Adolescents' Transition to Adulthood and Their Assimilation from Violent to Peaceful Contexts

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Abstract We study the assimilation to peaceful contexts among adolescents who were exposed to violence (armed conflict) regarding three transitions: marriage/cohabitation, household management and childbearing. The change of context from violent to peaceful is achieved using migrants. We formulate and test nine paths to describe adolescents' assimilation. These paths are the combinations of the three possible effects of current exposure to violence, and the possible changes of behaviour when adolescents move to peaceful areas. The possible effects are: no effects, positive effect and negative effect. The possible changes of behaviours are: persistency, adaptation and disturbance. Persistency occurs when adolescents' behaviour continues to be the same after migration. Adaptation indicates that although they were affected by violence before migration, after migrating to peaceful areas they behave as adolescents who have never been exposed to violence. Disturbance describes when the effect of violence is more than countered in a peaceful context. We find that the effects of the exposure to armed conflict on adolescents' transition to adulthood differ according to adolescents' features and the nature of the transition. In general, the level of poverty increases the vulnerability of adolescents who are currently exposed to violence, promoting their early transition to marriage/cohabitation, household management and childbearing. After moving to a peaceful environment, adolescents' behaviour also depends on their characteristics. As result, the assimilation paths also vary between adolescents.

Keywords: armed conflict, displacement, war, adolescents' behaviour, marriage/cohabitation, household management and childbearing, assimilation process

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1. Introduction

Although several authors have confirmed that armed conflict affects adolescents' development, altering their educational achievement and even their fertility and nuptiality patterns, their assimilation to peaceful contexts has been understudied. We suggest that adolescents exposed to violence that migrate to peaceful contexts might change their trajectories regarding marriage/cohabitation, childbearing and household management manager (becoming a head of a household or her/his partner), and even that some of them might acquire the trajectories of adolescents who have never been exposed to violence. However, the assimilation from violent to peaceful contexts can vary between genders, ages and regions of origin. For instance, it is possible that males adapt faster to peaceful contexts than females. Therefore, the treatment needed to normalise the physical, cognitive and psychological development of children and adolescents exposed to violence in a peaceful destination might differ according to their characteristics.

Several researchers have found that exposure to violence modifies people's nuptiality and fertility patterns. Verwimp and Bavel (2005) find that refugee women in Rwanda exhibit higher fertility rates than other population groups. Rutayisire et al. (2014) point out that replacement fertility and little access to family planning methods increases fertility rates in Rwanda between 1992 and 2000, despite the fact that the percentage of married women decreased. Also for Rwanda, Jayaraman et al. (2009) and Schindler and Verpoorten (2013) state that the exposure to violence causes women to postpone marriage, increasing the age at first marriage. Shemyakina (2007) concludes for Tajikistan that living in armed conflict areas affects negatively age at first birth. In contrast, in the Nepalese scenario, Valente (2011) finds that women of school age during the armed conflict became more likely to be married by the age of 15; however, this violent context does not affect the marriage status among older women (over the age of 21). For Colombia, Sanchez-Cespedes (2018) concludes that exposure

to armed conflict generally accelerates the transition to childbearing among rural adolescents; however, a reduction in violence levels decreases this probability. To the best of the author's knowledge, this is the first study that explores the effect of violence caused by Colombian armed conflict on adolescents' transition to marriage/cohabitation and household management. [2]

Some of the channels proposed by other authors, through which violence may modify adolescents' fertility and nuptiality patterns are: 1. community social disorganisation - measured with the rates of substance abuse, violence, etc. - is an important predictor of high-risk sexual behaviour (Upchurch, Aneshensel, Sucoff, and Levy-Storms 1999; Kirby and Lepore 2005; Harding 2009, and Uthman 2010). 2. Being exposed to contexts that do not offer a long life expectancy, as in the middle of an armed conflict, increases also the probability of engaging in risky behaviours (Harding 2009). 3. The cases of rape, sexual humiliation, and forced prostitution, marriage, and pregnancy increase during an armed conflict (Woroniuk, 2000). 4. Colombian displaced children and adolescents also assume adult roles earlier, such as obtaining a job, because of the need to find resources for their own survival or that of their relatives (Pfizenmaier, 2004). In consequence, they become independent, and it is more likely that they form their own families.

In short, there is a consensus that the exposure to violence affects adolescents' development; and in the case of Colombia, according to the results of this study, the exposure to armed conflict affects the transition to marriage/cohabitation, household management and childbearing. However, this is only the first contribution of our study. The second contribution is the description of adolescents' assimilation to peaceful context. We simulate the passage from violent to peaceful contexts using migrants; focusing the analysis on migrants ensures

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[2] The Colombian conflict has its origin with the period of violence between parties after the assassination of Jorge Eliecer Gaitan, presidential candidate, in 1948. In mid-1960s, far-left guerrillas are created, such as the Revolutionary Armed Forces of Colombia (FARC), and the National Liberation Army (ELN), that fight each other, and against the Army and illegal paramilitary groups to increase their influence in Colombian territory.

that all individuals (whether exposed to violence or not) share the migration experience. In addition, the paths proposed in this study to describe adolescents' assimilation from violent to peaceful contexts are based on those proposed by other authors to describe the assimilation process of migrants when they arrive in a new environment.[3] The difference is that they compare migrants to natives, and we compare migrants from municipalities with armed conflict to those from peaceful municipalities.

We propose and test nine assimilation paths. They characterise the behaviour of adolescents when they are currently exposed to violence (before migration), and after they stop experiencing it (after migration). Before migration, we establish whether violence has accelerated, delayed or not had effect on adolescents' transition to adulthood. If adolescents in violent areas behave as if they have never experienced violence, it is possible that they are a *self-selected* group. If adolescents exposed to violence exhibit a higher probability of taking on a transition, there is a *positive effect* of violence; otherwise, there is a *negative effect*. After migration, adolescents' change of behaviour is described by *persistency*, *adaptation* and *disturbance*. If they maintain their behaviour after migrating to peaceful areas, they experience *persistency*. If they change their behaviour because they adapt to the new context, their behaviour is described as *adaptation*. However, if they change their behaviour showing that the effect of violence is more than countered, they experience *disturbance*; which can be positive or negative - positive if there is an increase in the likelihood of experiencing a

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[3] Most of the theories on the effect of migration on the transition to adulthood concentrate on childbearing as an outcome, and they are: the *socialisation hypothesis*, which assumes that the fertility behaviour of migrants reflects the fertility preferences and behaviour dominant in their childhood. The *adaptation hypothesis* suggests that migrants, sooner or later, adapt to the fertility behaviour dominant in the destination environment. The *selection hypothesis* argues that migrants are a special group whose fertility preferences are more similar to the preferences of people at destination than at origin. The *disruption hypothesis* indicates that immediately following migration, migrants show particular low levels of fertility due to the disruptive factor associated with the migration process. The assimilation of migrants has been widely studied. For instance, Kahn (1988) and Stephen (1992) suggested migration selectivity for Mexican immigrats in the United States. Carsol (1985) found short-term effects of disruption on migrant's life. Other authors, such as Mayer et al. (2000) explain that sooner or later migrants adapt to the new culture.

transition, or negative if there is a decrease. The nine paths are combinations between the effects of violence before migration, and the change of behaviour after migration.

To establish the effect of violence on the transition to adulthood and the assimilation path for each transition, we estimate two multilevel logistic models with two levels: municipality of origin and individual adolescent. The first model establishes if a group of adolescents is a self-selected group, or it has been affected positively or negatively by violence; the second model determines the aftermath of violence in a peaceful destination. Based on these two models we identify the assimilation path that adolescents follow. One of the independent variables is a municipal index of violence and conflict (IVC) that indicates the level of violence in the place of origin.

We find that the effects of the exposure to armed conflict on adolescents' transition to adulthood differ according to adolescents' features and the nature of the transition. In general, the level of poverty increases the vulnerability of adolescents who are currently exposed to violence, promoting their early transition to marriage/cohabitation, household management and childbearing. After moving to a peaceful environment, adolescents' behaviour also depends on their characteristics. For instance, the difference in the probability of childbearing between adolescents exposed and those not exposed to violence becomes clearer as their level of education increases. As result, the assimilation paths also vary between adolescents.

The remainder of the paper is structured as follows: the next section explains why the assimilation to a peaceful context can vary between transitions (e.g. the transition of forming a family differs from that of becoming a mother) and adolescents' characteristics. Section three explains in detail the nine paths. The fourth section describes the construction of the database and of the Index of violence and conflict. The fifth section explains the methodology used to identify the prevalent path that best describes the assimilation for each transition. The sixth section contains the results and their analysis. The last section is dedicated to conclusions.

2. Different transitions and persons, different paths of assimilation

Gordon (1964) explains that the assimilation of immigrants should be analysed by dimensions (e.g. Socioeconomic Assimilation, Cultural Assimilation) and a change in one dimension does not lead immediately or inevitably to a change in others (Gordon 1978). We specifically study three aspects that can be included in a demographic dimension: age at first birth, at first union (marriage or cohabitation) and at becoming independent (household manager). Although these ages are interrelated, they have lost correlation over time. In 1995 for 20 to 29 year-old Colombian women, the correlation between the age at first sex and age at first union was 0.29, between the age at first sex and age at first birth 0.18, and between the age at first union and age at first birth 0.47 (Demographic Health Survey DHS-1995). In contrast, in 2010 these correlations were lower: 0.19, 0.12 and 0.37, respectively (DHS-2010).[4] Hence, a change of behaviour related to one of these transitions: forming a family (marriage/cohabitation), having a baby and starting managing a household, might not lead immediately or inevitably to a change of behaviour in the other two.

In addition, migrants' characteristics also determine their assimilation process. The literature has found assimilation differences associated with the place of origin and age of migrants (e.g. Fernandez and Paulsen 1989; Fejgin 1995; Hirschman 2001; Leventhal 2006). In conclusion, the assimilation of displaced adolescents might differ by transition, and by adolescent's characteristic.

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[4] This loss of correlation is consequence of the Second Demographic Transition (Florez and Sanchez-Cespedes 2013). The basic features of the Second Demographic Transition are: 1) the rupture between sexuality, marriage and procreation, 2) the declining importance of marriage as an institution for raising children and 3) the increase of one-parent families (Lesthaeghe 2010).

3. The paths of assimilation

The previous section argues that adolescents can take different assimilation paths according to the transition to assume and their characteristics. This section proposes nine assimilation paths. These paths describe the effect of violence on the behaviour of adolescents when they reside in armed conflict areas, and their change of behaviour after they migrate to peaceful destinations. Therefore, each path is divided in two parts describing each stages: during exposure to violence (before migration) and the experience of peace (after migration). Hence, this section is divided in three parts: the first part sets out the possible effects of violence on adolescents' behaviour, the second part describes the change of behaviour after they have resided in peaceful areas, and the last part introduces the nine paths, which are combinations of the possible effects and the changes of behaviour described in the two previous parts.

3.1 Adolescents' behaviour in armed conflict areas

The three possible effects of violence in the origin are:

a. *Self-selection:* a specific group of adolescents in violent areas whose behaviour is more akin to the behaviour of adolescents in peaceful areas than to the usual behaviour of adolescents in violent areas.

b. *Negative effect:* the exposure to violence discourages adolescents' transition to adulthood, decreasing their likelihood of experiencing a transition.

c. *Positive effect:* the exposure to violence promotes adolescents' transition to adulthood, increasing their probability of taking on a transition.

3.2 The change of behaviour of the adolescents who were exposed to violence after residing in peaceful contexts

The changes of behaviour are described by:

a. *Persistency*: adolescents who have been affected by violence maintain their behaviour even if they move to a peaceful area. In terms of migrants in a peaceful destination, which is the study population to identify this change-, migrants from violent municipalities maintain or increase their differences with migrants from peaceful municipalities.

b. *Adaptation*: adolescents whose behaviour was affected by violence behaves as they have never been exposed to it in a peaceful destination. In terms of our study population, migrants from violent municipalities start behaving in a similar way to migrants from peaceful municipalities after both groups migrate to peaceful municipalities.

d. *Disturbance:* adolescents from violent areas change their behaviour in a peaceful destination because they struggle to adapt to the new context. There are two types of disturbance: positive and negative disturbance. *Positive disturbance* occurs if after migration the probability of experiencing a transition among adolescents from violent areas increases instead of decreasing or being null, as the effect of violence in the origin indicates. In the same way, there is *negative disturbance* if the probability decreases after migration, changing the positive or null effect of violence in the origin.

3.3 Assimilation paths

The nine assimilation paths are combinations of the possible adolescents' behaviours when they are exposed to violence and the potential changes to them after they stop experiencing it. They are set out in Table 1:

Table 1 Assimilation paths to peaceful contexts for people who were exposed to violence

Living in armed conflict areas before migration		After migrating to peaceful areas		Final path
Effect	Description	Change	Description	
Self-selection	Adolescents in violent areas behave as they have never experienced violence	Persistency	Adolescents continue behaving as they have never been exposed to violence	Self-selection with persistency
		Negative disturbance	Migrants from violent areas struggle to adapt, causing a delay in the transition	Self-selection with negative disturbance
		Positive disturbance	Migrants from violent areas struggle to adapt, which promotes the transition	Self-selection with positive disturbance
Negative effect	Violence decreases adolescents' likelihood of experiencing a transition to adulthood	Positive disturbance	Moving to peaceful areas interrupts the effect of violence, increasing the probability of experiencing a transition	Negative effect with positive disturbance
		Persistency	The effect of violence continues after residing in a peaceful environment	Negative effect with persistency
		Adaptation	Adolescents who were exposed to violence behave as adolescents who have not been exposed	Negative effect with adaptation
Positive effect	Violence increases adolescents' likelihood of experiencing a transition to adulthood	Negative disturbance	Migrating to peaceful areas interrupts the positive effect of violence and discourages the transition to adulthood	Positive effect with negative disturbance
		Persistency	The effect of violence continues after migrating to a peaceful area	Positive effect with persistency
		Adaptation	Adolescents from violent areas behave as adolescents who have never lived in violent contexts	Positive effect with adaptation

4. Data

4.1 Sisben database

We use a longitudinal data constructed with the Sisben (System of Identification of Potential Beneficiaries of Social Programmes) database from 2006 to 2009. The Sisben is the main instrument for individual targeting of welfare policies in Colombia. It uses an index that measures the households' well-being and orders them according to their living standards. The Sisben index is divided into six levels, people in level 1 are considered to be extremely poor (11,287,020 or 25% of population in March 2006) and people in level 2 are considered to be poor (7,969,057 or 18% of population in March 2006).[5]

The study population is based on the following definition of *premature transition to adulthood*: when a person experiences a transition (e.g. marriage/cohabitation, having the first child) before reaching a sufficient physical and cognitive development to handle it properly. Therefore, s/he does not have sufficient preparation or the means for being a partner, parent and household manager. The complete physical maturity for girls is reached between their eighteenth and twentieth birthday (Dixon-Muller 2008). However, Breinbauer and Maddaleno (2005) indicate that a person's cognitive maturity is achieved one decade after puberty or more, usually after age 24. Because of this, the study population is young people aged 12 to 24, which covers most of the cognitive development and all the physical development.

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[5] The variables included in the Sisben index are: socio-economic stratum, floor materials, wall materials, location of water supply, type of toilet, type of waste management, number of toilets, location of toilet, own shower, own telephone - land line, type of cooking fuel, number of goods (refrigerator, washing machine, colour TV, heater, oven, air conditioning, cable), years of education of the head of the household, years of education of his/her partner, schooling gap for persons aged 6 to 25, proportion of persons with private healthcare, proportion of workers in the household and overcrowding (Florez et al. 2008).

The study population to determine the assimilation paths for marriage and household management includes both genders, while the population to establish the paths for childbearing considers only females. Moreover, the study population includes migrants who have been classified as poor or extremely poor (people classified in Sisben level 1 are considered extremely poor, and in Sisben level 2 poor) by the Colombian government, and their exposure time in the municipality of destination is minimum one year. In addition, the sample comprises municipalities of origin and destination that have 100,000 inhabitants and lower, since the exposure of individuals to violence is likely to be higher and more homogeneous in small municipalities than in large ones. Moreover, there is no information about armed conflict at neighbourhood level, so this has to be measured at municipal level.

The construction of the database consists of merging migrants in two consecutive years and 2009, specifically 2006, 2007 and 2009, and 2007, 2008 and 2009. The first year gives the information before migrating. The next consecutive year gives the information about the destination municipality, and the initial conditions there, in particular whether or not an adolescent has already taken on a transition. If s/he has already experienced the transition, s/he is included in the model estimated before migration; if s/he has not experienced it, s/he is included in the model estimated after migration. Table A1 in Appendix 1 reports the percentage of adolescents that successfully merged for each period. According to this table about 60 per cent of them do merge in both periods. Because of this, a weight is calculated by each adolescent that merged to control for attrition due to the nonrandomness of the merging procedure. The weights are estimated as the inverse of the probabilities predicted by the logistic models reports in Table A2 (Appendix 1). In this model, the dependent variable is zero if a person does not merge and one if he/she merges. The independent variables are taken from the first year of the period (for instance, for the period 2007–2008–2009, the first year is 2007) and are: the number of households in the same dwelling, household size, age, gender (woman=1 and man=0), whether

the head of the household is the homeowner (homeowner=1 and other=0), the degree of urbanicity in the origin (one dummy for dispersed rural areas and another for nondispersed rural areas), and the Sisben level (Sisben 1 or extremely poor=1 and Sisben 2 or poor=0).

4.2 The Index of violence and context (IVC)

To measure armed conflict violence, we estimate an index that comprises several variables that indicate the level of violence at municipal level; hence, the measure of violence does not rely on only one variable, which would increase the probability of measurement bias. We estimate the index as the predicted probability of a logistic model; a method that needs a variable that indicates the impact of violence.[6] Ibañez-Londoño (2008) explains that guerrillas attack the civil population to provoke displacement and achieve their war objectives. Therefore, the displacement rate is a good indicator of the impact of a violent act on the population. Thus, the dependent variable in the logistic model is one if the municipal displacement rate is higher than the average and zero otherwise. We calculate the municipal displacement rate with the following formula:

$$displacement\ rate_{i\ 2005} = \frac{M_{i\ 2005}}{p_i} * 100$$

$$p_i = \frac{p_{i\ 2004} + p_{i\ 2005}}{2}$$

where M_{i2005} is the number of outdisplaced migrants from municipality i in 2005. p_{i2004} and p_{i2005} are the populations of i in the years 2004 and 2005, respectively. The independent

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[6] Other weighting methods were also considered, such as principal component analysis and simple weighting. The former method was discarded because it demands that all the variables are highly correlated, which is not met by the Colombian armed conflict variables as Table A3 shows (Appendix 2); most correlations are lower than 0.3. The second method assigns arbitrarily weights; commonly the same weight. For instance, the index is the number of attacks of insurgence (Ibañez-Londoño, 2008) or the number of human rights violations (Leon, 2012). The problem with this method is that different violent acts have different impacts on people; for example, an illegal detention might have a lower impact than a murder.

variables describe the armed conflict in 2004 to avoid double causality with the dependent variable, which is measured in 2005. Table 2 reports the result of the logistic model.

Table 2 Index of violence and conflict

Displacement rate$_{i\ 2005}$	Coef.		Std Err.	Z	P>z
Confrontations	0.605	***	0.216	2.800	0.005
Armed contact	0.274	***	0.040	6.900	0.000
Total terrorist acts	0.160	**	0.076	2.120	0.034
Homicides and kidnappings per 10,000 inhabitants	0.173	**	0.081	2.140	0.033
Assaults on private property per 10,000 inhabitants	0.580	***	0.212	2.740	0.006
Ambush	0.036		0.291	0.120	0.902
Harassment	0.099		0.121	0.820	0.410
Cons	-1.874	***	0.100	-18.760	0.000

Notes: [a.] Source: Universidad de los Andes – CEDE and Observatorio del Programa Presidencial de Derechos Humanos y el Derecho Internacional Humanitario – Observatory of the Presidential Programme for Human Rights and International Humanitarian Law. [b.] the index takes into account only the violent incidents of Table 3A that occur in more than 5 per cent of municipalities.

4.3   Identifying peaceful municipalities

The study population to determine the change of behaviour of adolescents after residing in a peaceful context are migrants who moved to municipalities with a low incidence of armed conflict. To identify these municipalities, we classified all the municipalities in three levels of violence by applying the method of K-means clustering to the IVC. 94 municipalities are classified in the high level of violence, 131 in the middle level and 877 in the low level. The means of the IVC for municipalities in the high, medium and low levels are 0.868, 0.444 and 0.158, respectively.

5. Method

The procedure to identify the assimilation path that adolescents exposed to violence follow after their exposure to violence ends consists of three steps: in the first steps, we estimate multilevel logistic models in the origin (before migration) to determine the effect of violence.

In the second step, we estimate multilevel logistic models in peaceful destinations (after migration) to find out the aftermath of the exposure to violence on adolescents. Finally, we combine the results of the two first steps to deduce the assimilation path. The three step are explained in more detail below.

The transitions to marriage, household management and childbearing are modelled using multilevel logistic models because an adolescent in an armed conflict area relates with other adolescents who have also been influenced by armed group violence. Hence, the effects of armed conflict on the transitions to marriage, household management and childbearing of an adolescent are determined by the effect of violence on her/his peers in her/his municipality. Therefore, we have a hierarchical system with two levels: adolescent and the group of adolescents with whom s/he interacts. Moreover, multilevel models allow that the intercept and the coefficients of the independent variables vary across municipalities taking into account their heterogeneity, and solve the problem of obtaining spurious significant values caused by the similarities among residents of a specific geographical area (Hox, 2010). We estimate the models using the GLIMMIX procedure of Statistical Analysis Software (SAS).

5.1. Determining the effect of violence on adolescents' behaviour

The effect of violence in the origin is estimated with the following multilevel logistic model:

$$Y_{ij}^{BM} = \beta_{00} + \beta_{01}IVC_j + \sum_{k=1}^{K} \beta_{k0}X_{kij} + \sum_{k=1}^{K} \beta_{k1}X_{kij}IVC_j + \sum_{k=1}^{K} u_{kj}X_{kij} + u_{0j} + \varepsilon_{ij}$$

Where, i represents the individual, j the municipality of residence and k the individual variable. Y_{ij}^{BM} is 1 if an adolescent i who lives in the municipality j is married/household manager (head of the household or her/his partner)/mother and it is 0 otherwise. IVC_j represents the IVC in the municipality of residence j. X_{kij} is the independent variable k for the individual i that lives

in municipality j. K is the total number of individual variables. The individual variables X_{kij} included in the model are: the age of the individual i who lives in municipality j, gender (1 for females and 0 for male), the number of years of education of the head of household, poverty level (1 if s/he is extremely poor or Sisben 1 and 0 if s/he is poor or Sisben 2), and the degree of urbanicity of the area of residence (rural is 1 and urban is 0). $\sum_{k}^{K} u_{kj} X_{kij,}$ is the random part of the independent variables. u_{0j} and u_{kj} are the stochastic parts of the intercept and the variable k, respectively.

The interaction terms between the individual variables and the IVC, $X_{kij} IVC_j$, express the moderator effect of violence on the relationship between the dependent variable Y_{ij} and the individual predictors. Hence, the relationship between the likelihood of a transition to adulthood and the level of violence for specific characteristics $X_{1ij} \dots X_{Kij}$ follows the equation: log of the odds equals $\beta_{01} + \sum_{k=1}^{K} \beta_{k1} X_{kij}$. Based on this equation, we determine if adolescents with features $X_{1ij} \dots X_{Kij}$ are a self-selected group, or their probabilities of a transition have been affected positively or negatively by violence.

5.2.   Establishing the aftermath of violence in peaceful contexts

These models are estimated by adolescents' characteristic according to the effect of violence in the origin, because if violence affects two groups differently before migration, it is very likely that the same occurs after migration. For example, if before migration the effect of violence differs between genders, a model by gender is estimated after migration. The models we estimate in this stage are:

$$Y_{ij}^{AM} = \gamma_{00} + \gamma_{01} IVC_j + \sum_{k=1}^{K} \gamma_{k0} X_{kij} + \sum_{k=1}^{K} \gamma_{k1} X_{kij} IVC_j + \sum_{k=1}^{K} u_{kj} X_{kij} + u_{0j} + \varepsilon_{ij}$$

Two levels are considered in this scenario: adolescent i and municipality of origin j. Y_{ij}^{AM} is one if adolescent i who came from municipality j has taken on a transition to adulthood in a peaceful municipality in March 2009, and it is zero otherwise. Therefore, adolescents who experience the transition before migration are not considered. IVC_j is the index in the municipality of origin j. The independent variables X_{kij} are the same considered in Section 5.1, expect the education of the head of household; which is replaced by adolescent's education. Adolescent's education is not considered in the models before migration to avoid endogeneity problems with the dependent variable. To consider the same group of adolescents before and after migration, age corresponds to the adolescent's age measured before migration, and we add a new variable after migration that it is the Exposition time at destination. The sum of the age measured before migration and the explosion time approximates the age in 2009. The rest of the individual independent variables are measured in the municipality of residence before migrating. Based on the equation: log of the odds equals $\gamma_{01} + \sum_{k=1}^{K} \gamma_{k1} X_{kij}$, we establish the aftermath of violence on adolescents' behaviour in a peaceful destination by feature X_{kij}.

5.3. Identifying the assimilation path

Table 3 shows the conditions that equations $\partial Y_{ij}^{BM} / \partial IVC = \beta_{01} + \sum_{k=1}^{K} \beta_{k1} X_{kij}$ and $\partial Y_{ij}^{AM} / \partial IVC = \gamma_{01} + \sum_{k=1}^{K} \gamma_{k1} X_{kij}$ need to meet to identify each assimilation path. In this table the symbol = means statistically equal, < means negative and statistically different from zero, and > means positive and statistically different from zero.

Table 3 Assimilation paths to peaceful contexts for people who were exposed to violence

Living in armed conflict areas before migration		After migrating to peaceful areas		Final path
Effect	Description	Change	Description	
Self-selection	$\beta_{01}+\sum_{k=1}^{K}\beta_{k1}X_{kij}=0$	Persistency	$\gamma_{01}+\sum_{k=1}^{K}\gamma_{k1}X_{kij}=0$	Self-selection with persistency
		Negative disturbance	$\gamma_{01}+\sum_{k=1}^{K}\gamma_{k1}X_{kij}<0$	Self-selection with negative disturbance
		Positive disturbance	$\gamma_{01}+\sum_{k=1}^{K}\gamma_{k1}X_{kij}>0$	Self-selection with positive disturbance
Negative effect	$\beta_{01}+\sum_{k=1}^{K}\beta_{k1}X_{kij}<0$	Positive disturbance	$\gamma_{01}+\sum_{k=1}^{K}\gamma_{k1}X_{kij}>0$	Negative effect with positive disturbance
		Persistency	$\gamma_{01}+\sum_{k=1}^{K}\gamma_{k1}X_{kij}<0$	Negative effect with persistency
		Adaptation	$\gamma_{01}+\sum_{k=1}^{K}\gamma_{k1}X_{kij}=0$	Negative effect with adaptation
Positive effect	$\beta_{01}+\sum_{k=1}^{K}\beta_{k1}X_{kij}>0$	Negative disturbance	$\gamma_{01}+\sum_{k=1}^{K}\gamma_{k1}X_{kij}<0$	Positive effect with negative disturbance
		Persistency	$\gamma_{01}+\sum_{k=1}^{K}\gamma_{k1}X_{kij}>0$	Positive effect with persistency
		Adaptation	$\gamma_{01}+\sum_{k=1}^{K}\gamma_{k1}X_{kij}=0$	Positive effect with adaptation

Notes: [a.] the symbols = means statistically equal, < statistically different from zero and negative, and > statistically different from zero and positive.

Since two tests are evaluated at the same time, the chance of rejecting the null hypothesis although it is true (type I error) increases. To establish whether or not a group of adolescents follow an assimilation path, we combine two methods that adjust the significance levels required to reject the null hypothesis, they are: Bonferroni and Holm's sequential Bonferroni

adjustments. The Bonferroni adjusted p-value for *n* paired comparisons equals *target p-value* divided by *n*; where *n* is the number of paired comparisons. In this study *n=2* and the target *p-value=0.10*, so the *adjusted p-value=0.5*. Therefore, both hypothesis tests have to be significant at 95% to reject the null hypothesis. Holm's sequential Bonferroni method works as follows: if n pairs are compared with *q* as the threshold p-value then the most significant of the n p-values has to be smaller than q/n; the second most significant p-value of the n has to be smaller than q/n-1, the third most significant p-value has to be smaller than q/n-2 and so on. Hence in our case, one hypothesis must be significant at 95% and the other at 90%. We decided to do an average between both methods to identify the assimilation paths, and propose the criteria about the p-values specified in Table 4.

Table 4 P-values to identify the assimilation paths

	Condition
$\beta_{01} + \sum_{k=1}^{K} \beta_{k1} X_{kij}$ and $\gamma_{01} + \sum_{k=1}^{K} \gamma_{k1} X_{kij}$ are statistically significant	$\alpha \leq 0.05$ and $\rho \leq 0.05$ $\alpha \leq 0.01$ and $\rho \leq 0.10$ $\alpha \leq 0.10$ and $\rho \leq 0.01$
$\beta_{01} + \sum_{k=1}^{K} \beta_{k1} X_{kij}$ is statistically significant, and $\gamma_{01} + \sum_{k=1}^{K} \gamma_{k1} X_{kij}$ is not	$\alpha \leq 0.05$ and $\rho > 0.05$
$\gamma_{01} + \sum_{k=1}^{K} \gamma_{k1} X_{kij}$ is statistically significant, and $\beta_{01} + \sum_{k=1}^{K} \beta_{k1} X_{kij}$ is not	$\alpha > 0.05$ and $\rho \leq 0.05$
$\beta_{01} + \sum_{k=1}^{K} \beta_{k1} X_{kij}$ and $\gamma_{01} + \sum_{k=1}^{K} \gamma_{k1} X_{kij}$ are not statistically significant	$\alpha > 0.05$ and $\rho > 0.05$

Notes: [a.] α and ρ are the estimated p-values for $\beta_{01} + \sum_{k=1}^{K} \beta_{k1} X_{kij}$ and $\gamma_{01} + \sum_{k=1}^{K} \gamma_{k1} X_{kij}$, respectively.

Table 6 combines the specifications of the assimilations paths described in Table 3 with the

P-values listed in Table 4 to show the conditions that must meet $\beta_{01} + \sum_{k=1}^{K} \beta_{k1} X_{kij}$, $\gamma_{01} +$

$\sum_{k=1}^{K} \gamma_{k1} X_{kij}$, α and ρ to identify each assimilation path. The conditions are numbered to

help in their identification in the next section.

Table 5 P-values to identify each assimilation path

Final path	Conditions that α and ρ have to meet to identify the assimilation path. Number of the condition in ()	
Self-selection with persistency	$\beta_{01} + \sum_{k=1}^{K} \beta_{k1} X_{kij}$ and $\gamma_{01} + \sum_{k=1}^{K} \gamma_{k1} X_{kij}$ are not statistically significant	$\alpha > 0.05$ and $\rho > 0.05$ (1)
Self-selection with negative disturbance	$\gamma_{01} + \sum_{k=1}^{K} \gamma_{k1} X_{kij} < 0$ is statistically significant, and $\beta_{01} + \sum_{k=1}^{K} \beta_{k1} X_{kij}$ is not	$\alpha > 0.05$ and $\rho \le 0.05$ (2)
Self-selection with positive disturbance	$\gamma_{01} + \sum_{k=1}^{K} \gamma_{k1} X_{kij} > 0$ is statistically significant, and $\beta_{01} + \sum_{k=1}^{K} \beta_{k1} X_{kij}$ is not	$\alpha > 0.05$ and $\rho \le 0.05$ (3)
Negative effect with positive disturbance	$\beta_{01} + \sum_{k=1}^{K} \beta_{k1} X_{kij} < 0$ and $\gamma_{01} + \sum_{k=1}^{K} \gamma_{k1} X_{kij} > 0$ are statistically significant	$\alpha \le 0.05$ and $\rho \le 0.05$ (4) $\alpha \le 0.01$ and $\rho \le 0.10$ (5) $\alpha \le 0.10$ and $\rho \le 0.01$ (6)
Negative effect with persistency	$\beta_{01} + \sum_{k=1}^{K} \beta_{k1} X_{kij} < 0$ and $\gamma_{01} + \sum_{k=1}^{K} \gamma_{k1} X_{kij} < 0$ are statistically significant	$\alpha \le 0.05$ and $\rho \le 0.05$ (7) $\alpha \le 0.01$ and $\rho \le 0.10$ (8) $\alpha \le 0.10$ and $\rho \le 0.01$ (9)
Negative effect with adaptation	$\beta_{01} + \sum_{k=1}^{K} \beta_{k1} X_{kij} < 0$ is statistically significant, and $\gamma_{01} + \sum_{k=1}^{K} \gamma_{k1} X_{kij}$ is not	$\alpha \le 0.05$ and $\rho > 0.05$ (10)
Positive effect with negative disturbance	$\beta_{01} + \sum_{k=1}^{K} \beta_{k1} X_{kij} > 0$ and $\gamma_{01} + \sum_{k=1}^{K} \gamma_{k1} X_{kij} < 0$ are statistically significant	$\alpha \le 0.05$ and $\rho \le 0.05$ (11) $\alpha \le 0.01$ and $\rho \le 0.10$ (12) $\alpha \le 0.10$ and $\rho \le 0.01$ (13)
Positive effect with persistency	$\beta_{01} + \sum_{k=1}^{K} \beta_{k1} X_{kij} > 0$ and $\gamma_{01} + \sum_{k=1}^{K} \gamma_{k1} X_{kij} > 0$ are statistically significant	$\alpha \le 0.05$ and $\rho \le 0.05$ (14) $\alpha \le 0.01$ and $\rho \le 0.10$ (15) $\alpha \le 0.10$ and $\rho \le 0.01$ (16)
Positive effect with adaptation	$\beta_{01} + \sum_{k=1}^{K} \beta_{k1} X_{kij} > 0$ is statistically significant, and $\gamma_{01} + \sum_{k=1}^{K} \gamma_{k1} X_{kij}$ is not	$\alpha \le 0.05$ and $\rho > 0.05$ (17)

Notes: α and ρ are the estimated p-values for $\beta_{01} + \sum_{k=1}^{K} \beta_{k1} X_{kij}$ and $\gamma_{01} + \sum_{k=1}^{K} \gamma_{k1} X_{kij}$, respectively.

6. Results

The results are presented in two parts. The first part explains how exposure to violence regulates the effect of the individual variables. The second part shows the final effect of violence by adolescents' characteristics and identifies the assimilation paths. Only the interactions and the variances that are statistically significant at 90% and above are considered in the final models. We centre the adolescent's age around 12 (age-12), and the educational variables around 5 (years of education – 5). Thereby, the intercept is the value that corresponds to a 12-year-old male for the marriage/cohabitation and household management models, and a 12-year-old female for the childbearing models, who lives in or come from an urban area and was or is poor (depending on the model), and whose head of household or s/he (depending on the model) had or has 5 years of education.

6.1. Violence moderating effect on individual variables

a. Marriage/cohabitation

Table 6 shows the estimates for the probability of marriage/cohabitation for different populations; the variances of the coefficients are reported in Table A4 of Appendix 3. The first model includes all the migrants, not only those who migrate to peaceful municipalities; the other three models consider exclusively migrants to these municipalities. The dependent variable for the two first models is measured before migration, and for the other two after migration in peaceful destinations in 2009. The last two models are estimated by poverty level, because in the second model the interaction between the IVC and Sisben 1 is statistically significant, and it is possible that the behaviours of extremely poor and poor adolescents are different after migration as well.

Comparing the models estimated before migration, the coefficients of both models are very similar; indicating that the behaviour of the migrants to peaceful municipalities might be representative of that of all migrant population from and to small municipalities. In both cases, although the coefficient of the IVC is not statistically significant, its interaction with Sisben 1 is positive and statistically significant. This suggests that violence moderates the effect of the level of poverty. The coefficient of Sisben 1 is given by the equation -0.133+1.211 IVC, according to the second model. The IVC does not regulate the effect of another variable.

In the first two estimates the coefficients of age, gender, and head's education are also positive, statistically significant and similar in magnitude. Being older and/or a woman increases the likelihood of marriage/cohabitation, which was expected. The odds of marriage/cohabitation increases by 120 per cent for a one-year increase in age, and the likelihood for women are about 10 times that for men. The positive sign of the coefficient of head of household's education is unexpected. This result might be explained by the low levels of education in small municipalities. The average years of education of the heads of household is 3.65; only 37.43 per cent of them complete primary education and 5.82 per cent secondary education. Hence, it is likely that heads of household's education is not an important feature to reduce the probability of marriage/cohabitation among the residents of small municipalities.

The third and fourth models describe the behaviour of extremely poor and poor migrant adolescents in peaceful destinations, respectively. For poor migrants, the coefficients of the IVC and of any of its interactions are not statistically significant; in other words, violence does not moderate the effect of any of the individual variables. This suggests that poor adolescents from violent and peaceful municipalities behave similarly after migrating to peaceful destinations. In contrast, for extremely poor adolescents, violence regulates the effect of exposition time with the equation -0.043+0.747 IVC, suggesting that the adaptation process to a peaceful context is more difficult for adolescents that come from violent areas.

Table 6 Probability of marriage/cohabitation

	All migrants - before migration		Migrants to peaceful context - before migration		Migrants to peaceful context - after migration in 2009			
					Sisben 1 – extremely por		Sisben 2 - poor	
	Coeff.	Odds ratio	Coeff.	Odds ratio	Coeff.	Odds ratio	Coeff.	Odds ratio
Age	0.748 *** (0.016)	2.114	0.809 *** (0.023)	2.245	0.478 *** (0.019)	1.613	1.311 *** (0.187)	3.709
Woman	2.197 *** (0.096)	9.001	2.425 *** (0.134)	11.301	2.933 *** (0.145)	18.800	6.418 *** (0.580)	612.65
Education of the head	0.138 *** (0.016)	1.147	0.160 *** (0.021)	1.173				
Adolescent's education					-0.098 *** (0.025)	0.907	-0.590 *** (0.166)	0.554
Sisben 1	-0.034 (0.117)	0.966	-0.133 (0.150)	0.875				
From rural areas	0.101 (0.091)	1.106	0.117 (0.120)	1.124	-0.328 ** (0.128)	0.720	-4.604 *** (1.143)	0.010
Exposition time					-0.043 (0.112)	0.958	-0.218 (0.398)	0.804
IVC	-0.015 (0.326)	0.985	-0.186 (0.478)	0.830	-1.941 ** (0.775)	0.144	-0.274 (2.204)	0.760
Sisben 1*IVC	0.892 *** (0.308)		1.211 *** (0.468)					
Exposition time*IVC					0.747 ** (0.011)			
Intercept	-8.834 *** (0.207)		-9.580 *** (0.292)		-6.522 ** (0.359)		-20.282 *** (1.988)	
# of zeros	16247		11348		6307		3875	
# of ones	2015		1418		861		358	

Notes: [a.] Source: Sisben database 2006-2009 [b.] The reference category for rural is urban, and for level 1 of Sisben it is level 2. [c.] The variances of the coefficients are reported in Table A4 in Appendix 3. [d.] Standard error in parenthesis. [e.] *** Significant at 99%, ** significant at 95%, and * significant at 90%.

Table 7 Probability of household management

	All migrants - before migration		Migrants to peaceful context - before migration		Migrants to peaceful context - after migration			
					Sisben 1		Sisben 2	
	Coeff.	Odds ratio	Coeff.	Odds ratio	Coeff.	Odds ratio	Coeff.	Odds ratio
Age	0.869 ***	2.385	1.093 ***	2.984	0.565 ***	1.760	0.965 ***	2.625
	(0.022)		(0.052)		(0.028)		(0.092)	
Woman	2.506 ***	12.251	3.224 ***	25.121	2.694 ***	14.793	3.500 ***	33.145
	(0.116)		(0.216)		(0.159)		(0.588)	
Education of the head	0.302 ***	1.353	0.409 ***	1.505				
	(0.021)		(0.039)					
Adolescent's education					-0.049	0.952	-0.423 ***	0.655
					(0.025)		(0.076)	
Sisben 1	-0.392 **	0.676	-0.714 **	0.490				
	(0.182)		(0.296)					
From rural areas	0.385 ***	1.470	0.407 **	1.502	-0.367 **	0.693	-1.587 ***	0.205
	(0.116)		(0.192)		(0.154)		(0.568)	
Exposition time					-0.243 *	0.784	-0.519 **	0.595
					(0.132)		(0.259)	
IVC	0.071	1.073	0.599	1.821	-1.214	0.297	-1.833 ***	0.160
	(0.400)		(0.730)		(0.864)		(1.646)	
Adolescent's education*IVC							1.249 ***	
							(0.313)	
Sisben 1*IVC	1.650 ***		1.987 **					
	(0.475)		(0.836)					
Exposition time*IVC					0.682 **			
					(0.330)			
Intercept	-10.483 ***		-13.454 ***		-6.663 ***		-13.199 ***	
	(0.286)		(0.684)		(0.410)		(1.436)	
Number of zeros	16320		11422		6386		3846	
Number of ones	2032		1344		882		430	

Notes: [a] Source: Sisben database 2006-2009 [b] The reference category for rural is urban, and for level 1 of Sisben it is level 2. [c] The variances of the coefficients are reported in Table A5 in Appendix 6. [d] Standard error in parenthesis. [e] *** Significant at 99%, ** significant at 95%, and * significant at 90%.

Table 8 Probability of childbearing before migration

	All migrants - before migration		Migrants to peaceful context - before migration	
	Coeff.	Odds ratio	Coeff.	Odds ratio
Age	0.712 ***	2.037	0.738 ***	2.091
	(0.027)		(0.035)	
Education of the head	0.196 **	1.216	0.209 ***	1.232
	(0.018)		(0.025)	
Sisben 1	-0.346 **	0.707	-0.661 ***	0.516
	(0.153)		(0.205)	
From rural áreas	0.244 **	1.276	0.151	1.163
	(0.102)		(0.134)	
IVC	-0.753	0.471	-1.646 **	0.193
	(0.498)		(0.760)	
Age*IVC	0.114 **	1.121	0.241 ***	1.273
	(0.054)		(0.086)	
Sisben 1*IVC	1.138 ***	3.120	1.506 **	4.508
	(0.403)		(0.601)	
Intercept	-6.524 ***	0.001	-6.683 ***	0.001
	(0.244)		(0.035)	
Number of zeros	8600		6061	
Number of ones	1721		1155	

Notes: [a.] Source: Sisben database 2006-2009 [b.] The reference category for rural is urban, and for level 1 of Sisben it is level 2. [c.] The variances of the coefficients are reported in Table A6 in Appendix 3. [d.] Standard error in parenthesis. [e.] *** Significant at 99%, ** significant at 95%, and * significant at 90%.

Table 9 Probability of childbearing after migration

| | Migrants to peaceful context - after migration in 2009 | | | | | |
| | Sisben 1 - 12 to 16 | | Sisben 1 - 17 to 24 | | Sisben 2 - 14 to 24 | |
	Coeff.	Odds ratio	Coeff.	Odds ratio	Coeff.	Odds ratio
Age	1.543 ***	4.681	0.696 ***	2.010	0.312 ***	1.366
	0.281		0.275		0.021	
Adolescent's education	-0.097	0.907	-0.260 **	0.771	-0.248 ***	0.780
	0.149		0.179		0.043	
From rural áreas	-1.974 **	0.139	-1.002 ***	0.367	-0.502 ***	0.605
	0.771		1.093		0.139	
Exposition time	-0.025	0.975	-0.561 *	0.571	0.151 **	1.164
	0.394		0.769		0.074	
IVC	-2.287	0.102	-0.561 *	0.570	0.301	1.352
	1.936		2.659		0.31	
Adolescent's education*IVC					0.426 ***	
					0.119	
Intercept	-13.714 ***		-14.367 ***		-3.783 ***	
	1.404		2.947		0.256	
Number of zeros	2432		872		3626	
Number of ones	289		379		932	

Notes: [a]. Source: Sisben database 2006-2009 [b]. The reference category for rural is urban, and for level 1 of Sisben it is level 2. [c]. The estimate for the group Sisben 2 - 12 to 13 does not converge. [d]. The variances of the coefficients are reported in Table A6 in Appendix 3. [e]. Standard error in parenthesis. [f]. *** Significant at 99%, ** significant at 95%, and * significant at 90%.

Concerning the effect of individual variables, the odds ratio for Sisben 2 between women and men increases from 11.3 to 612.7 before and after migration. This extremely high odds ratio is explained by the really low number of married male adolescents in the sample of Sisben 2, 41 out of 2124; in contrast, for females these figures are 324 out of 2237. Coming from rural areas and the years of education of the adolescents decreases the likelihood of marriage. The odds for rural adolescents are 72 and 1.0 per cent the odds for urban adolescents for Sisben 1 and 2, respectively. In that order, the odds of marriage/cohabitation decreases by 9 and 45 per cent for a one-year increase in an adolescent's education

b. Household management

Table 7 reports the results for household management. This table has the same structure as Table 6. The variances of the coefficients are reported in Table A5. The first two models of Table 7 are before migration, one for all migrant population and the other for the migrants to peaceful destinations. The other two models are estimated after migration for adolescents in Sisben 1 and 2, because the interaction between this variable and the IVC is statistically significant in the models before migration. Table 7 shows that the signs and the significance of the coefficients of the two first models are the same; this suggests that results for the behaviour of migrants to peaceful destinations may be extended to all migrants.

According to Table 7 the relationship between the level of poverty and the likelihood of household management before migration depends on the level of violence. This relationship is given by the equation: log of the odds equals -0.714+1.987 IVC. Hence, in peaceful circumstances the odds of household management for extremely poor adolescents are one-half (exp(-0.714)) the odds for poor adolescents. In contrast, in violent scenarios when the IVC equals 1, the odds ratio between extremely poor and poor adolescents is 3.571 (exp(-0.714+1.987)), which is statistically significant at 95 per cent.

Concerning the other variables, age, being a woman, head of household's education and coming from rural areas increases the likelihood of household management. A one-year increase in age and in head's education increase this likelihood in 198 and 51 per cent, respectively. The odds of becoming a household manager for women is 25 times the odds for men and for rural adolescents is 1.51 times the odds for urban ones.

For Sisben 1 after migration, previous exposure to violence moderates the effect for exposition time with the equation log of the odds equals -0.243 +0.682 IVC. For Sisben 2, this exposure regulates the effect of adolescent's education with the equation log of the odds equals -0.423+1.249 IVC. The first equation shows that exposition time decreases the likelihood of household management for adolescents from peaceful areas, but for adolescents from violent areas, it may increase this probability. In the second case, a one-year increase in adolescent's education reduces the odds in 34% if adolescents migrate from peaceful areas; but if they come from violent areas, a one-year increase increases the odds in 128%. This means that the differences between the odds for adolescents from violent and peaceful municipalities increase with their level of education.

Finally, after migration, age increases the probability of household management; in contrast, coming from rural areas decreases it. In that order, their odds ratios are 1.76 and 0.69 for Sisben 1 and 2.63 and 0.21 for Sisben 2. These results suggest that rural adolescents might experience disruption regarding this transition after migrating. In both cases, Sisben 1 and 2, women have very high probabilities of household manager in comparison to men, with odds ratios higher than 14.

c. Childbearing

Table 8 and Table 9 shows the estimates before and after migration, respectively. The variances of the coefficients are reported in Table A6. The differences between the estimates

with all the migrants and with migrants to peaceful destinations are the levels of significance of "from rural areas" and the IVC. For the former population, the coefficient of coming from rural areas is positive and statistically significant; but for the latter population, it is not. The results about the IVC are discussed below. According to the two first estimates, the exposure to violence regulates the effects of the level of poverty and age. This is the reason why we estimate the model after migration for four populations: Sisben 1 – Age: 12 to 16, Sisben 1 – Age: 17 to 24, Sisben 2 – Age: 12 to 13 and Sisben 2 – Age: 14 to 24.

Before migration the effect of age is given by the equation log of the odds equals 0.738+0.241 IVC. Thus, the odds of childbearing increases 109 per cent by one-year increase in age in peaceful circumstances, and 166 (exp(0.738+0.241)-1) per cent in violent, IVC=1. In the same way, the effect of the level of poverty is obtained with the equation log of the odds equals -0.661+1.506 IVC. Therefore, in peaceful municipalities the odds for extremely poor adolescents is half the odds for poor adolescents; while, in violent municipalities, the odds for the former group are 2.33 (exp(-0.661+1.506)) times the odds for the latter.

Regarding the other variables, head of household's education and coming from rural areas increases the likelihood of childbearing before migration. The second model indicates that a one-year increase in head of household's education increases this likelihood in 23.2 per cent. As was explained for marriage/cohabitation: this result might be explained by the low levels of education in small municipalities. The first model shows that the odds for adolescents from rural areas are 1.28 times the odds for adolescents from urban areas.

After migration, Table 9, the level of violence is not statistically significant and does not moderate the effect of any individual variable for the two estimates of Sisben 1. In contrast, the IVC does regulates the effect of adolescent's education on childbearing for poor females (Sisben 2) aged 14 to 24 with the equation log of the odds equals -0.248+0.426 IVC. Therefore,

one-year of education decreases the odds of childbearing in 22 per cent when adolescents come from a peaceful area; but if they come from a violent, one-year of education increases the odds of childbearing in 19 per cent. This means that the difference in the probability of childbearing between adolescents exposed and those not exposed to violence is more notorious as the education of adolescents increases. The estimate for poor females (Sisben 2) aged 12 to 13 does not converge, because only 47 females among 1627 become mothers after migration.

As in the transitions to marriage and household management, after migration, age increases the probability of childbearing; whereas coming from rural areas decreases it. These results suggest that migration might also disrupt the transition to childbearing among rural adolescents.

6.2. The final effect of the exposure to violence

Table 10 shows the coefficients of the IVC for two transitions: marriage and household marriage; and Table 11 for childbearing. Tables 10 and 11 are divided in three panels. The left panel shows the odds ratios and the p-values when the coefficient of the IVC is statistically significant in the models before migration, when adolescents are currently exposed to violence. The central panel presents the same information when their exposure to violence has ended, and they have lived for one to three years in a peaceful municipality. Based on the first two panels, the right panel identifies the assimilation path they have followed.

Tables 10 and 11 show that in the origin the coefficient of the IVC is not statistically significant for poor adolescents (Sisben 2), but it is statistically significant for extremely poor (Sisben 1). In the case of marriage and household management the odds ratios for Sisben 1 are 2.79 and 13.28, respectively. This considerable difference between these ratios suggests that in armed conflict areas becoming a household manager is not so linked to marriage as in peaceful areas.

Considering only marriage/cohabitation, the results of the first panel of Table 10 suggest that poor migrant adolescents are a self-selected group, since their P-value>0.5, this means that poor adolescents from violent and peaceful areas behave similarly. To complete the assimilation path of poor adolescent regarding marriage/cohabitation, we analyse the second panel. This panel shows that poor adolescents do not present any aftermath of violence regarding their attitude to marriage, P-value>0.5; suggesting that their assimilation path is *self-selection with persistency*.

The probability of marriage/cohabitation for extremely poor adolescents is affected by violence before and after migration. Before migration, the odds for extremely poor adolescents who reside in violent areas is 2.78 times the odds for those in peaceful areas; showing that there is a *positive effect*. After migration, the effect of violence on the probability of marriage/cohabitation for extremely poor adolescent varies according to the time exposition. If the adolescent has resided in a peaceful municipality one or almost two years, s/he experiences *negative disturbance* because the coefficient of IVC is negative and statistically significant. This means that s/he delays her/his transition to marriage/cohabitation. However, if s/he has lived in this municipality two years or more, her/his behaviour is described by *adaptation*. In short, the assimilation path for extremely poor adolescents from violence areas who have lived in a peaceful municipality less than two years is *positive effect with negative disturbance*, while for those who have resided more than two years is *positive effect with adaptation.* It is possible that these results are consequence of the differences between the reasons for migrating between voluntary and forced migrants. For the former group, marriage is one of the main reasons; while for the latter one, the main reason is fleeing from violence. Nevertheless, eventually adolescents from violent areas also decide getting marriage after meeting people at destination.

The same does not occur with household management for extremely poor adolescents. Although, before migration their probability is *affected positively* by violence, their odds are 13.28 times the odds for adolescents who reside in peaceful areas, after migration they behave as adolescents from peaceful areas, at least the first two years (Exposition time<3). Therefore, their behaviour is described by *positive effect with adaptation*. When they have lived during three years at destination, adolescents from violent areas are more likely to become a household manager than those from peaceful areas. The odds ratio between the two groups is 2.13. So, they eventually follow *positive effect with persistency*. This result, first *positive effect with adaptation* and then *positive effect with persistency*, may explained by the need of finding resources to survive at destination. Forced migrants usually move with their families or with a group of families to attenuate the risk of migration (Sanchez-Cespedes, 2017); hence, after migration it is very likely that they are one member of the household different from the head of the household. However, they need to work, which is the first step to their eventual independence, and to become the manager of their own households.

Poor adolescents, Sisben 2, are a self-selected group about their transition to household management, since the P-vulues>0.1 before migration according to Table 10. However, their assimilation paths after migration differ according to their educational level. The less educated they are, the more likely they follow *self-selection with negative disturbance*. This means that migration to peaceful areas delays their transition to become independent. The inverse occurs with adolescents with opposite characteristics: the higher educated, the more likely they follow *self-selection with positive disturbance*. In other words, we find that the higher educated an adolescent is, the more likely s/he becomes independent and a manager of her/his own household.

Regarding the current effect of violence on the probability of childbearing, the coefficient of the IVC is statistically significant for extremely poor female adolescents aged

17 to 24. The odds ratios for this group range between 2.90 and 15.67. This means that the odds of childbearing among extremely poor adolescents aged 17 to 24 in violent areas are at least three times the odds for their peers in peaceful areas. Since, the likelihood of childbearing for extremely poor adolescents aged 17 to 24 is positively affected by violence before migration, but not after, their behaviour is described by *positive effect with adaptation*. A similar result is found by Sanchez-Cespedes (2018), violence incentives the transition to childbearing especially among rural females; nevertheless, a decrease in violence levels reduces the risk. The younger group, aged 12 to 16, are not affected before and after migration according to Table 11, so they follow *self-selection with persistency.*

Finally, Table 11 shows that only the childbearing tends of the youngest females are affected positively by violence before migration. However, it is impossible to deduce an assimilation path for this group, since the model after migration does not fit. Regarding the group Sisben 2 - Age: 14-24, they are no affected by the current exposition to violence, P-values>0.5, so they are a *self-selected group*. However, they have been affected by the pre-exposure to violence, and this effect is given by the equation logs of the odds equals 0.301+0.426 adolescent's education; which indicates, as we explained before, that the positive effect of violence on the probability of childbearing is more notorious as the education of adolescents increases. Hence, the assimilation path for the 14-to-24-year-old group goes from *self-selection with negative disturbance* to *self-selection with positive disturbance* as the educational level increases. These assimilations paths coincide to the paths found for household management, and it is possible that they related. The higher educated a displaced female is, the more likely she becomes independent, and in consequence, the more likely she forms her own family.

Table 10 Effect of violence on adolescents' transition to marriage and household management and their assimilation path

	Current effect of violence – before migration				Aftermath of violence in peaceful context – after migration				Assimilation path
	$\beta_{01}+\sum_{k=1}^{K}\beta_{k1}X_{kij}$	Odds ratio	Pr > |t|	Condition	$\gamma_{01}+\sum_{k=1}^{K}\gamma_{k1}X_{kij}$	Odds ratio	Pr > |t|	Condition in Table 5	
Marriage/cohabitation									
Sisben 1 (extremely poor)	1.025	2.786	0.002	ET:[1,2]	-1.194	0.303	0.021	11	Positive effect with negative disturbance
Sisben 2 (poor)	-0.186	0.830	>0.05	ET:[2,3]	-0.447	0.640	>0.1	17	Positive effect with adaptation
					The IVC and the interactions are not statistically significant		>0.05	1	Self-selection with persistency
Household management									
Sisben 1 (extremely poor)	2.586	13.277	0.000	ET:[1,3)	0.114	1.121	>0.1	17	Positive effect with adaptation
				ET:3	0.755	2.128	0.0693	15	Positive effect with persistency
Sisben 2 (poor)	0.600	1.822	>0.1	Edu:<3	-4.332	0.013	0.026	2	Self-selection with negative disturbance
				Edu: 4 to Edu: 9	-3.083 / 3.164	0.046 / 23.672	0.083 / 0.064 Tuoc	1	Self-selection with persistency
				Edu: >10	3.414	30.26	0.018	3	Self-selection with positive disturbance

Notes: a. Source: Sisben database 2006-2009 b. The values to calculate $(\beta_{01}+\sum_{k=1}^{K}\beta_{k1}X_{kij})$ and $(\gamma_{01}+\sum_{k=1}^{K}\gamma_{k1}X_{kij})$ are taken from Table 6 and Table 7 c. ET: exposition time

Table 11 Effect of violence on female adolescents' transition to childbearing and their assimilation path in peaceful contexts

Childbearing	Current effect of violence – before migration $\beta_{01}+\sum_{k=1}^{K}\beta_{k1}X_{kij}$	Odds ratio(b)	Pr>|t|	Aftermath of violence in peaceful context – after migration $\gamma_{01}+\sum_{k=1}^{K}\gamma_{k1}X_{kij}$ Coeff.	Odds ratio(c)	Pr>|t|	Condition in Table 5	Assimilation path
Sisben 1 - Age: 12 to Age: 16	-0.14 / 0.824	0.869 / 2.280	>0.5 / >0.5	The IVC and the interactions are not statistically significant		>0.1	1	Self-selection with persistency
Sisben 1 - Age: 17 to Age: 24	1.065 / 2.752	2.901 / 15.674	0.013 / <0.001	The IVC and the interactions are not statistically significant		>0.1	17	Positive effect with adaptation
Sisben 2 - Age: 12 to Age: 13	-1.646 / -1.405	0.193 / 0.245	0.030 / 0.040	The model does not converge. Y=1 for only 47 observations among 1627				
Sisben 2 - Age: 14 to Age: 24	-1.164 / 2.752	0.312 / 15.674	>0.5 / >0.5	Edu: <3: -0.979	0.376	0.042	2	Self-selection with negative disturbance
				Edu: 3 to: -0.552	0.576	0.165		Self-selection with persistency
				Edu: 5: 0.301	1.351	0.331	1	
				Edu: >6: 0.728	2.071	0.027	3	Self-selection with positive disturbance

7. Conclusions

Previous studies have found that patterns of fertility and nuptiality are different between peaceful and violent areas. We suggest that migration to peaceful areas might change adolescents' behaviour; and in some cases, it makes them acquire the conduct of adolescents who have never been exposed to armed conflict; however, this change depends on adolescents' features and the type of transition (marriage/cohabitation, childbearing, etc.).

To describe the adolescents' behaviour when they pass from an armed conflict area to a peaceful, we propose nine paths. These paths are the combinations of the three possible effects of the current exposure to violence, and the possible changes of behaviour when adolescents move to peaceful areas. The possible effects are: *no effects* – so they are a *self-selected group -*, *positive effect* and *negative effect*. The possible changes of behaviours are: *persistency*, *adaptation* and *disturbance*. *Persistency* occurs when adolescents' behaviour continues to be the same after migration. *Adaptation* indicates that although they were affected by current exposure to violence, in peaceful areas they behave as adolescents who have never been exposed to violence. *Disturbance* describe when the effect of violence is more than countered.

We find that the exposure and the pre-exposure to violence may or may not affect adolescent's transition to adulthood, and their effects depend on adolescents' characteristics. For instance, extremely poor adolescents are more vulnerable to violence than poor adolescents; the current exposure to violence increases the probability of premature transitions to marriage/cohabitation and household management for the former group, but not for the latter. Exposure to violence also promotes early transition to childbearing among extremely poor adolescents aged 17 to 24, but not among their poor peers.

We also find that the assimilation path also varies according to adolescents' characteristics. For example, although the current exposure to violence accelerates the transition to marriage/cohabitation among extremely poor adolescents, which suggests a *positive effect*; after migrating to a peaceful municipality, the assimilation process depends on the exposition time. Initially, adolescents delay their transition, showing *negative disturbance*, but after two years they behave as adolescents who were not exposed to armed conflict, experiencing *adaptation*. In short, the assimilation path for marriage/cohabitation for those who have lived in a peaceful municipality less than two years is *positive effect with negative disturbance*, while for those who have resided more than two years is *positive effect with adaptation.*

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Appendix 1. The construction of Sisben panel database

Table A1 Percentage of merging according to criterion by year

Merging Criterion	2006–2007–2009	2007–2008–2009
Nonmerged	43.09%	42.06%
First name, middle name, both surnames, citizen identification number, and date of birth	27.85%	45.48%
First name, middle name, both surnames, and citizen identification number	0.33%	0.25%
First name, middle name, both surnames, and date of birth	27.73%	10.67%
First name, both surnames, citizen identification number, and date of birth	0.93%	1.51%
First name, both surnames, and citizen identification number	0.07%	0.04%
Total	100%	100%
Number of observations merged in two consecutive years and 2009	5,246,999	5,442,951
Number of persons aged between 12 and 24 in March 2009		9,393,360

Notes: [a] Source: Sisben data 2006–2009.

Table A2 Logit models to calculate the weights

	2006–2007–2009			2007–2008–2009		
	Coefficient		Odds ratio	Coefficient		Odds ratio
Number of households in the same dwelling	-0.026	*	0.974	-0.021	*	0.979
	(0.003)			(0.003)		
Household size	-0.014	*	0.987	-0.010	*	0.99
	(0.001)			(0.001)		
Age	0.012	*	1.012	0.006	*	1.006
	(0.000)			(0.000)		
Female	-0.118	*	0.889	-0.104	*	0.901
	(0.003)			(0.003)		
Owner	-0.040	*	0.961	0.002		1.002
	(0.003)			(0.003)		
Dispersed rural	0.086		1.089	0.033	*	1.034
	(0.004)			(0.003)		
Nondispersed rural	-0.013	*	0.987	-0.027	*	0.974
	(0.005)			(0.004)		
Level 1 of Sisben	-0.042	*	0.959	-0.049	*	0.952
	(0.003)			(0.003)		
Constant	0.568	*		0.437	*	
	(0.007)			(0.007)		

Notes: [a.] Source: Sisben data 2006–2009. [b.] The reference category for a homeowner is tenant or other condition, for dispersed rural and nondispersed rural it is urban, and for level 1 of Sisben it is level 2. [c.] The coefficients are significant (*) when the t values are greater than or equal to the Leamer–Schwarz critical value, 4.0.

Appendix 2. The index of violence and conflict (IVC)

Table A3. Correlation of the armed conflict variables for 2004

	Confrontations	Armed contact	Total terrorist acts	Homicides and Kidnappings per 10,000 inhabitant	Assault to private property per 10,000 inhabitant	Ambush	Harassment	Population raid	Roadblock
Confrontations	1.000								
Armed contact	0.287	1.000							
Total terrorist acts	0.245	0.743	1.000						
Homicides and Kidnappings per 10,000 inhabitant	0.212	0.324	0.336	1.000					
Assault to private property per 10,000 inhabitant	0.088	0.236	0.303	0.344	1.000				
Ambush	0.220	0.458	0.549	0.297	0.272	1.000			
Harassment	0.079	0.423	0.468	0.206	0.118	0.521	1.000		
Population raid	-0.012	0.041	0.041	0.036	0.006	0.032	0.207	1.000	
Roadblock	0.220	0.342	0.315	0.242	0.218	0.279	0.253	0.018	1.000
Massacres	0.195	0.367	0.389	0.217	0.196	0.223	0.143	-0.013	0.294

Notes: [a] Source: Universidad de los Andes – CEDE and Observatorio del Programa Presidencial de Derechos Humanos y el Derecho Internacional Humanitario - Observatory of the Presidential Program for Human Rights and International Humanitarian Law [b] Each variable is the sum of the acts committed by the three armed groups: FARC, ELN and AUC.

Appendix 3. Variances of the coefficients

Table A4. Variances of the coefficients of the models of the probability of marriage

	All migrants - before migration	Migrants to peaceful context - before migration	Migrants to peaceful context - after migration in 2009	
			Sisben 1	Sisben 2
Var (intercept)			0.535 ***	44.513 ***
			(0.226)	(15.774)
Var (age)	0.013 ***	0.017 ***		2.549 ***
	0.002	0.004		(0.792)
Var (woman)	0.697 ***	1.251 ***	1.005 ***	
	0.140	0.242	(0.281)	
Var (head's education)	0.063 ***	0.099 ***		
	0.010	0.018		
Var(Adol's education)			0.123 ***	10.183 ***
			(0.025)	(3.124)
Var (Sisben 1)				
Var (rural)	1.148 ***	1.785 ***	2.221 ***	180.2 ***
	0.200	0.358	(0.460)	(56.91)
Var(exposition time)				7.979 ***
				(2.961)
Number of observations	18352	12766	7168	4233

Notes: [a.] Source: Sisben database 2006-2009 [b.] The reference category for rural is urban, and for level 1 of Sisben it is level 2. [c.] *** Significant at 99%, ** significant at 95%, and * significant at 90%.

Table A5. Variances of the coefficients of the models of the probability of household management

	All migrants - before migration	Migrants to peaceful context - before migration	Migrants to peaceful context - after migration in 2009	
			Sisben 1	Sisben 2
Var (intercept)		1.356 **		21.751
		0.686		7.918
Var (age)	0.021 ***	0.053 ***	0.056 ***	0.342 ***
	0.004	0.014	0.013	0.121
Var (woman)	0.799 ***	2.106 ***	1.660 ***	31.180 ***
	0.208	0.640	0.447	10.287
Var (head's education)	0.103 ***	0.282 ***		
	0.017	0.060		
Var(Adol's education)			0.095 ***	
			0.028	
Var (Sisben 1)	2.785 ***	7.382 ***		
	0.443	1.545		
Var (rural)	2.170 ***	5.700 ***	2.970 ***	47.458 ***
	0.374	1.307	0.673	14.978
Var (Exposition time)			0137 **	2.403
			0.057	1.115
Number of observations	18352	12766	7268	4276

Notes: [a] Source: Sisben database 2006-2009 [b] The reference category for rural is urban, and for level 1 of Sisben it is level 2. [c] *** Significant at 99%, ** significant at 95%, and * significant at 90

Table A6. Variances of the coefficients of the models of the probability of childbearing

	All migrants - before migration	Migrants to peaceful context - before migration	Migrants to peaceful context - after migration in 2009		
			Sisben 1 - 12 to 16	Sisben 1 - 17 to 24	Sisben 2 - 14 to 24
Var (intercept)	0.435 *** 0.16		151.36 ** 75.123		0.848 ** 0.231
Var (age)	0.01 *** 0.003	0.021 *** 0.005	6.522 ** 1.808	4.196 *** 1.731	0.026 *** 0.007
Var (head's education)	0.058 *** 0.012	0.115 *** 0.025			
Var(Adol's education)			12.888 ** 4.464	45.392 *** 17.650	0.203 *** 0.038
Var (Sisben 1)	1.045 *** 0.252	2.12 *** 0.467			
Var (rural)	1.122 *** 0.25	1.786 *** 0.432	157.18 *** 43.585	173.26 *** 60.58	2.607 *** 0.539
Var (Exposition time)			8.921 *** 2.540	23.583 *** 9.655	
Number of observations	10321	7216	2721	1251	4558

Notes: [a.] Source: Sisben database 2006-2009 [b.] The reference category for rural is urban, and for level 1 of Sisben it is level 2. [c.] *** Significant at 99%, ** significant at 95%, and * significant at 90%.