentage of drop-out		-5.072		
		4.316		
Locality-level percentage of *Fail* [t-1]			7.277	
			18.683	
Locality-level percentage of *Fail*				3.067
				31.664
Locality fixed effects	yes	yes	yes	yes
Academic year fixed effects	yes	yes	yes	yes
No. Observations	1,191	1,496	1,191	1,496

Note: OLS regression results. Each line is a different regression. For each regression, the dependent variable is Fatalities, the number of all conflict-related Palestinian fatalities caused by the Israeli Defence Forces at the locality level during the academic year. *Locality-level percentage of drop-out [t-1]* is the percentage of drop-out at the locality-level in the previous academic year. *Locality-level percentage of Fail [t-1]* is the locality-level percentage of students whose result at the final exam is Fail in the previous academic year. *Locality-level percentage of drop-out* and *Locality-level percentage of Fail* are the locality-level percentage of drop-out and fail in the academic year. In each regression, a constant is included but not shown. Standard errors in parenthesis are robust. ***, **,* means significant at 1%, 5% and 10% level.

Table A4: Placebo Test: the effect of number of fatalities in the following year on the probability to pass the high-school final exam for Palestinian students in the West Bank

	(1) Pass Exam	(2) Pass Exam	(3) Pass Exam	(4) Pass Exam
Number of Fatalities (following year)	-0.0000	-0.0000	-0.0000	-0.0000
	0.0002	0.0002	0.0002	0.0003
Male		-0.0751 ***	-0.0756 ***	-0.0755 ***
		0.0119	0.0118	0.0117
Christian			-0.0699 *	-0.0699 *
			0.0093	0.0093
Late			-0.0365 ***	-0.0362 ***
			0.0185	0.0112
District-level economic controls	no	no	no	yes
Birth-Cohort fixed effects	yes	yes	yes	yes
School fixed effects	yes	yes	yes	yes
Academic year fixed effects	yes	yes	yes	yes
Number of observations	138,135	138,135	138,135	138,135

Note: OLS regression results for equation (1). For all regressions the dependent variable is *Pass Exam*, a dummy variable which takes value 1 if the student has passed the final exam and 0 otherwise. *Fatalities following year* is the number of all conflict-related Palestinian fatalities caused by the Israeli Defence Forces at the locality level in the academic year after the student takes the final exam. *Male* is a dummy which takes value 1 if the student is male and zero otherwise. *Christian* is a dummy which takes value 1 if the student is Christian and 0 otherwise. *Late* is a continuous variable that measures the difference between the year in which the student was expected to take the exam and the actual year in which she takes the exam. District-level economic controls include district-

level average wage, district-level low-skilled wage, district level unemployment rate. All regressions include school, birth-cohort and time fixed effects. In each regression, a constant is included but not shown. Robust standard errors in parenthesis are clustered at the locality level. ***, **,* means significant at 1%, 5% and 10%.

Table A5: The effect of the the Israeli-Palestinian conflict on the probability to pass the high-school final exam for Palestinian students in the West Bank: per-capita number of fatalities at the locality level

	(1) Pass Exam		(2) Pass Exam		(3) Pass Exam		(4) Pass Exam	
Number of Fatalities (per-capita)	-10.7960	**	-9.9273	**	-9.9022	**	-9.7314	**
	4.3998		4.3113		4.3063		4.3704	
Male			-0.0781	***	-0.0786	***	-0.0785	***
			0.0111		0.0110		0.0110	
Christian					-0.0351	*	-0.0350	*
					0.0183		0.0183	
Late					-0.0776	***	-0.0776	***
					0.0112		0.0112	
District-level economic controls	no		no		no		yes	
Birth-Cohort fixed effects	yes		yes		yes		yes	
School fixed effects	yes		yes		yes		yes	
Academic year fixed effects	yes		yes		yes		yes	
Number of observations	138,135		138,135		138,135		138,135	

Note: OLS regression results for equation (1). For all regressions the dependent variable is *Pass Exam*, a dummy variable which takes value 1 if the student has passed the final exam and 0 otherwise. *Per-capita Fatalities* is the number of all conflict-related Palestinian fatalities caused by the Israeli Defence Forces at the locality level in the academic year divided by the locality population. *Male* is a dummy which takes value 1 if the student is male and zero otherwise. *Christian* is a dummy which takes value 1 if the student is Christian and 0 otherwise. *Late* is a continuous variable that measures the difference between the year in which the student was expected to take the exam and the actual year in which she takes the exam. District-level economic controls include district-level average wage, district-level low-skilled wage, district level unemployment rate. All regressions include school, birth-cohort and time fixed effects. In each regression, a constant is included but not shown. Robust standard errors in parenthesis are clustered at the locality level. ***, **,* means significant at 1%, 5% and 10%.

Table A6: The effect of the the Israeli-Palestinian conflict on the probability to pass the high-school final exam for Palestinian students in the West Bank: different estimation samples

	(a) Excluding small localities	(b) Only students living in large localities
	Pass Exam	Pass Exam
Number of Fatalities	-0.0004 ***	-0.0005 ***
	0.0001	0.0002
Male	-0.0786 ***	-0.0751 ***
	0.0142	0.0201
Birth-Cohort fixed effects	yes	yes
School fixed effects	yes	yes
Academic year fixed effects	yes	yes
Number of observations	126,738	104,333

Note: OLS regression results for equation (1). The dependent variable is *Pass Exam*, a dummy which takes value 1 if the student has passed the final exam and 0 otherwise. *Fatalities* is the number of all conflict-related Palestinian fatalities caused by the Israeli Defence Forces at the locality level during the academic year. *Male* is a dummy which takes value 1 if the student is male and zero otherwise. (a) We exclude from the sample all the localities for which there are less than 200 observations. (b) We exclude from the sample all the localities which are in the first quartile of the distribution of the population at the locality level. All regressions include school, birth-cohort and time fixed effects. In each regression, a constant is included but not shown. Standard errors in parenthesis are robust. ***, **,* means significant at 1%, 5% and 10% level.

Table A7: The effect of the the Israeli-Palestinian conflict on the probability to pass the high-school final exam for Palestinian students in the West Bank: number of locality-level fatalities one month, two months before and three months before the exam

	All students (1) Pass Exam		All students (2) Pass Exam		All students (3) Pass Exam		Only Male (4) Pass Exam		Only female (5) Pass Exam		All students (6) Pass Exam		All students (7) Pass Exam	
Fatalities (one month before the exam)	-0.0037	***	-0.0036	***	-0.0037	***	-0.0069	***	-0.0013	*				
	0.0009		0.0009		0.0008		0.0018		0.0008					
Fatalities (two months before the exam)											0.0002			
											0.0015			
Fatalities (three months before the exam)													-0.0002	
													0.0002	
Male			-0.0788	***	-0.0792	***					-0.0794	***	-0.0793	***
			0.0111		0.011						0.011		0.011	
Christian					-0.0344	*	-0.0433	*	-0.0216		-0.0343	*	-0.0344	*
					0.0179		0.0248		0.0164		0.0179		0.0179	
Late					-0.0775	***	-0.0506	***	-0.0978	***	-0.0777	***	-0.0776	***
					0.0112		0.0107		0.0177		0.0112		0.0112	
District-level economic controls	no		no		yes		yes		yes		yes		yes	
Birth-Cohort fixed effects	yes		yes		yes		yes		yes		yes		yes	
School fixed effects	yes		yes		yes		yes		yes		yes		yes	
Academic year fixed effects	yes		yes		yes		yes		yes		yes		yes	
Number of observations	138,135		138,135		138,135		62,532		75,603		138,135		138,135	

Note: OLS regression results for equation (1). For all regressions the dependent variable is *Pass Exam*, a dummy variable which takes value 1 if the student has passed the final exam and 0 otherwise. *Fatalities Last Quarter* is the number of all conflict-related Palestinian fatalities caused by the Israeli Defence Forces at the locality level during the month before the exam. *Male* is a dummy which takes value 1 if the student is male and zero otherwise. *Christian* is a dummy which takes value 1 if the student is Christian and 0 otherwise. *Late* is a continuous variable that measures the difference between the year in which the student was expected to take the exam and the actual year in which she takes the exam. District-level economic controls include district-level average wage, district-level low-skilled wage, district level unemployment rate. All regressions include school, birth-cohort and time fixed effects. In each regression, a constant is included but not shown. Robust standard errors in parenthesis are clustered at the locality level. ***, **,* means significant at 1%, 5% and 10%.