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Adolescent Social Networks and Violence in Rural Colombia

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FLORIDA INTERNATIONAL UNIVERSITY

Miami, Florida

ADOLESCENT SOCIAL NETWORKS AND VIOLENCE IN RURAL COLOMBIA

A dissertation submitted in partial fulfillment of

the requirements for the degree of

DOCTOR OF PHILOSOPHY

in

PSYCHOLOGY

by

Ana Lucía Rodríguez de la Rosa

2021

To : Dean Michael R. Heithaus
College of Arts, Sciences, and Education

This dissertation, written by Ana Lucía Rodríguez de la Rosa, and entitled Adolescent Social Networks and Violence in Rural Colombia, having been approved in respect to style and intellectual content, is referred to you for judgment.

We have read this dissertation and recommend that it be approved.

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Date of Defense: July 1, 2021

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Andrés G. Gil
Vice President for Research and Economic
Development and Dean of the University Graduate School

Florida International University, 2021

DEDICATION

En memoria de mi madre, Margarita de la Rosa Echávez.

Tu ímpetu, sabiduría, vocación de servicio y fe, orientarán por siempre mi camino.

In loving memory of my mother Margarita de la Rosa Echávez.

Your impetus, wisdom, vocation of service, and faith, will forever guide my path.

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ABSTRACT OF THE DISSERTATION

ADOLESCENT SOCIAL NETWORKS AND VIOLENCE IN RURAL COLOMBIA

by

Ana Lucía Rodríguez de la Rosa

Florida International University, 2021

Miami, Florida

Professor Dionne P. Stephens, Major Professor

This dissertation examines violence in adolescent social networks in the context of a rural and resource-limited community in the Caribbean region of Colombia. Utilizing mixed methods data (focus groups and surveys) from 242 school-enrolled adolescents, three empirical studies explored adolescent violence experiences in their community, school, and intimate partner violence relationships. Study one utilizes a social complexity framework and mixed methods design to address victimization. Social network data showed that adolescents' psychological and physical violence victimizations occurred across their community, household, school, and emotionally adverse relationships; and were more likely in girl-nominated relationships, a relationship that shared more alters or included an adult. Qualitative findings highlight cycles of violence that were salient across inter-generational and community settings. Cultural beliefs about violence emerged as critical to consider, particularly as participants perceived differential effects and values of victimization by gender and age.

The second study builds on the previous findings by concentrating on school peer violence perpetration. Results show that psychological and physical violence perpetration status is not related to being socially connected to similar perpetration status peers. Adolescent victims of school peer violence were more likely to engage in perpetration

(both psychological and physical) than non-victims controlling for non-school victimization (e.g., community, household), age, and academic standing, ethnicity, and gender.

Adolescents who engaged in physical violence perpetration were more likely to live with non-parental caregivers (than those living with one or both parents) and report multiple cross-gender friendships at school.

Study three centers on school peers' social network influence on physical intimate partner violence (IPV) engagement. Results show that adolescents with higher proportions of socially connected peers who perpetrate IPV are more likely to report perpetration, controlling for gender, age group, social network position, and school victimization. Conversely, adolescents with a higher proportion of IPV victim friends are less likely to report victimization. Bidirectional violence in the partnership was associated with the opposite status, such that victims were more likely to be perpetrators in the same relationship and vice versa. IPV engaged adolescents were not more likely to be socially connected to school peers of similar status, than expected by chance.

Finally, the last paper describes how Community-Engaged Research (CEnR) approaches were used to develop, implement, and guide the dissemination and protocols for my study.

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INTRODUCTION

Adolescent violence is a global problem that results in costly health, economic, and social burdens while undermining future adult populations' health (Patton, et al., 2009; WHO, 2015). It refers to intentional threats or violent acts directed towards adolescents (those aged 12 to 18 years old), including sexual, physical, or psychological abuse. Adolescent violence is one of the top five causes of mortality and disability-adjusted life years in this age group cross-culturally (UNICEF, 2018). Consequences of adolescents' experiences of violence can persist long after the occurrence of these acts, including detrimental effects on their developmental trajectories and future behaviors and attitudes towards violence in their adult relationships (Malti & Rubin, 2018; Park et al., 2018; Rothman, 2018; Smith et al., 2020). Non-fatal consequences of violence during adolescence are wide-ranging and include later victimization or perpetration, substance misuse, chronic diseases, suicidal behavior, and depression (Bowes et al., 2015; Schachter, 2021; Park et al., 2018; Taquette et al., 2019; WHO, 2015).

Although adolescent violence is concerning globally, it is disproportionately affecting those living in Latin American Low- and Middle-Income Countries (LMIC; Patton et al., 2009; Nagata et al., 2016). The majority of the adolescent population experiencing violence currently lives in LMIC, while most of the research on this void is done in different settings (Devries et al., 2019; Le et al., 2018). For example, in the context of Latin America's LMIC, nearly one-third of adolescent boys' deaths are violent (WHO, 2015); a caregiver has physically or psychologically victimized between 30% and 60% of adolescents; and physical violence among peers ranges from 17% to 61%

(Devries, et al. 2019). Addressing adolescent violence in LMIC and resource-limited settings requires centering the context by incorporating the multileveled experiences of violence in their countries, communities, social networks, and schools (Coley et al., 2018; Massetti & David-Ferdon, 2016; Viner et al., 2012, WHO, 2017).

Colombia is important to consider as a high-risk social ecology for addressing adolescent violence experiences among Latin American LMIC (Jimenez Bautista, 2018). This country has the lengthiest history of internal conflict in the western hemisphere. Colombian adolescents are exposed to complex community-level violence experiences such as drug-dealing, paramilitary forces, guerrillas, and organized crime (Acemoglu et al., 2013; Rettberg, 2020). Among Colombian adolescents, those living in rural and disadvantaged areas are disproportionately affected by violence (ANSPE, 2014; Basso, 2015; Bedoya et al., 2019; Ministerio de Salud y Protección Social, 2019). Rural Colombian adolescents often endure poverty, access precarious social services, and face more detrimental educational and health consequences to violence exposure than their urban counterparts (Bedoya et al., 2019; Browne et al., 2017). Therefore, rural Colombian adolescent populations are inhabiting exceptional global and local violence risks, with multifaceted costs to their developmental trajectories.

Investigating adolescent violence in rural Colombia can have global health significance for at least two reasons. First, through centering the experience of seldom studied adolescent populations facing devastating cumulative impacts of complex community violence in a critical developmental stage (Bedoya, et al., 2019; Le et al., 2018; Mendez-Lopez et al., 2021; Dierkhising et al., 2019). Second, to explore social and individual factors that could potentially differ in these high-risk rural LMIC community

settings (Bedoya et al., 2019; Browne et al., 2017); and therefore, minimize the scarcity of knowledge for future prevention efforts on rural adolescent violence in similar LMIC contexts (Devries et al., 2019; Le et al., 2018; Nagata, 2016; Pasupathi et al., 2017; WHO, 2015). Finally, when examining rural LMIC adolescent experiences with violence, it is critical to utilize socio-ecological approaches that can incorporate the multidimensional specificities (e.g., poverty, conflict, limited resources) they inhabit (Butti, 2018; Bonilla-Escobar et al., 2017; Broesch et al., 2020; Hamby et al., 2018)

Hinde's (1987) social complexity theoretical approach is a multileveled framework to adolescents' social experiences. Hinde's theory proposes six social layers mutually affected and constrained by the others: psychobiological, individual, interaction, relationship, social networks, and socio-cultural. Researchers have utilized this social complexity approach to understand youths' social niches, including adolescents' experiences of violence (Bukowski et al., 2018; Bukowski & Vitaro, 2018; Laursen, 2018; Rubin et al., 2006; Stevenson-Hinde, 1987; Veenstra et al., 2018). The first two levels of the social complexity hierarchy are the psychobiological and individual cognitions, predispositions, and the developmental trajectories that the adolescent brings to a social event. These dispositions or constraints also change as a function of a history of interactions. Interactions refer to time-constrained exchanges with others that can vary from cooperation, play, sexual contact, or aggression. These interactions are frequently taking place in relationships, the next level in the social complexity. Relationships are distinctive because they include higher-order cognitions, meaning, expectations, and more complex qualities than interactions. Therefore, the influence, strength, and importance of a relationship (i.e., antipathy or closeness) can

also shape an interaction's interpretation or effect. Patterns of relationships and interactions assemble social networks, with emerging characteristics and properties that cannot result from the simple addition of dyadic ties or dynamics (e.g., segregations, identities, hierarchies). Finally, the socio-cultural level refers to the systems of values, inter-generational patterns, meanings, and beliefs shared in the historical context of the society where all the lower-level social exchanges occur. The societal and cultural level is mutually informed, limiting, and nesting social networks. Laursen (2018) noted that cross-cultural research on adolescent violence should incorporate these multiple social complexity levels. The development, interpretation, and response to violent experiences of the global majority (those living in non-westernized, LMIC) could have multi-final trajectories according to the socio-cultural environment. For example, physical acts of violence can be a normative form of discipline, a neutral interaction among a dyad, or an intolerable feature of a relationship, according to the societal dynamics (Laursen, 2018; Rubin et al., 2006).

Social complexity can be categorized as a socio-ecological perspective to adolescent relationships and violence, falling in line with Bronfenbrenner's (1977) ecological model and a relational developmental systems meta-theoretical approach (Overton, 2013). A common goal of these three standpoints is the process-relational assumptions about the dynamics of development and relationships, incorporating the co-creative role of the bio-socio-cultural ecology in shaping adolescents' trajectories. For these three theoretical outlooks, a cartesian or mechanistic view of relationships and individuals is replaced by nested and systemic models that outline development as a complex system.

A social complexity theoretical approach to adolescents' violent experiences in an LMIC rural setting requires research instruments and practices that adopt community, social networks, historical and cultural levels of scrutiny. It further requires culturally positioned lenses and deep relationship building with the study community (Burlew, 2018; Dejonckheere, 2019). Therefore, a central goal of the present dissertation work was including cross-disciplinary, mixed methods, and community-engaged practices. My project further integrates social network analyses with community-engaged principles, an emerging practice in the psychology field (Neal, et al., 2020; Tubaro, 2019)

The integration of systemic relational levels through assembling grained evidence is a shared goal of mixed methods research (Kallemeyn et al., 2020), complexity science (Koopmans, 2017), and community-centered approaches (Lynam et al., 2020). The dissertation draws from each of these research lineages, nested in a cross-disciplinary and community-engaged research effort. Moreover, the last study of the dissertation reflects on the applications, lessons, and experiences of the fieldwork.

My dissertation investigates violent experiences among a school-enrolled adolescent population living in an Afro-Caribbean rural village in Colombia (Santa Ana, Island of Baru, Cartagena), utilizing a social complexity theoretical approach and a social networks mixed methods research design. The goal of the three empirical studies in the dissertation is to describe the relationships among adolescent social networks and their individual experiences of victimization and perpetration, utilizing non-deficit approaches, and a community-engaged research design. Specifically, each study will focus on a particular type of violence (community, peer, intimate partner)

utilizing household, community, or school social network analyses. The fourth study reflects on the development, implementation and interpersonal dynamics involved in creating the community-university collaboration research project in the culturally unique setting.

STUDY I: ADOLESCENT VIOLENCE IN RURAL COLOMBIA: A SOCIAL
COMPLEXITY APPROACH

Abstract

This study examines violence victimization experiences in adolescent social networks, and how these relate to meanings and perceptions of violence in the rural community of Santa Ana, Colombia. Guided by a social complexity framework and a mixed method design (focus groups, social network data) we analyzed data from 242 school-enrolled adolescents aged 13-17. The social network data showed that both psychological and physical violence victimizations occurred across community, household, school, and emotionally adverse relationships. Logistic regression results of the network data also indicate that both types of violent victimizations are more likely to be present within relationship dyads that are sharing a higher number of contacts, were in the same grade, or included an adult. Although matched gender in the dyad was not predictive of victimization, girl nominated relationships increased the probability of observing both types of violent victimizations. Analyses of focus group data expanded these quantitative findings by showing cycles of violence that were salient across inter-generational and community settings. Cultural beliefs about violence emerged as critical to consider, particularly as participants perceived differential effects and values of victimization by gender and age. Our findings highlight the applicability of a social complexity approach for identifying multilevel factors (individual, social, cultural) when considering adolescents' unique lived experiences with violence in understudied settings (e.g., post-conflict country, rural, high crime, resource-limited).

Keywords: adolescent social networks, violence, social complexity, rural adolescents

Literature Review

The World Health Organization (WHO) identified adolescent violence as a global public health priority (2015); it is one of the top five causes of mortality and disability adjusted life years in this age group (UNICEF, 2018). Defined as intentional violent acts or threats directed towards adolescents (those age 12 to 18), it can range from homicide to psychological abuse, including sexual assault, physical beating, or bullying (WHO, 2015). Consequences of adolescent violence victimization are varied and can be lifelong, including suicidal behavior, depression, substance misuse, chronic diseases, and physical injuries (Smith et.al, 2020, WHO, 2015).

Although the global rates of adolescent violence are high, its prevalence is disproportionately higher in Low- and Middle-Income Countries (LMIC; Patton et al., 2009; Smith et.al, 2020); and in particular in Latin America. Those living in communities with a history of conflict, crime, poverty, social stigma, and geographic segregation are especially vulnerable to the risk for exposure and engagement in violence as a consequence of complex and cumulative impacts. These socio-economic vulnerabilities not only affect adolescents themselves, but also shape peer, family, and village social network experiences (Coley et al., 2018; Massetti & David-Ferdon, 2016; Viner et al., 2012; WHO, 2017).

Among LMIC, Colombia is important to consider when examining adolescent' violence experiences, as it has the lengthiest internal conflict in the Western hemisphere (Acemoglu et al., 2013). Half of Colombian adolescents have witnessed violence in their home or community, and their physical and psychological victimization rates are higher than the LMIC average (45% girls, 40% boys; Ministerio de Salud y Protección Social,

2019). The Colombian conflict has exposed adolescents to the regular presence of non-legal actors (e.g., drug dealers, paramilitary forces, organized crime) who directly contribute to the creation of cultures of violence many communities referred to as “justice by own hand” (Jiménez Bautista, 2018; Rettberg, 2020). The resulting normalization and cyclical nature of violence experiences, in turn, increases Colombian rural adolescents’ risk for community level violence vulnerabilities, including engagement in or witnessing of criminal activities (e.g., drug use or human trafficking), and physical or sexual assaults (Browne et al., 2017). These occurrences are particularly prevalent in rural settings. Colombian rural adolescents affected by violence face more detrimental lifetime consequences (e.g., health, educational outcomes) compared to their urban counterparts (Bedoya et al., 2019).

This seemingly inescapable vulnerability to “justice by own hand’ is reinforced by Colombian rural adolescents’ narratives emphasizing retaliation and reciprocity as justifications for the escalation and continuation of violent acts across contexts (Pasupathi et al., 2017). However, these beliefs cannot simply be dismissed as a reflection of individual level cultural values. Instead, the meanings rural adolescents give to violence are informed by the negotiation of broader experiences of enduring poverty, limited community resources, criminal activity, and social stigma- all of which place Colombian rural adolescents in a context of multidimensional marginalization (Butti, 2018). Consequently, researchers have called for the utilization of socio-ecological and poly-victimization approaches to identify the complex lived experiences of adolescents in this unique context (Bonilla-Escobar et al., 2017; Hamby et al., 2018).

Context of Santa Ana

This study focuses on adolescents from the two centuries old Colombian rural village of Santa Ana. Comprised of approximately 1,000 Afro-Caribbean families, “Santaneros” relationships are characterized by flexible kinship bonds that go beyond bloodline or household boundaries (ANSPE, 2014; Basso, 2015). Located on the island of Baru, Santa Ana now shares space with emerging touristic and industrial enclaves. This juxtaposes most Santaneros’ realities of living below the national poverty line (ANSPE, 2014; Pizarro, 2008). Further, in addition to a conflictual history over land ownership with economic elites (e.g., corporations, government agencies), Santaneros now face an increased presence of illicit agents commonly associated with touristic spaces (e.g., drug dealers, sex traffickers; Basso, 2015; CNMH, 2017). Addressing factors contributing to increased violence is difficult, however, as their livelihoods depend upon touristic and related activities (e.g., fishing, agriculture, transport). One public school, a local clinic, three religious’ organizations, and a few non-profit educational institutions comprise the social services available to Santa Ana’s adolescents.

It is important to examine Santa Ana adolescents’ experiences with violence as it overlaps with that of seldom studied rural LMIC “border villages,” where victimization is nested in political and historical conflicts (Ceccato & Ceccato, 2017). In these contexts, the complexities of adolescent polyvictimization are tied to their communities’ duality of rural LMIC (e.g., limited services, government absenteeism, poverty, conflict) and emergent transnationally attractive economic sites (Ceccato & Ceccato, 2017). Centering contextual factors, including values about violence is critical for addressing victimization in these settings (Bonilla-Escobar et al., 2017).

Social Complexity Theoretical Approach to Victimization

Given the complexity of the Santa Ana context, it is useful to draw upon socio-ecological and dialectical theories to examine the multi-level factors shaping adolescents' violent experiences (Hinde & Stevenson-Hinde, 1987). This socio-ecological perspective will help identify victimization as part of broader social systems comprising individual, social, cultural, and historical influences. Specifically, Hinde's Social Complexity theory (1987) serves to frame dyadic violence acts as networked "interactions" nested in six socio-cultural levels. At the first two levels are the psychobiological processes and the characteristics (traits) of those individuals involved in a dyad. The third level includes the interactions among them, that exist within a specific setting and period of time. Relationships are the fourth level, described as higher order ties that hold meanings and expectations in addition to their history of interactions. At the fifth level relationships further assemble social networks, that have their own emergent properties and higher order features, that go beyond the simple addition of the dyads. At the final sixth level, social networks are nested within the sociocultural norms, values, and historical dynamics of their hosting society (Hinde & Stevenson-Hinde, 1987; Laursen, 2018; Malti & Rubin, 2018). These six analytical levels of Hinde's social complexity (psychobiological, individual, interaction, relationship, social networks, and socio-cultural) are operating, affected, and constrained by events and processes taking place across other levels at any point in time (Hinde & Stevenson-Hinde, 1987; Laursen, 2018; Malti & Rubin, 2018).

Colombian Adolescent Social Networks and their Violent Interactions

The growing literature examining adolescent social networks and violence has predominantly focused on classroom, peer, and school ties, finding evidence for selection, homophily, and contagion effects, on physical and psychological violence (e.g., Berger, et al., 2019; Casper et al., 2020; Faris & Felmlee, 2014; Huitsing et al., 2014; Jackson et al., 2015; Lodder et al., 2016; Sentse et al., 2013; Watling & Veenstra, 2020). In this same body of research of adolescent violence, network position (e.g., degree), gender, and antipathy (or animosity) has shown to influence peer victimization, defense, and aggression (e.g., Faris & Felmlee, 2011; Kisfalusi et al., 2020; Kornbluh & Neal, 2016; Shin, 2017; Wittek et al., 2020). However, few analyses have made the distinction between a violent dyadic ‘interaction’ as opposed to violent ‘relationships,’ often assumed as the ‘negative tie’. This difference in measuring ties is concerning given recent research highlighting the effectiveness of capturing adolescent school-based aggression or victimization as a different construct from friendship and antipathy networks, when conducting classroom interventions (Palacios et al., 2019; Oldenburg et al., 2018).

Current Study

The present study builds upon the current field’s focus on identifying multi-level factors shaping adolescent experiences of victimization, by integrating individual, dyadic, social network, and socio-cultural levels of analysis (Malti & Rubin, 2018). First, we use social network data to model the presence of psychological and physical violence victimization in dyads, and how these relate to individual (age and gender in the dyad), relationships (adverse, community, school, household), and social network characteristics (same grade, shared contacts, degree difference). We pair these findings with the

qualitative data on the cultural meanings and values towards adolescent victimization by type of relationship (adverse, community, school, household), including participants' perceptions of the reasons and motivations for violence in their community, and the surrounding gendered and generational dynamics. Utilizing a mixed methods approach complements the social network analyses on (psychological and physical) victimization with our participants' interpretations of all forms of adolescent violence in their community. Qualitative and quantitative evidence are integrated by social complexity level, through framing victimization as socio culturally nested interactions. The incorporation of multi-leveled and systemic approaches has been a shared goal of mixed methods research, complexity science and community-centered methodologies (Kallemeyn et al., 2020; Koopmans, 2017). This systemic perspective will increase our ability to develop a comprehensive, culturally sensitive framework for examining adolescent violence in this unique community.

Methods

This study was part of a larger research project (IsBARU) that aimed to explore adolescent social networks, health, and risk-taking behaviors. Following a community preparedness process, institutional review board approval was granted from both Florida International University in the United States and Universidad de los Andes in Colombia.

Participants

A total of 242 adolescents completed the survey. Response rate was 90.30% (N=242), and almost evenly split by gender (49.60% girls, 49.17% boys). The majority

self-identified as Black or African Colombian¹ (84%), followed by White (8%), Indigenous (5%), and other ethnicities/races (2%). In terms of primary care giver presence in the household, 45% reported living with one parent, 37% with both parents, and 14% with other family members; 4% refused to answer. Focus group discussion (FGD) participants were 50% boys ($n=20$) and 50% girls ($n=20$), with similar parity across age groups (50% early adolescents aged 13 to 15 years old and 50% late adolescents aged 15 to 17 years old).

Data Collection

The data collection took place in the spring of 2019, and included adolescents enrolled in 6th to 11th grades (ages 13 to 17) in the only public school of the village. Thus, the identification and recruitment of survey participants was solely school based. As required by Colombian policies, written consent was obtained from both the adolescents and two primary caregivers prior to data collection. Focus group discussions (FGD) followed the surveys; therefore, qualitative recruitment was contingent on survey participation. The first 40 individuals expressing interest in the FGD were selected after gender, age, and grade stratification.

Participation compensation included a movie ticket gift card for completing the survey (equivalent to 10 USD), and local gift basket of school goods for FGD participation (equivalent to 5 USD). A local licensed psychologist and the school counseling team were available before and after all sessions, and participants had the opportunity to get

¹ Native from Santana is included among Black/African Colombian. This territory is defined as part of “Comunidades Negras” which represents a legal, ethnic, cultural, and racial identification of Black Colombian communities.

immediate and/or follow up free mental health services, if needed. No participant required these.

All data collection sessions were held outside the school context. Out of school data collection was central to confidentiality protection in a socially and physically dense community. Survey data collection took place in a university campus' computer labs. Two authors (ALR, FM) and four graduate students administered the surveys. Survey completion times averaged two hours (range 1 to 2.8). Respondents were grade and gender matched, with computers 6 feet apart in small group classroom (of 15 to 25 students) to safeguard privacy in reporting. The Focus Group Discussions took place four weeks after the survey data collection. Upon arrival, FGD participants received contact information cards designed for this project; they included health services information and emphasized the importance of confidentiality. FGD were held in our community organization partner's private meeting space that provided a comfortable environment for conversation and were facilitated by one of the authors, native from the same district and familiar with participant's idiomatic variations. The FGD audio recordings lasted approximately two hours across all four sessions and were encrypted with complex password protection.

Social Network Methods

The computer-based survey included three name generators designed to identify emotionally supportive and adverse relationships by context (school, household, and community) and emotional evaluation (adversity). The first name generator gathered school contacts considered friends with whom important matters were discussed. The next name generator asked for people in Santa Ana they shared important matters with. Lastly,

participants nominated individuals with whom they had difficult relationships; these relationships were described persons with whom they experienced frequent sadness, anger, or deception (all prompts included). Each name-generator was independent, allowing up to ten nominations (alters could repeat across questions). The automated population of previously entered names added information about the gender, age, and shared household status of nominees not participating in the study.

Adolescents were asked to report bidirectional violent interactions for each nominated dyad. The prompted violent behaviors included was member-checked with our community partners. For psychological violence, participants recorded if the relationship involved any of the following behaviors in the past three months: scare, scream, offend, calling names, or insulting. For physical violence, respondents stated if the relationship involved any of the following behaviors in the past year: hitting, throwing rocks or something else, pinching, squeezing, pushing, kicking, dragging, shacking, or slapping. Therefore, we could discern the source and target by each type of violence, and relationship. We reversed perpetration to facilitate interpretation and counted once each report. Therefore, directed psychologically or physically violent interaction (coded as one) indicated the alter as perpetrator and ego as victim.

For all nominated relationships in the study, we could discern dyadic features by social complexity level: individual attributes of those involved (gender, age group); presence of psychological or physical violence interactions; categories of relationships (school, community, or household; adverse or not); group (same grade); and social network characteristics (degree difference, shared neighboring contacts). We estimated two separate models for each type of violence data as described below.

Utilizing logistic regression for network data, each analysis estimated the likelihood of a violent interaction (psychological or physical), specifying the relationships' characteristics, via quadratic assignment procedure (QAP) hypothesis test with 1000 repetitions. Through Monte Carlo simulation QAP analysis accounts for the structural properties of the observed social network while exploring differences induced by vertex labelling (Butts & Carley, 2001).

To analyze individual level characteristics of the dyads, we took the following steps: First, we considered the gender of the individuals in the dyad, estimating a predictor matrix for all nominations where the source was a girl (coded as one, other gender or not nominated as zero). Second, we included a gender similarity matrix of all ties in the nomination network (same-gender ties coded as one, and cross-gender ties or not nominated left to be zero). Finally, we created a predictor matrix for age group, assigning one if the nomination included an adult or zero if it was among two adolescents.

To explore the effects school groups and social network characteristics in the dyads we took the following steps. First, we created a predictor matrix for same-grade adolescents (one if attending same grade; zero otherwise). The Colombian education system keeps grade groups together from age seven to high school completion. Second, we appraised neighbor similarity scores among all nodes in the nomination network to consider the effects of common contacts, utilizing a Jaccard method (Ball, et. al. 2011). This coefficient assigns each possible dyad a pairwise number of common neighbors divided by the nominations of at least one of the two nodes pondered. Finally, we estimated a predictor matrix of the dyadic differences in degree (the sum of incoming and

outgoing number of personal ties) to analyze the effect of disparity in social connectedness (including all nodes in the nomination network). In terms of missing data management, 4% of all study nominations were left unmarked in violence or individual attributes. We used a case deletion approach and removed these ties from all quantitative estimations.

Focus Group Discussions Methods

To explore these results by social complexity level, FGD questions and prompts were developed specifically to identify the meanings these adolescents give to violence and their perceptions of the intersecting influence of community, school, and household relationships. The initial questions were evaluated for clarity in community-partnered workshops and adapted to reflect local and age-appropriate language. Before starting each FGD, participants were reminded they could leave the conversation at any given time and that their data were going to be anonymized. Questions focused on community and group level violence and avoided the gathering of private information. Transcriptions were done by research assistants fluent in Caribbean Spanish. The FGD note-taker further revised the transcriptions. The FGD and survey data were matched using respondent anonymous identifications to extract demographics.

To analyze the FGD data, we developed a pre-defined coding system that was member-checked with our community-research partners in two analytical workshops. Transcripts were analyzed in three rounds, using grained coding and allowing for code emergence, consistent with a grounded theory standpoint (Strauss & Corbin, 1994). Three independent coders with qualitative training participated in all rounds. The inter-coder agreement was 80.42%. The transcripts were not translated into English to ensure that

the adolescents' experiences and meanings were centered within the specific cultural context.

Results

Social Network Analysis Results

Violence Involvement. Most adolescents were involved in a violent dyad (83.47%), with girls and boys reporting almost equal rates (84.17% and 82.35%, respectively). By violence types, the majority had reported at least one psychological violence victimization in the past three months (76.6% girls and 73.1% boys). In the previous year, most adolescents had experienced physical violence victimization in their relationships (57.5% girls and 55.46% boys).

Networks by type of relationship. The nomination network included 2436 relationships among 1006 individuals, comprising the survey participants and their alters. Figure 1 includes a multi panel graph by relationship. Across nominations 63.51% of dyads were among adolescents, and 70.24% were gender matched. The community network was the largest with 1075 ties (relationships) and 733 nodes (individuals), followed by school (1364 ties, 408 nodes), adverse (634 ties, 469 nodes) and household (338 ties, 235 nodes).

Psychological Violence. A total of 846 psychologically violent interactions were reported across relationships, involving 431 individuals. The average outdegree (number of victimizations) of psychological violence in the nomination network was 1.96, and among those who were involved in at least one interaction it increased to 2.27. Most psychological violence ties were gender matched (68.91%) and among same grade peers (53.31%). One third included an adult (32.27%). Out of all psychological violence

victimizations reported, 27.90% were also adverse; 7.09% household; 35.93% school; and 24.59% community relationships. One third of psychologically violent victimizations were simultaneously physically violent (31.68%). See Figure 2 for a representation of violent interactions in the nomination network.

Result of the logistic regression for network data predicting psychological violence victimizing interactions in the past three months yielded the following results (Table 1): First, girl nominated ties increased the likelihood of reports of victimization (OR=24.98, $p<0.001$). Matched gender relationships in the nomination network did not have an effect on psychological victimization (OR=0.73, $p=0.127$). An adult alter in the dyad increased the likelihood of psychological victimization (OR=22.94, $p<0.001$). Attending the same grade with another survey respondent significantly increased the likelihood of reporting a psychologically victimizing interaction (OR=20.70, $p<0.001$). A larger Jaccard coefficient of similarity among individuals also increased the likelihood of a psychologically violent interaction (OR=7.59, $p<0.001$). Degree difference in the dyad did not affect the likelihood of a psychological violence victimization (OR=1.00, $p<0.001$). All types of relationship settings increased the likelihood of a psychologically violent interaction (Community OR=2.21, $p=0.001$; Household OR=2.27, $p=0.024$; School OR=3.10, $p<0.001$; Adverse OR=30.27, $p<0.001$).

Physical Violence. A total of 460 physically violent interactions were reported among 294 individuals. The average outdegree (victimization) of physical violence in the past year was 0.51, increasing to 2.2 among those who reported at least one interaction. Most physical violence interactions were gender matched (66.96%) and among same grade peers (68.70%). One third included an adult (31.30%). From all physical violence

victimizations 25.22% were also an adverse relationship; 6.52% household; 40.43% school; and 25.57% community. The majority of physically violent victimizations held psychologically violent interactions simultaneously (58.26%).

Logistic regression results for network data predicting physical violence victimizing interactions in the past year yielded the following results (Table 1): First, girl nominated ties increased the likelihood of reports of victimization (OR=21.11, $p<0.001$). Same- gender relationships in the nomination network did not have a statistically significant effect on being physically victimized (OR=0.67, $p=0.950$). Having an adult alter in the dyad increased the likelihood of receiving an incoming physical violent interaction (OR=15.18, $p<0.001$). Same grade with another survey respondent significantly increased the likelihood of reporting a physically victimizing interaction (OR=14.46, $p<0.001$). A larger Jaccard coefficient of similarity among individuals also increased the likelihood of a physically violent victimization (OR=5.99, $p=0.002$). Degree difference in the dyad did not affect the likelihood of a physical violence victimization (OR=1.00, $p=0.049$). All types of relationships settings positively increased the likelihood of a physically violent victimization in the past year (Community OR=1.94, $p=0.001$; Household OR=3.31, $p<0.001$; School OR=4.58, $p<0.001$; Adverse OR=10.78, $p<0.001$).

Focus Group Discussion Results

Although several attitudes, beliefs, experiences with, and interpretations of violence and violent interactions emerged as salient during the FGD sessions (Authors, Year), the relevance of these to adolescents' social networks was specifically explored in our study. The manuscript includes the qualitative data specific to values and experiences

on violence related to each level of the social complexity framework. Three themes emerged: 1) meanings and types of violent interactions by setting and relationships, 2) motivations or situations for violent interactions, and 3) gendered and age group distinctions (see Table 2). First, we describe adolescents' perceptions of all types of violence by relationship setting. The second theme expands the social network analysis' socio-cultural level results by identifying adolescents' perceptions of interpretations and motivations for violence. Finally, the third theme describes individual traits' (gender and age) influence on victimization experiences in Santa Ana.

Violence by Setting and Relational Positionality

Violent Interactions. Across all groups, participants described violent interactions as a common, concerning, life-threatening, and widespread community phenomenon. Victimization was framed as a collective community experience across relationships. Community violence (e.g., street) was the most salient and impactful. Most participants were cognizant of and socially connected to peer level victims of homicide or rape in the past year (e.g., cousin, friend, neighbor).

Community. Participants across all FGDs perceived their community relationships as occurring in unsafe environments; shootings, street fights, rape, threats, robbery, and homicides were familiar in these spaces. The term "*peleas*" (physically violent interactions) was used to characterize these contextually specific, multi-leveled dyadic or group conflicts. The community was viewed as both accepting and endorsing physical violence as an appropriate response to certain actions by these adolescents. Threats, insults, and territorial claims for public space were the most common forms of community level psychological violence.

Although there were forms of community violence FGD participants expressed concern about and morally condemned (e.g., adolescent homicide, sexual abuse in public space), it was agreed that perpetrators of any form of violence across Santa Ana community spaces were unlikely to face consequences for their actions. They shared a sense of community hopelessness; these adolescents did not believe the government, police, other community agencies (e.g., NGOs, churches, local council), their families or peers had the capacity to eradicate all forms of violence. However, the value participants place upon communal values and extended kinship relationships specific within Santa Ana, highlights the need for developing a shared narrative about violence toward this end. This extended kinship was critically important as the close ties and community relationships across all members mean a violent event directly affects everyone. Thus, as these adolescents assert, victimization is not an individual level experience but a community reality permeating their identity and wellbeing.

School. Violent encounters in school were reported as common, with perpetrators and victims identified as classmates. When violence did occur, it typically involved fights, slapping, hitting, bullying, threats, and name calling. However, they reported this was an inappropriate space for these behaviors. Specifically, psychological and physically violent interactions were discouraged, and perpetrators faced consequences for their actions from adults in the school.

Household. Across both girls and boys FGD, participants described physically violent interactions frequently occurring in homes. Although this included both children and adults as perpetrators, when describing adolescent offenders, the language used framed it as defensive (e.g., protecting self or to a sibling) or prompted by the

adolescent's substance misuse situations. When discussing adults as perpetrators, it was primarily described as a parental discipline tactic because of "not knowing any other way" to address children's behaviors. These adult initiated physical punishments were depicted as common and accepted. However, other forms of physical violence in same-home relationships could involve hitting, damaging property, and beating. These were often seen as being caused by escalating personal conflicts among members of the household. Psychologically violent acts in this setting were described as threats, insulting, name calling and screaming. Incest and child sexual abuse cases were particularly salient in the girls' FGD; it was only mentioned as a secondary concern by some boys.

Overall, violence occurring within households was perceived as a private sphere concern and should be addressed as such. As a result, perpetrators in this realm were not seen as having to face further consequences outside the home. Instead, the victims coped by either temporarily (or permanently) leaving the home or holding their ground by fighting back, according to FGD participants.

Adverse Relationships. Adversity in relationships were perceived by FGD participants as a strong contributor to the possibility for violent occurrences. Specifically, otherwise ordinary encounters could easily escalate into psychological, physical, or life-threatening situations in adverse relationships. Avoidance of spaces where adverse alters was described as one way for adolescents to avoid victimization.

Dyadic & Group Level Motivations/Situations for Violence

Three factors were identified as motivating or creating dyadic and group level violence situations in the FGDs. First, existing trauma and previous aggression experience was as an explanation for violence perpetration (e.g., intimate partner

victimization leads to perpetration toward children and other community members). Therefore, the adolescent perceived experiences with cycles of violence contributed to the cultures of violence in Santa Ana. Second, the perception of how one was harmed was determined by the victim's view of the action or slight, not the perpetrator's intention; this understanding was central to determining both "fault" and the appropriate response. As a result, an unintentional action could be interpreted as a deliberate attack, leading to a violent reaction (e.g., unintentionally stepping in someone's foot would trigger a physical fight). Participants perceived they could not avoid these situations as a result of community belief of "faultiness" or accountability. The third most commonly mentioned cause of violent interactions was substance misuse and related distributions (drug-trafficking). The adolescents shared stories of several community and household acts of violence attributed to the perpetrator using substances like alcohol or hard illegal drugs. Relatedly, drug trafficking activity in Santa Ana was central in participants' explanations for the high violence related incidences and fatalities in the community (e.g., homicide, gangs' fights).

Gender, Age, and Violence

Gender. All FGDs participants believed that violent experiences were common for both men and women in their community, but also identified gender inequalities in frequency and type of violence. For example, girls' victimization occurred more frequently and primarily in private spheres. In contrast, boys' physical victimization (e.g., street fights, homicides) occurred in public spaces. Gender differences described in FGDs were also observed in the types of violence, whereby adolescent girls discussed more wide-ranging forms of violence in Santa Ana (e.g., physical, sexual, street, school). Street

violence and fights were the main forms of violence adolescent boys described. Boys perceived school contexts as prioritized protecting girls from victimization; girls did not report a gendered difference. In public spaces, both boys and girls mentioned women (especially mothers) would be defended because of their gender, while the opposite was true for men and boys. However, it is important to note a shared acknowledgment that there were times when girls should utilize violence actions. These boys referenced the ways women's willingness to both initiate violence and fight back against victimization was unique to their community. Many adolescent girls similarly asserted that women should and would defend other women in a physical fight.

Cross-gender violence (both men and women perpetrators) was described as occurring in intimate partner relationships and corporal punishment. Acts of sexual violence, robbery, and bullying were reported as primarily men perpetration- women victimization by participants. All other forms of violence were perceived as occurring between individuals of the same- gender (e.g., fights, name-calling, yelling). However, in women's same- gender fight, involvement by others was expected in terms of jumping in, defending, observing, or calling for other bystanders.

Age. Participants identified violence as occurring and learned through cross-generational interactions (e.g., parent to child). Public (e.g., community, street) and private sphere violence disproportionately included adults as perpetrators (except in school setting). Although, participants viewed adult perpetration as morally wrong, adolescent initiated violence against adults was perceived as a justifiable self-defense, resulting from learned behaviors, or due to substance misuse. In cases of adult group violence, adolescents stated they would not get involved.

Discussion

Consistent with a social complexity approach, the findings emphasize the multi-leveled relational arrangements of individual attributes, social networks, and socio-cultural meanings of violence for exploring rural Colombian adolescent's victimization experiences (see Table 3). Gender's influence on violence experiences exemplified the ways simultaneous dynamics are informed and specified by other levels of evidence. For instance, social network data indicated that individual victimization risks (both psychological and physical) across nominated relationships were higher for girls but not same-gender relationships. Qualitative evidence further showed gendered effects and constraints differed according to positionality or type of interaction. FGD results also expanded the quantitative findings by noting settings determined the perceived influence of gender on the likelihood or appropriateness of the act (e.g., corporal punishment endorsement had no gender differential but women dyads fighting in public spaces requires social intervention). Further, in same-gender group conflicts and school settings, girls report having more protectors against victimization specifically at relationships and social network levels. Taken together, these results further affirm the complexities of both increased and gendered risks of physical, street, and sexual violence against adolescent girls in post-conflicted settings (Chioda, 2017; Hossain et al., 2014). However, for both girls and boys witnessing community crimes there is an increased probability for normalizing and engaging in physical violence (Farrell et. al., 2020). Consistent with our findings, LMIC contexts with greater social gender inequality have fewer gender differences in violence engagement (Nivette et. al., 2019). Thus, Santa Ana girls' intensified risk for victimization, along with their willingness to fight back, defend same-

gender peers, and engagements in physical fights, may reflect broader community violence experiences, response expectations, situational attributes, and contextual coping mechanisms. Moreover, our study results reveal that for these adolescents the associations of gender and community levels of violence were salient.

A second individual level attribute found to inform adolescent violence experiences in Santa Ana was age group. An increased probability of victimization by adults appeared in both quantitative models, and in the qualitative FGD. However, adult perpetrators were held to a different standard by these adolescents, such that they are expected to be able to make more responsible and healthier decisions. Further, participants were critical of adult perpetrators as contributing to cross-generational violent cycles, while qualifying adolescent perpetration as self-defensive. These self-assessments support previous research that found that violence exposed Colombian adolescents were less likely to assume moral agency and inclined to consider retaliation if victimized (Pasupathi et al, 2017). Thus, Pasupathi et al (2017) assertion that Colombian adolescents' perceptions and values cannot be detached from experiences with severe and pervasive community violence aligns with our findings. Qualitative results also supported life-threatening forms of adult violence (e.g., machete among adverse adult relationships, gun violence) that can be traced as informing these generational evaluations. Thus, our findings support the importance of measuring poly-victimization at the family and community social networks in similar high risk-settings (Bedoya et al., 2019; Hamby et al., 2018).

Our participants experienced both physical and psychological victimization at higher rates than the national average (Ministerio de Salud y Protección Social, 2019).

Further, adolescents perceived the school as the only setting where perpetrators faced consequences, and violence was discouraged according to the FGD results. Research on school-based interventions to prevent violence in Colombia show promising results, especially when focusing on socio-emotional skills (Atienzo et al., 2017; Chaux et al., 2017). Extending the school efforts to community and family social networks could be central to addressing victimization in this population (Atienzo et al., 2017). Youth resilience and poly-strengths approaches to prevention could account for the inter-connections between community, household, and school violence (Hamby et al., 2018).

Finally, these qualitative findings emphasized the perceived central role of social and cultural contributors to all forms of victimization in their community. These adolescents' interpretations centered on the consequences of illegal activities (e.g., drug trafficking); the history of community conflict; the perception of violence as a form of conflict resolution; and the values on perpetration (e.g., perpetrators' low accountability; unintentional actions as violent). These interpretations of community violence are important to consider as community level violence has been found to negatively affect Colombian adolescents' mental health, even when accounting for individual victimization and social support (Cuartas et al., 2019). Clearly, there is a need to answer the WHO's (2015) call for more evidence-based efforts in LMIC rural settings that align with policies promoting the rule of law, provision of basic resources, and hotspot policing.

Our study findings expose the need for communal level strategies to address adolescent violence in Santa Ana. Adolescents living in high-risk communities' experience more complex mental health consequences related to violence exposure, even with available social and family support (Cuartas et al., 2019; Turner et al., 2012). For

prevention, educational and therapeutical interventions in high crime rural settings, these cumulative burdens of community violence and the resulting community values about victimization (e.g., gendered, intentions) need to be incorporated. Together, our results emphasize the utility of multi-leveled approaches to inform prevention efforts in rural LMIC “border villages” (Ceccato & Ceccato, 2017, Murray et al., 2014). We highlight the advantage of socio-ecological approaches for contextualizing and centering adolescent’s experiences with violence in these understudied settings.

Limitations and Future Directions

Although this study provides comprehensive evidence about LMIC rural adolescents violence and social networks, several limitations must be addressed. First, a cross-sectional and observational design prevented the detection of selection, contagion, and homophily trajectories, for improved understandings of social network dynamics and violent interactions. We cannot detect causality or temporal precedence among relationships of ties in our QAP model. Second, not having fully mapped the community social network (ex. adult alters) prevented the self-characterization of non-school contacts, and perceptions of these interactions or relationships. Finally, face to face FGDs can introduce social desirability bias, limiting participation, and quality of shared information. Participants were socially connected, and preexisting power dynamics and relationship history of the groups could have affected the frequency and content of the conversations. These limitations are not uncommon in social network research, given the hardships of establishing socio-metric boundaries and balancing research resources. Future investigators in this and other similar socially vulnerable populations of youth in LMIC countries, could explore emotionally adverse and supportive social influence and

dynamic processes, within socio-centric mapped networks at the village level (e.g., Shakya, et al., 2020). Despite these limitations our study provides foundational information critical for informing global policy and research foci seeking to address adolescent violence beyond individual- centered analysis, in understudied, LMIC, rural, high risk settings (Nagata, et al., 2016). We examined victimization experiences as nested interactions within social networks and the values and meanings of violence among Colombian rural adolescents. We highlight the advantages of a mixed methods design paired with a social complexity framework to address adolescent experiences in contexts of complex violence (Jiménez Bautista, 2018). Cross-disciplinary and community-centered lenses are critical to approach violence in limited research history contexts of multidimensional vulnerabilities (e.g., conflict, poverty; Taylor et al., 2020).

Table 1. Logistic Regression for Network Data and Violence Victimization

	<i>Psychological Violence</i>	<i>Physical Violence</i>
	β	β
Intercept	-8.37	-8.80
Girl Nominator ^{a,b}	24.98***	21.11***
Matched Gender ^b	0.73	0.67
Adult in Dyad ^b	22.94***	15.18***
Attending same Grade ^c	20.70***	14.46***
Degree Difference ^c	1.00***	1.00*
Shared Neighbors ^c	7.59***	5.99**
Community	2.21***	1.94**
Household	2.27*	3.31*
School	3.10***	4.58***
Adverse	30.27***	10.78***
R^2	0.57	0.58

*** p<0.001 ** p<0.01 *p<0.05

Note: Models were estimated independently, using quadratic assignment procedure (QAP) hypothesis test with 1000 repetitions. The dependent variable took the value of 1 for a reported violent interaction (direction was homogenized and the source was the victim).^a Girls' nominations in nomination network (coded as 1; other gender, or not nominated as 0).^b Estimated for adverse, household, community, and school in the nomination network. ^c Coefficients were estimated for all possible all among 1.006 individuals in the nomination network.

Table 2. *Focus Group Themes*

<i>Themes</i>	<i>Definition</i>	<i>Quote</i>
Community	Frequency, types, and acceptability of violence occurring in this public sphere space.	<p>“There are parents, neighbors, people, that support the bad things. If someone is already robbing, harming, or threatening, they will hide them, say nothing, never bring them to any authority. This is never going to end.” (Adolescent Girl)</p> <p>“Yes, that was in November, they killed like three [adolescents] one after the other...” (Adolescent Girl)</p> <p>“Uh... around my streets, my house, that is every moment... all the time” (Adolescent Boy)</p>
School	Frequency, types and acceptability of violence occurring in this public sphere space.	<p>“Last week a boy was teasing a girl at school and he grabbed her ass... I don’t know who she was, but the school dismissed him. They called his mom. I mean, this is just one case... but the school sees these things as wrong and even if they miss some, they see it as bad.” (Adolescent Girl)</p> <p>“Yeah... and then [teachers] who started that [fight]? Everything is blamed on the other. If there is a teacher against you then you are lost- it is like having the police” (Adolescent Boy)</p>
Household	Frequency, types and acceptability of violence occurring in this private sphere space.	<p>“Yes, when [adult couples fight] everyone goes to their own home. And [the fighting couple] stay in there beating each other.” (Adolescent Boy)</p> <p>“You know, parents here, mothers, they don’t know how to give advice, because if they are not yelling at you, then they don’t say anything... and nobody likes to be yelled at.” (Adolescent Girl)</p>

Adverse Relationships	Relationships between individuals characterized by animosity	<p>“If they [adults] have some trouble or issue, they cannot see each other on the street, because they will beat each other with a machete.” (Adolescent Boy)</p> <p>“Sometimes you know, just the way they [don’t] get along... It’s from time to time, there will be fights, then they will calm down, then they will fight [again]. Let’s say in December, people couldn’t even go out because there were <i>peleas</i> [fight] all the time” (Adolescent Girl)</p>
Reasons or motivations for violence: Cycles of Violence	Experiences with multiple forms of violence. Characterized by maintained violence traumas.	<p>“This boy... he needs help really. His mom will hit him, a lot, his father too. They hit him really bad... it’s really terrible. That is why he is that way, how can he not be? If your family is hitting you, then you go out and you treat people bad, you hit them on the face, you hurt... since you cannot let your anger out at home, well you go to school and you do that with anyone you see there.” (Adolescent Girl)</p> <p>“And what are [adults engaging in violence] sowing? Well, that is what they are going to collect!” (Adolescent Girl)</p> <p>“You know here, when there is trouble, instead of trying to stop the fight, [adults] will jump into it, will join the <i>pelea</i>” (Adolescent Boy)</p>
Reasons or motivations for violence: Accountability for unintentional actions	Holding individuals at fault for being disrespectful or harmful regardless of their intention.	<p>“You won’t see here the concept of ‘I didn’t mean it’. It is assumed it was your fault and that’s all. All you feel after that is the slap on your face.” (Adolescent Boy)</p> <p>“People fight with each other, it is common. Sometimes just because they step into another person’s foot. They won’t apologize. Sometimes just because you looked at them, only the way you look</p>

		at them... just staring at someone can be enough [to get into a fight].” (Adolescent Girl)
Reasons or motivations for violence: <i>Substance Misuse & Distribution</i>	Perpetrator or victim actively using or trafficking substances (e.g., drugs, alcohol)	<p>“We see many drug addicts, they will consume in front of children, they go through the streets and they consume everything they want, nobody says anything, sometimes they hurt and insult people, they think they own the town!” (Adolescent Boy)</p> <p>“There’s [regular substance abuser] that when he is high will hit both of his parents. He would sell their tv...” (Adolescent Girl)</p> <p>“Near my house there two places where they were selling drugs, and since they didn’t like each other, well violence, violence, violence... or when someone would steal, then they don’t like it. Everything will be done wrongly; everything will be done beating” (Adolescent Boy)</p>
Gender	If the victim/ perpetrator is boy/ man or girl woman	<p>“Yes, there can be girls that are different from the ones we have here. Some girls in other places would apologize, but that is not how they are here... [local girls] won’t say I am sorry. They will hit each other right away, for no reason.” (Adolescent Boy)</p> <p>“I support any [woman]- let it be my mom, sister... or not my sister. Any girl who is being beaten. Yes, because people will get into the fight. It will end up being a lot of people hitting the girl by herself otherwise.” (Adolescent Girl)</p> <p>“Let’s say someone hits your mother and since she is a woman, you have to react. However, if it was your father, well no, he is a man.” (Adolescent boy)</p>

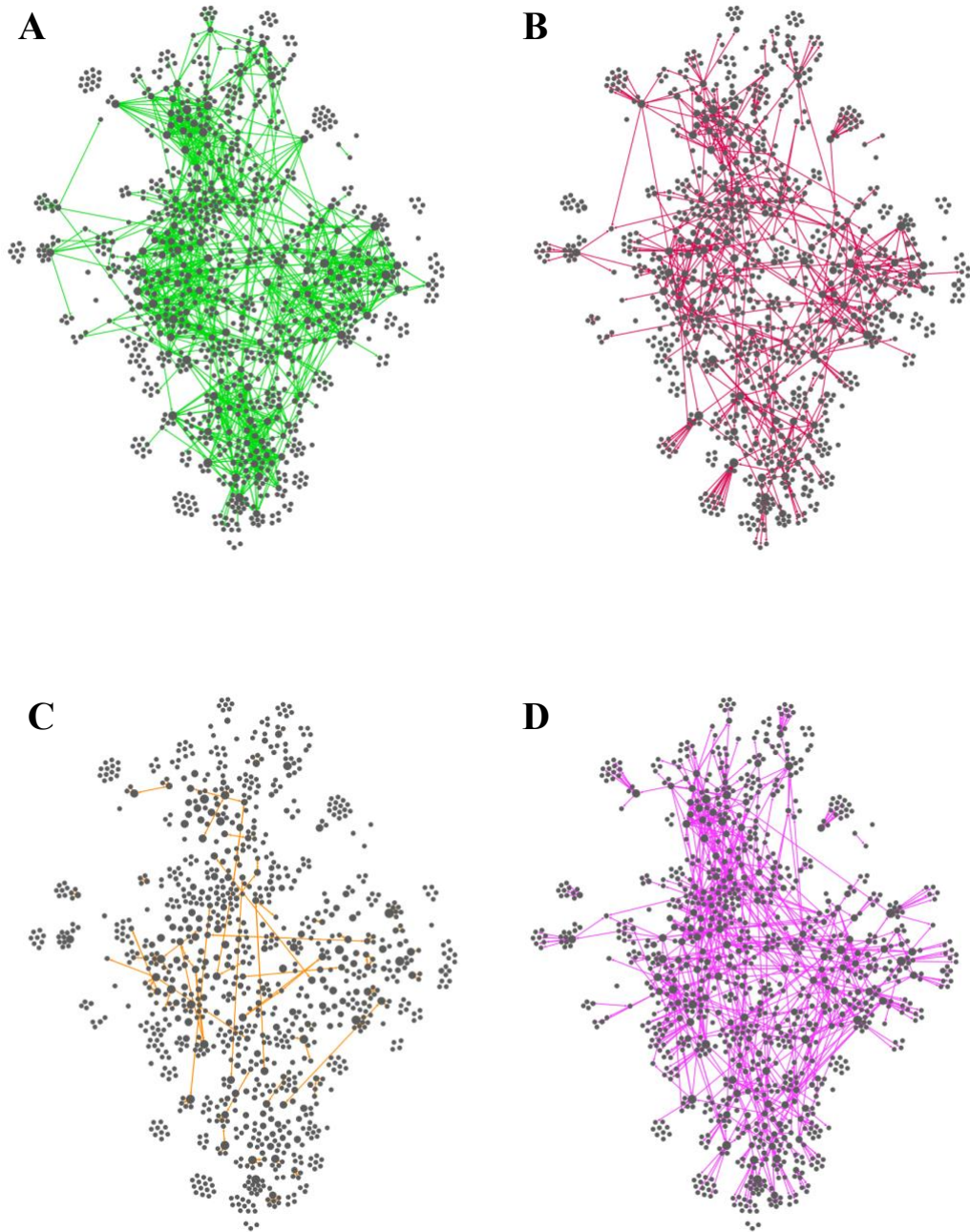
		<p>“Women would pull their hairs and men would punch their faces” (Adolescent boy)</p>
Age	<p>If the victim/ perpetrator is a child, adolescent or adult</p>	<p>“[Adults] here do not see you as a young person... someone in the grocery store will ask you to give them a cigarette. Then if you don’t have it, they will attack you. That literally happened yesterday... They said, ‘give me 500 pesos’, and then when you don’t give it to them, then you are the bad person. And then they say let’s fight.” (Adolescent Boy)</p> <p>“My mom is a crazy person. You think I can tell her that we should sit and talk? She says a lot of things [name-calling] so I insult her back- why not? Am I stupid? I’m no stupid. The words she uses are offending me so if she calls me a bitch, I call her back” (Adolescent Girl)</p> <p>“Parents are responsible for the ways in which they treat their children. Sometimes they love them, sometimes they will only insult them and hit them a lot” (Adolescent Girl)</p>

Table 3. Mixed Methods Results on Adolescent Violence by Social Complexity Level

Social Complexity Level	Quantitative	Qualitative
<p>Individual</p> <p>Psychological and personal traits, including attributes, behaviors, and experiences that individuals bring to their relationships and inform their violent interactions.</p>	<p>Girls' nominations and adult alters increase the probability of psychological and physical violence victimization. Most adolescents experience physical or psychological violence.</p>	<p>Past victimizations, trauma, and substance misuse relate to perpetration. Girls and women are at higher risk of victimization. Women are considered defenders of women. Adult perpetrators are considered to be more accountable than adolescents. All genders and age groups are involved in some form of violence.</p>
<p>Interaction</p> <p>A violent encounter, act, or action between individuals.</p>	<p>Psychological and physical violence victimizations are common across settings (school, community, households).</p>	<p>Violent interactions are common across settings (community, household, school, street) and assessed as concerning, dangerous, and life-threatening. Saliency of homicide and rape.</p>
<p>Relationship</p> <p>Evaluation, interpretation, or representations of dyadic relationships.</p>	<p>Adversity increases the odds of a physical or psychological violence victimization. Victimization (psychological and physical) occurring across school, community and household relationships.</p>	<p>Adversity valued as latent condition for violent interactions. Supportive relationships across settings (community, household, school) hold physical, psychological, and sexual violence. Despite an expectation of protectiveness, violence is observed across family and friendships.</p>
<p>Social Networks and Groups</p> <p>Networks of relationships that form an assemblage of higher order connections, with emergent properties, and dynamics. Social Networks include relationships, and their violent interactions.</p>	<p>Higher number of shared neighboring contacts increases the probability of observing victimizing ties.</p> <p>Degree difference in the dyad did not affect the probability of psychological or physical violence victimization.</p>	<p>Only at school (and classroom) settings perpetration is held accountable and is discouraged. Relational closeness at the household or community would not be protective and perpetrators would face few consequences. Groups of drug dealers and gangs are predominant perpetrators of life-threatening violence at the community level.</p>
<p>Socio cultural</p> <p>Meanings on violent interactions, relationships, groups. Values and qualities assigned to the structures and experiences found in other relational levels.</p>		<p>Community violence perceived as unavoidable, cyclic. Violence as a form of conflict resolution. Unintentional acts considered violent. Physical punishment and fights are viewed as common. Victimization is affecting the community. Communal values are central to the Santa Ana's identity.</p>

Note. Based on Hinde & Stevenson-Hinde, 1987; Malti & Rubin, 2018

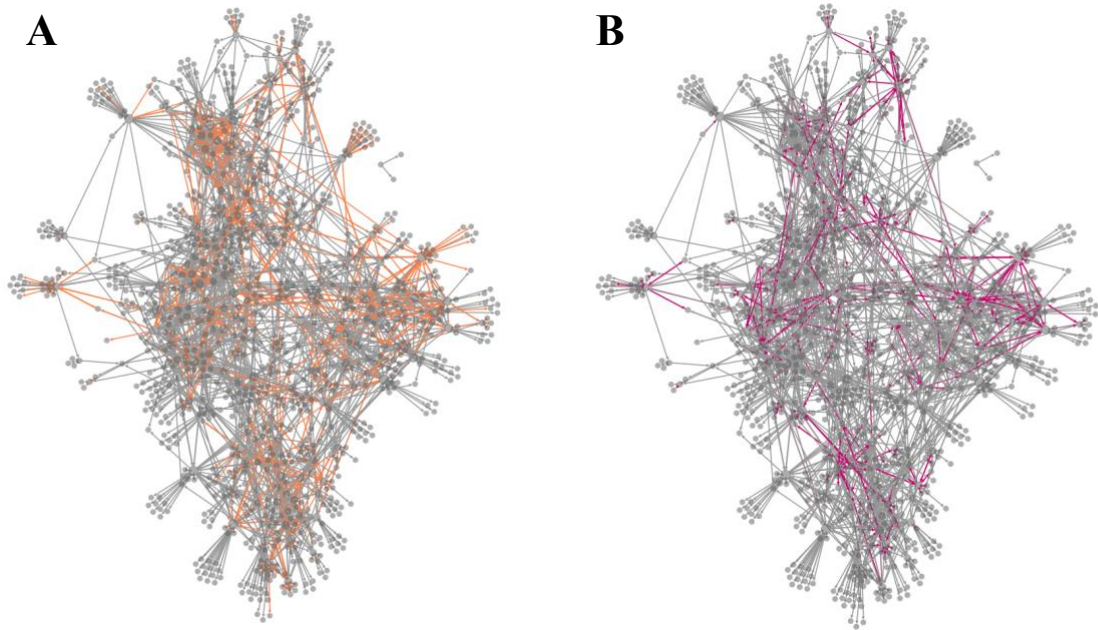
Figure 1
School, Adverse, Household, and Community Relationships.



Note. For all networks nodes indicate 1.006 individuals including participants (N=246) and their alters. Panel A: School ties in green. Panel B: Adverse ties in red. Panel C: household ties in yellow. Panel D: Community ties in purple. Layout: Force Atlas.

Figure 2

Psychological and Physical Violence Interactions in the Nomination Network.



Note. Nomination network with nodes representing 1.006 individuals including participants ($N=246$) and their alters. Panel A: Psychological violence interactions in orange/light grey ($n=431$). Grey represents nominated relationship with no psychological violence reported. Panel B: Physical violence interactions in fuchsia/dark grey ($n=294$). Grey represents nominated relationship with no physical violence reported. Layout: Force Atlas.

STUDY II: PHYSICAL AND PSYCHOLOGICAL VIOLENCE PERPETRATION IN SCHOOL PEER SOCIAL NETWORKS IN RURAL COLOMBIAN ADOLESCENTS

Abstract

The extensive body of research consistently showing the negative physical, psychological, and educational impacts of adolescent peer violence has led the phenomenon to be viewed as a global health concern (WHO, 2015). Studies have found violence-related homophily among adolescents, such that perpetrators tend to be socially connected to those who share their status. Utilizing cross-sectional social network data from 242 rural Colombian adolescents, our study found no effect of peers' psychological and physical violence perpetration over adolescents' perpetration probability in their school social network. In turn, results show that school victimization increased the likelihood of perpetration (both psychological and physical), controlling for gender, non-school victimization (community, household), age, academic standing, and ethnicity. For physical violence perpetration (and not for psychological violence), the odds of perpetration increased if adolescents lived with non-parental caregivers or reported multiple cross-gender friendships at school. These findings are contextualized in a rural LMIC, post-conflict, and resource-limited community setting. Results are discussed, highlighting the importance of addressing socio-historical factors and adolescents' sensitive period of socio-cultural processing when studying peer violence in adolescent social networks.

Keywords: adolescent social networks, school violence, adolescent violence perpetration

Literature Review

Violence among adolescents is a global health priority given its critical developmental consequences in the future social, educational, and health trajectories of adult populations (Chaux et al., 2012; Ellsberg et al., 2018; Mendez-Lopez et al., 2021; Dierkhising et al., 2019; WHO, 2015). Referred to intentional violent acts or threats targeting non-kin, same-age individuals, peer adolescent violence has a high probability of resulting in physical or psychological harm (Kamdaya et al., 2017; WHO, 2015). The effects of peer violence victimization can be lifelong, including physical injuries, chronic diseases, and mental health impacts (e.g., depression, suicidal behaviors; Bowes et al., 2015; Schacter, 2015). Similar detrimental effects extend to adolescent perpetrators, with further increased risks of later violent engagement in their relationships (Bushman et al., 2018; Farrel et al., 2020; Rappaport et al., 2011; Taylor et al., 2016).

Although adolescent violence towards peers occurs in populations cross culturally, reported prevalence rates are particularly high among adolescents living in contexts of poverty, limited resources, high community violence, or post-conflicted settings such as Colombia (Bacchini et al., 2011; Blum et al., 2019; Chaux, 2009; Cromer & Villodas, 2017; Molano et al., 2015; Ribeiro et al., 2009; Sui et al., 2018). Colombia is the country with the lengthiest internal conflict in the Western hemisphere (Acemoglu et al., 2013) which has historically influenced Colombian adolescents' exposure to complex forms of violence. Nearly one-third (27.90%; Ministerio de Salud y Protección Social, 2019) of Colombian adolescents' have experienced peer physical violence, a higher rate than most America's Low- and Middle-Income Countries (Patton et al., 2009; Pinto-Cortez et al., 2021; Sanchez de Ribera et al., 2019; Smith et al., 2020).

The exposure to various types of community violence is especially prevalent in rural areas of Colombia, such that the normalization and cyclical nature of violent experiences exacerbates Colombian rural adolescents' risk for peer violence perpetration (Browne et al., 2017; Chaux et al., 2012; Chaux, 2009; Dodge, Bates, & Pettit, 1990). Colombian rural adolescents, in particular, experience severe forms of community violence exposure, including witnessing political armed conflict, being recruited for criminal activities, displaced as a result of the conflict, and victimization from organized crime (Butti, 2018; Chaux, 2009). Colombian rural adolescents' experiences with violence have shown to have more detrimental health, educational, and occupational impacts than their urban counterparts (Bedoya et al., 2019).

Increasingly, the research has noted the necessity of examining violence experiences of rural Colombian and Latin American adolescents inhabiting exacerbated rates of community violence and poverty (Butti, 2018; Devries et al., 2019; Finkelhor et al., 2011; Natukunda et al., 2019; Ribera et al., 2019; Pinto-Cortez et al., 2021; Patton et al., 2009; Rozo-Sánchez, 2019; Smith et al., 2020). The limited research has noted the importance of peer relationships and school settings as buffers against negative outcomes in this region (De Ribera, 2019; Ribeiro, 2009; Patton et al., 2009). However, most studies on adolescent violence perpetration have predominantly focused on urban school settings across Latin America (Pinto-Cortez et al., 2021; Le et al., 2018). This limited research on rural adolescents is concerning given the unique contextual experiences and peer values that adolescents negotiate in rural settings (Bedoya et al. 2019; Blum, et al., 2019).

Adolescent Social Networks and Violence Perpetration

Peer violence perpetration peaks during adolescent years (Cauffman, 2000). It is essential to understand violence perpetration among adolescents in the context of their peer social networks, as this is a central niche of their socialization process (Bukowski et al., 2018; Montgomery et al., 2020; Steinber & Morris, 2001). Adolescents simultaneously face the most significant lifetime increase of non-kin social networks (Wrzus et al., 2013), with decreasing adult supervision (Pérez-Martínez et al., 2020); and an augmented relative importance of peer relationships (Steinberg & Moris, 2001). Adolescents' intensified vulnerability to peer social networks, has shown to influence individual aggressive and anti-social behaviors (Lansford et al., 2020; Sijtsema & Lindenberg, 2018).

Empirical studies utilizing social network analysis have documented homophily in adolescent relationships according to violence perpetration status, such that adolescents who engage in peer violence tend to be socially connected (Bond & Bushman, 2017; Gallupe et al., 2019; Moutappa et al., 2004; Rokven et al., 2016; Turanovic & Young., 2016). Homophily in adolescent violence perpetration can be a result of at least four mechanisms: preference, avoidance, influence, or selection. Turanovic & Young (2016) described the first three processes as follows. Preference refers to the ego's (adolescent) preferential attachment to similar perpetration alters (friends); avoidance refers to the evasion by which non- perpetrator alters would create a deficit in friendships, facilitating further engagement of the ego with equally violent friends; and finally, through social contagion processes, by which the ego's violence status would become more similar to that of the alter over time. A fourth alternative could be selection, that is the external

placement of similar perpetration status adolescents in groups such as classrooms or classes, were they would have scarce opportunities to relate to non-similar peers (Valente et al., 2004).

As noted by Valente and colleagues (2004) the growing scholarship on adolescent social networks has utilized at least three theoretical approaches to explain peers' similarity mechanisms in adolescent social networks. First, Bandura's (1986) social learning theory, through the social reinforcement of the aggressive behavior. A social learning process would justify a social contagion effect such that a violent peer connection would enhance the probability of imitating that behavior, through observing its potential social rewards. Second, the differential association theory (Sutherland & Cressey, 1992) that would explain the selection of violent peers, such that the ego would seek to befriend similar perpetration status individuals. The underlying assumption of the differential association perspective would be that violent behavior learning would precede the peer selection process (family, developmental experiences). Finally, following Ajzen's theory of planned behavior (1991), the normative expectations and attitudes towards violent behaviors would be increasing the probability of the ego acting violently, through exposure to a violent alter (contagion) or to a classroom (selection) with high levels of violent acts. Together, these theories are not mutually exclusive, given they operate through often simultaneous social mechanisms (selection, influence, preference, or avoidance) that can be concurrently present in a specific social network.

Current Study

Our study centers the experiences of understudied setting in the adolescent social network literature- adolescents living in a LMIC, rural, resource limited, post-conflict

community (Coley et al., 2018; Gallupe et al., 2019; Massetti & David-Ferdon, 2016; WHO, 2017). Specifically, the peer violence experiences of adolescents living in a rural Afro Colombian community located in the Caribbean region of Colombia will be examined. With approximately 1,000 families that have lived in the area for several generations, the village has been transitioning from a long-standing history of conflict, poverty, and limited resources, to sharing territory with transnationally attractive touristic and industrial enclaves (ANSPE, 2014; Basso, 2015; CNMH, 2017). The current study aims specifically to examine adolescent psychological and physical violence perpetration in peer social networks, in the context of a rural LMIC school setting. Utilizing an exploratory approach, we analyzed three questions at the individual and social network levels. First, we explore the relationship of individual characteristics and violence perpetration, such as non-school victimization, gender, age, ethnicity, and academic standing. Second, we include individuals' social network characteristics as they relate to perpetration status, in order to expand the analysis to school victimization, and social network attributes. Finally, we test the existence of preferential attachment or peer effects, through analyzing if social connections to perpetrators could be related to adolescent's perpetration status.

Methods

Data Collection

Recruitment took place in the only public school in the community. Inclusion criteria required adolescents to be between 13 to 17 years old at the time of data collection and enrolled in 6th to 11th grades (middle school and high school). As the response rate was 90% among eligible individuals ($N=242$), data from most adolescents

attending school in the community was collected. Written consent was obtained from two parents/ primary caregivers and adolescents provided written assent before taking the survey. The computer-based survey was taken a local university facility in the spring of 2019. Response times averaged two hours (active pause breaks were provided). Adolescents received a movie ticket/meal card in compensation for their participation (equivalent to 10 USD).

Social Network Data. The survey included three name generators to gather the social network data, involving emotionally supportive and emotionally adverse peer relationships. First, adolescents were asked to nominate up to ten friends at their school with whom they shared important matters. The second name generator extended the same question to people in their community. Lastly, adolescents were asked to nominate people with whom they held difficult relationships and with whom they experienced frequent sadness, anger, or deception (all prompts included). Therefore, each ego (adolescent) could nominate up to thirty alters (contacts). Alters could repeat through name generators and nominations could include participant and non-participant alters. Alters' full names were typed by each respondent.

We took the following steps to build the school peer's social network. First, adolescents were instructed to type all four alters' names. (Individuals are typically given two first names and use both their paternal and maternal surnames in Colombia). Social network nominations informed a roster of respondent and non-respondent alters. Raw names were matched utilizing a 90% string similarity algorithm that suggested coincidences. Therefore, we could discern between homonyms. Two authors manually

and blindly revised each nomination independently for consistency and the final pair was the result of their consensus.

The school peers' social network was utilized for further statistical modelling (see statistical analyses section) and to estimate descriptive characteristics of the graph (e.g., density, degree assortativity, diameter; Newman, 2002). Further, the socio-metric school network served to estimate the nominal assortativity coefficient for each type of violence perpetration (psychological or physical). The assortativity measure takes a positive value if two participants who are perpetrators tend to connect to each other in the observed graph, or a negative value in the opposite case (Newman, 2002).

Violence perpetration was measured in the context of the name generators. For each ego-alter dyad the survey incorporated follow-up questions that would utilize repopulation of the typed names. These questions included the presence of violence in the tie (psychological, physical) and the direction. Detailed information of the coding is explained in the next section. All ties with missing data for physical and psychological violence perpetration were removed (4% of all study nominations) of all estimations.

Non-school peer nominations corresponded to household or community relationships. These are alters not participating in the survey. A follow-up question for each ego alter dyad allowed establishing if the alter and the ego (adolescent nominator) shared the same household. All other nominations were considered community ties. Non- school nominations were utilized to create covariates of household and community violence victimization, described in detail in the next section. Finally, non-violent adverse nominations (difficult relationships that cause anger, deception) were utilized to

appraise school perceived adversity at the individual level, as described in the next section.

Measures

Physical and psychological violence perpetration in school peer relationships.

Adolescents described school peer psychological and physical violence perpetration for all dyads. For psychological violence, respondents reported engaging in any of following acts in the three months before the data collection: scare, scream, offend, calling names, or insulting. For physical violence, the following behaviors in the past year: hitting, throwing rocks or something else, pinching, squeezing, pushing, kicking, dragging, shacking, or slapping. They could mark yes or no for all nominations.

We estimated separate dichotomic variables for each type of violence perpetration (psychological and physical) utilizing bi-directional reports, such that the respondent or any other adolescent in the survey could indicate perpetration status of a socially connected peer. Research on school violence supports the significance of combining peer and self-reports in order to avoid biases with self-identification as a perpetrator (Branson & Cornell, 2009). Psychological and physical violence perpetration status took the value of one when at least one relationship included a dyadic perpetration report, and zero otherwise.

Social network individual measures. To assess adolescents' social network attributes, we appraised two variables utilizing the school social network data. For this network graph only supportive ties were considered, given that emotionally adverse relationships would account for a different effect, not in the scope of this study two aims (consider study one). First, we estimated the eigenvector centrality value which is a

measure of social status that accounts for the connectedness of the alters that are nominated by the adolescent (Bonacich, 1972). Here, each individual score is estimated from the first eigenvector of the graph adjacency matrix. As opposed to other measures (degree, closeness, in-betweenness centrality) it serves the purpose of accounting for the connectivity of their alters. The eigenvector centrality will take a higher value for those adolescents connected to highly connected adolescents in the school network.

Second, because cross-gender social network nominations have shown to affect adolescent violence perpetration (Faris & Felmlee, 2011), we also included the presence of cross gender ties. Participants were assigned a value of one in this variable when at least two of their alter (incoming or outgoing nominations) was from a different gender than their own. Because dating relationships are common on this age group and they create distinctive effect from that of peer contacts, we followed previous research considerations for setting the threshold in two or more cross-gender relationships, to discern dating from cross gender peer effects (Faris & Felmlee, 2011).

School peer victimization. The school peer victimization variable describes if the adolescent has been victimized by school peers, also utilizing bidirectional reports of victimization. Adolescents were asked to describe psychological and physical violence victimization in all nominated school peer relationships. Separate variables for each type of violence (psychological, physical) took the value of one when at least one relationship included a dyadic victimization report, and zero otherwise.

Perceived school peer adversity. The number of non-violent school peer relationships nominated in the third name generator (difficult relationships with adverse emotions) were considered emotionally adverse ties. Each adolescent was assigned a

value with the sum of the number of adverse nominations in which the dyad did not report a violence episode (neither the ego or the alter reported psychological or physical violence).

Household victimization. Non-school nominated relationships were reported by each participant as sharing the same household (or not) and being violent (physical, psychological) or not. We created a single dichotomic variable to describe if the adolescent nominated at least one victimization in their household ties. Household victimization took the value of one if the respondent was victimized and zero if they were not victimized or did not report household relationships as part of their personal network.

Community victimization. Non-school relationships not nominated as same household were reported as being violent (physical or psychological) or not. These are ties between a participant and non-participant alters who do not live together. We created a single dichotomic variable (including physical and psychological violence) to describe if the adolescent nominated at least one violent victimization in their community ties. Community victimization took the value of one if the respondent was victimized and zero if they were not victimized or did not report community relationships.

Individual level covariates. Individual level covariates included self-reported gender, age, being native (or non-native), parental presence at home, and academic standing. Gender was coded as girl, or boy. Two participants described being from another gender, so it was statistically unfeasible to estimate effects for this third group; therefore, they are not reported in the statistical models.

Because susceptibility to peers and developmental processes of adolescents can change from early to late adolescence (Steinberg and Monahan, 2007), age group was

coded as early (13-14 years old) or late (15-17years old) adolescent. As our participants belong to a “Comunidades negras” ethnic community we followed the local definition of native or non-native trait. If they answered yes to having at least one parent born in their community, they were coded as native (or non-native otherwise). Adolescents also described if they lived with both parents, one parent, and with non-parental caregivers. Finally, we controlled for academic standing. Adolescents reported if they passed all subjects in the past academic period or if they failed one or more classes (coded as good academic standing if they passed, or zero otherwise).

Analyses

Individual level analyses. We estimated eight models utilizing two types of analyses to examine violence perpetration at the individual level. Physical and psychological perpetration were analyzed separately. In the first set of models, we conduct logistic regression with bootstrapped errors to examine the individual level association of non-school victimization (household, community) on the probability of perpetrating violence to a school peer, controlling for gender, age, native status, parental presence at home, and academic standing. In a second step, we add school peer victimization, and the social network variables (eigenvector centrality, cross-gender relationships, perceived adversity). These four models aim to analyze the influence of social network and non-school victimization characteristics over the probability of perpetration at the individual level.

Social networks analyses. To further investigate the influence of socially connected peers’ perpetration status over adolescents’ perpetration we estimated two types of auto-logistic regression models for each type of violence (psychological and

physical violence) utilizing an undirected graph of the school peer’s social network. The first models (by type of violence) account for adolescents’ perpetration status and their contacts perpetration status only. The second estimation includes exogenous variables. These estimations consider adolescents’ school peer violence perpetration as a function of non-network covariates (gender, native, age, parental presence, household victimization, and community victimization), and their peers’ perpetration status, accounting for the structure of the school network. In our study, a centered auto logistic model (Caragea & Kaiser, 2009) calculates the logarithm of the conditional odds of observing perpetration scaling linearly with the number of neighbors (alters) that are also violence perpetrators, considering both social network endogenous and exogenous effects.

An auto logistic model is a class of Markov Random Field model that is suitable for modelling the network process (status of perpetration), considering the underlying graph (school social network), and the individual variables associated with the outcome (covariates). Utilizing maximum pseudo-likelihood, we predict the logarithm of the conditional odds of psychological or physical violence perpetration status given the perpetration behavior of neighbors in the undirected school social network (incoming and outgoing nominations) as described in equation 1 per Kolaczyk & Csardi (2014):

(1)

$$\log \frac{\mathbb{P}_{\alpha,\beta}(X_i = 1 \mid \mathbf{X}_{\mathcal{N}_i} = \mathbf{x}_{\mathcal{N}_i}, \mathbf{Z}_i = \mathbf{z}_i)}{\mathbb{P}_{\alpha,\beta}(X_i = 0 \mid \mathbf{X}_{\mathcal{N}_i} = \mathbf{x}_{\mathcal{N}_i}, \mathbf{Z}_i = \mathbf{z}_i)} = \mathbf{z}_i^T \alpha + \beta \sum_{j \in \mathcal{N}_i} (x_j - \mu_j)$$

Where x represents perpetration status of i , j is the number of neighbors with perpetration status, Z_i is a vector of exogenous adolescents' characteristics, α is a constant, and β is a vector of coefficients. To further assess goodness of fit of the auto logistic estimations we simulated 100 realizations of the fitted models and compared them to the observed assortativity coefficient in our empirical dataset (Kolaczyk & Csardi, 2014). We utilized the package *ngspatial* (Hughes & Cui, 2020) available in R (Team R, 2017). These four auto logistic models assessed the influence of peer perpetration on adolescents' perpetration in non-directed school peer relationships.

Additional analyses. To further complement the results of the auto logistic model, we also created an average degree constrained null model. The aim of this additional analyses is exploring if there was preferential tie formation among adolescents in the school peer network, according to their perpetration status. This null model utilized the mean degree of perpetrators and non-perpetrators for each type of violence. For each realization of the null model the structure of the observed network is held, and the perpetration status is reassigned through random permutations with less than 10% deviation from the original distribution of the mean degrees of perpetrators and non-perpetrators. The results from these models would provide reasonable evidence to confirm (or refute) if perpetration status would coincide with a higher preferential attachment to form ties with similar or dissimilar adolescents, than expected by chance, controlling by the structure and mean degree of the (cross-sectional) empirical social network.

Results

Participants

A total of 242 adolescents completed the survey. The majority of adolescents were psychological violence perpetrators in school peer relationships (73.97% overall; 76.66% girls and 72.50% boys). Likewise, most adolescents perpetrated physical violence to a school peer (55.78% overall; 57.75% girls and 55.00% boys) according to bidirectional reports. By gender 49.60% self-identified as girls, 49.17% as boys, and 0.81% as another gender. The majority of the respondents were native (74.00%; 26.00% were not). In terms of developmental stages, the majority of participants were late adolescents (54.54%; and 45.45% early). Most adolescents lived with one parent (44.62%) or both parents (36.36%). Some respondents lived with no parents (13.64%) and a few refused to answer this question (4.54%). The majority of adolescents passed all school classes in the past academic quarter (59.91%); the rest did not pass at least one class (40.08%). In terms of non-school victimization most adolescents did not report same household victimization in their personal network (92.93%), while 7.02% did report household victimization. Most respondents did not report community violence victimization (78.93%) in their personal networks, while 21.07% did report community victimization. In terms of social network characteristics, the majority of adolescents had more than one cross-gender nomination (57.43%; 42.57% did not). A total of 75.20% adolescents reported between one and 9 nonviolent adverse relationships at school, with an average of 0.58 ($SD=1.39$). The mean eigenvector centrality was 0.10 ($SD=0.19$).

School Peers' Social Network

Figures 4 and 5 display the school social network graph with a colored description of violence perpetrators (in orange) and non-perpetrators (in blue) for each type of violence. The school peer network included 241 connected nodes (adolescents who reported school peer ties) conforming the largest connected component of the social network, and one adolescent as an isolate. A total of 1329 directed ties were described by survey participants. The graph density was 0.22 and the diameter 12. From all nominations 21.75% were mutual dyads (both ego and alter nominated each other) and the remaining were asymmetrical (only ego nominating the alter and not the other way around). The degree assortativity was 0.14, meaning adolescents tended to connect to those with a greater number of ties. Violence perpetration assortativity coefficients were 0.11 for psychological violence and 0.12 for physical violence, so that it appeared that those who were perpetrators could be tending to relate to others with similar perpetration status. This relationship, however, is explored in the auto-logistic model and further analyzed in the mean degree null model analyses.

Logistic Regressions for School Peer Victimization

Table 4 summarizes the results of the four models predicting individual level perpetration for psychological and physical violence. First, the multivariate logistic regression predicting psychological violence perpetration explained a significant variance of the individual perpetration status (Nagelkerke Pseudo $R^2 = 0.14$). Boys' and girls' odds ratio did not differ (OR=1.13, CI [0.6, 2.12]). Compared to early adolescents, late adolescents did not have a different probability of reporting this type of perpetration (OR= 0.82, CI [0.44,1.53]). Natives were more likely to hold perpetration status than

non-Natives (OR=2.58, CI [1.34, 4.96]). Household victimization did not change the probability of psychological violence perpetration (OR=1.37, [0.36, 5.27]). On the contrary, community victimization was positively associated to psychological violence perpetration (OR=2.94, CI [1.15, 7.54]). Participants living with no parents were less likely to perpetrate psychological violence compared to those living with both parents (OR = 0.25 [0.1, 0.64]). Adolescents living with one parent did not differ when compared to those living with both parents, in terms of psychological violence perpetration (OR=0.67 CI [0.32, 1.4]). Lastly, having high academic standing (passing all subjects) as compared with not passing at least one subject did not significantly affect the likelihood of psychological violence perpetration (OR= 1.1, CI [0.59, 2.04]).

The second multivariate logistic regression predicting psychological violence perpetration explained a significant variance of the individual perpetration status (Nagelkerke Pseudo $R^2 = 0.45$). Boys' and girls' odds ratio did not differ (OR=0.88, CI [0.42, 1.84]). Compared to early adolescents, late adolescents did not have a different probability of reporting this type of perpetration (OR= 1.01, CI [0.47, 2.17]). Natives did not differ in their probability to hold perpetration status when compared with Non-Natives (OR=2.23, CI [1.00, 4.99]). Household victimization did not increase the probability of psychological violence perpetration (OR=0.87, [0.18, 4.28]). Participants living with no parents did not differ in their likelihood to perpetrate psychological violence compared to those living with both parents (OR = 0.5 [0.17, 1.47]). Similarly, adolescents living with one parent did not differ when compared to those living with both parents, in terms of psychological violence perpetration (OR=0.77 CI [0.32, 1.87]). Also, having high academic standing (passing all subjects) as compared with not passing at

least one subject did not significantly affect the likelihood of psychological violence perpetration (OR= 1.57, CI [0.74, 3.36]). Adolescents having adverse relationships did not significantly differ in their likelihood of holding perpetrator status (OR=0.84, CI [0.66, 1.07]). On the contrary, psychological violence victimization by peers was positively associated to psychological violence perpetration (OR=2.94, CI [1.15, 7.54]). In the same way, physical violence victimization by peers was positively associated to psychological violence perpetration (OR=2.68, CI [1.26, 5.69]). Finally, the eigenvector centrality coefficient was non-significant (OR=4.28 CI [0.19, 93.04]), meaning that adolescents' social network position in the school network did not affect the odds of psychological violence perpetration.

The first multivariate logistic regression predicting physical violence perpetration explained a significant variance of the individual perpetration status (Nagelkerke Pseudo $R^2 = 0.12$). Boys' and girls' odds ratio did not differ (OR=1.16, CI [0.67, 2.01]). Compared to early adolescents, late adolescents did not have a different probability of reporting this type of perpetration (OR= 1.31, CI [0.76, 2.25]). Natives were more likely to hold perpetration status than non-Natives (OR=2.37, CI [1.28, 4.38]). Also, adolescents experiencing community victimization did not differ in the likelihood of holding psychological violence perpetration status (OR=1.47, CI [0.73, 2.92]). Participants living with no parents did not differ in their likelihood to perpetrate psychological violence compared to those living with both parents (OR = 1.38 [0.58, 3.28]). Similarly, adolescents living with one parent did not differ when compared to those living with both parents, in terms of physical violence perpetration (OR=0.72 CI [0.39, 1.32]). Also, having high academic standing (passing all subjects) as compared

with not passing at least one subject did not significantly affect the likelihood of physical violence perpetration (OR= 0.63, CI [0.36, 1.09]). On the contrary, household victimization increases the probability of physical violence perpetration (OR=5.13, [1.36, 19.41]).

The second multivariate logistic regression predicting physical violence perpetration explained a significant variance of the individual perpetration status (Nagelkerke Pseudo $R^2 = 0.39$). Boys' and girls' odds ratio did not differ (OR=1.11, CI [0.58, 2.11]). Compared to early adolescents, late adolescents did not have a different probability of reporting this type of perpetration (OR= 1.01, CI [0.47, 2.17]). Natives did not differ in their probability to hold perpetration status when compared with non-Natives (OR=2.23, CI [1.00, 4.99]). Household victimization did not increase the probability of physical violence perpetration (OR=3.6, [0.75, 17.28]). Participants living with no parents were more likely to perpetrate physical violence compared to those living with both parents (OR = 3.08 [1.1, 8.66]). Adolescents living with one parent did not differ when compared to those living with both parents, in terms of physical violence perpetration (OR=0.83 CI [0.41, 1.66]). Also, having high academic standing (passing all subjects) as compared with not passing at least one subject did not significantly affect the likelihood of physical violence perpetration (OR= 0.69, CI [0.36, 1.31]). Adolescents having adverse relationships did not significantly differ in their likelihood of holding perpetrator status (OR=0.99, CI [0.8, 1.24]). On the contrary, cross gender ties was positively associated to physical violence perpetration (OR=2.64, CI [1.38, 5.04]. In the same way, psychological violence victimization by peers was positively associated to physical violence perpetration (OR=5.49, CI [2.9, 10.42]. Also, physical violence

victimization by peers was positively associated to physical violence perpetration (OR 2.97, CI [1.31, 6.72]). Finally, the eigenvector centrality coefficient was non-significant (OR=1.66 CI [0.21, 13.24]), meaning that adolescents' social network position in the school network did not affect the odds of physical violence perpetration.

Social Network Analyses

Table 5 summarizes the four realizations of the auto-logistic models and figures 6 and 7 display the graphic representation of the simulations. First, for psychological violence the estimated coefficient without exogenous covariates yielded a negative effect, meaning that adolescents socially connected to a perpetrator were less likely to hold similar status (OR=0.50). Similarly, the estimation including covariates (gender, native, age, and parental presence in the household) also yielded a negative coefficient (0.57). Results of the simulations, however, show that this result is not different than expected by chance, such that the observed assortativity in this network is similar to random realizations of the model.

Physical violence results were similar. The estimated coefficient without exogenous covariates yielded a negative effect, meaning that adolescents socially connected to a physical violence perpetrator were less likely to hold similar status (OR=0.42). Similarly, the second estimation including covariates (gender, native, age, and parental presence in the household) also yielded a negative coefficient (0.54). Results of the simulations, however, show that this result is no different than expected by chance, such that the observed assortativity in this network is similar to random realizations of the model.

The mean constrained null model statistical analysis shows that perpetrators did not have more ties among them, such that psychological or physical violence perpetration status was not guiding preferential tie formation (figures 8 and 9) any different than expected by chance. Observed ties among perpetrators ($p=0.95$ for psychological violence; $p=0.91$), perpetrators and perpetrators non-perpetrators ($p=0.70$ for physical violence; $p=0.35$ for psychological violence) were no higher than expected by chance. However, ties among non-perpetrators were lower for psychological violence ($p<0.001$) and higher for physical violence ($p<0.001$) than expected by chance.

Discussion

To analyze the relationship between school peer social networks and adolescent perpetration, this study analyzed individual and social network factors that could affect psychological or physical violence perpetration to a peer. Results are discussed recognizing the importance of addressing socio-historical dynamics informing adolescent social networks in the context of limited resources, post-conflict, and high exposure to community violence, such as rural Colombia (Basso, 2015; Butti, 2018; Bonilla-Escobar et al., 2017; Broesch et al., 2020).

First, findings of the individual level analyses indicate that school peer victimization significantly increased the likelihood of psychological and physical violence perpetration, regardless of gender, non-school victimization (community, household), age, academic standing, and ethnicity (native status). This aligns with a recent meta-analysis finding regarding correlates of perpetration among LMIC adolescents; among 86 studies analyzed, school peer victimization emerged as a robust predictor for adolescent violence (Ribera et al., 2019).

Second, this study found that when considering physical violence, the odds of perpetration increased if adolescents lived with non-parental caregivers. This was not found, however, for psychological violence. This result is consistent with previous research noting that decreased parental supervision and non-living with parents, is correlated to adolescent physical violence perpetration in the context of resource limited settings (Bacchini et al., 2011; Nadkarni et al., 2015; Losel & Farrington, 2012). For example, a study on rural Italian adolescents documented the same links between peer victimization and low parental monitoring when adolescents were exposed to high community violence (Bachini, et al. 2011).

Reporting multiple cross-gender friendship also increased the probability of being a physical violence perpetrator. This is aligned with Faris & Felmlee's (2011) findings on investigating violence in adolescent school social networks. They argue that cross-gender friends during this lifespan period reflect greater social status in a context where these relationships are scarce, and as a result the link between social status and aggression is magnified in the presence of these ties, regardless of the gender of the adolescent (Faris & Felmlee, 2011).

Both social network analyses yielded consistent results, such that having a socially connected peers that hold perpetration status was not associated with the adolescents' perpetration. Similarly, perpetration status was not related to the probability of observing preferential ties according to perpetration status. We suggest three possible explanations for these findings. First, as adolescence is a critical period for both social and cultural processing, and peer social networks effects are significantly defined by the contextual values of their community and broader cultural influences (e.g., social norms,

typical behaviors, and social rewards; Blakemore & Mills, 2014; Icengole et al., 2019; Rubin et al., 2006). This is supported by study one in this dissertation (Table 3), which found this same group of adolescents perceived their community as unsafe, with a long history of conflict and violence. Furthermore, these adolescents noted that perpetrators (even in the most pervasive forms of violence such as homicide) faced few consequences (Study one in this dissertation). Therefore, violent engagement in this context could hold different meanings than in other cultural settings, such that the associated social rewards or punishments for the behavior might become neutralized. Therefore, our results point to the need to extend our knowledge about social meanings given to violence in differing contexts and relationships. Research on vulnerable populations cross culturally have noted that individuals' perceptions of what are appropriate responses and methods for coping with violence are related to their socio-cultural contexts (e.g., Burnette, & Hefflinger, 2017; Eaton & Stephens, 2018; Massarwi & Khoury-Kassabri, 2017; Outland, 2019; Scorgie et al., 2017). Thus, the behaviors or coping mechanisms centered in unlike research locations may not be applicable to or adaptive in other contexts.

A second consideration would be that these adolescents' relationships have unique characteristics from those in urban settings (where most research has centered). Specifically, because this is such a small community, students have not only attended school together, but are part of a same grade classroom cohort from elementary school through to their high school graduation. Furthermore, these adolescents hold extended connections in their community, often sharing kinship or neighborhood ties among each. Therefore, the level of closeness and friendships intimacies extend to their non-school

family and community ties (Basso, 2015). These factors, along with low rates of mobility among residents of this rural setting means that everyone is connected to each other both in their daily lives and often across several generations. As such, the effects of a school-based experience of violence with a peer may be addressed outside the boundaries of the school setting, extending the social network effects to non-school social dynamics not captured in this study.

Lastly, this study only measured direct dyadic forms of violence perpetration, such that the ego or the alter would report the perpetration status. Sijstema and colleagues (2010) studied adolescent friendships and aggression longitudinally and found that instrumental and relational aggression differed in their homophily patterns. Direct forms of aggression (such as the ones in this study) were less susceptible to social influence. In the same line, Palacios and colleagues (2019) found that among Chilean adolescents, perpetration predicted longitudinal changes in antipathies, but not in friendships. This methodological concern could be addressed in future research to ensure that assessments direct and indirect violence are concurrently captured, to better capture what is occurring within these relationships, and, in turn, evidence of possible social contagion, or selection processes.

Limitations and Future Directions

Although this study provides valuable evidence about LMIC rural adolescents' s peer violence perpetration and social networks, several limitations must be addressed. First, violence perpetration reports were solely dyadic, meaning that only self-reports or socially connected peers could define the perpetration status of an adolescent. This methodological choice could be overlooking violent perpetration among school peers at more than one

degree of separation. Therefore, results of this study can only extend to physical and psychological violence among adolescent neighbors in the school social network. Second, a cross-sectional and observational design cannot detect causality, selection, or influence in adolescent peer social networks. Modeling these processes would involve longitudinal designs. Third, this study only addressed the experiences of school enrolled adolescents and the social connections among them. In rural, high-conflict, LMIC and resource limited settings, those adolescents experiencing elevated violence engagement could have already left the school system. As noted in study one of this dissertation, qualitative evidence showed that the school as an institution would hold violence perpetrators accountable. This means that our participants might be those adolescents not engaging in higher risk activities (e.g., gangs, substance use, weapon carrying). Therefore, future research in this and other similar settings could extend inclusion criteria to all adolescents in the community, in an effort to account for the potential biases in school enrollment.

Despite these limitations, this study addressed the relationship between social networks and adolescent peer violence perpetration in the context of a seldom studied rural LMIC population. Given the increases in national instability and conflicts globally that contribute to populations seeking to escape similar contexts of violence, these findings are critical. Not only for those helping those in regions experiencing turmoil similar to where this study's data was gathered, but also for the nations potentially receiving individuals fleeing these conditions. Further, as our findings suggest there is no association between school peers' social network engagement psychological and physical violence perpetration and the individual probability of an adolescent violence engagement, future studies need to examine the contextually unique factors, spaces and

sources of influence that do contribute to this risking public health concerns for adolescents.

Table 4.*Logistic Regression for School Peer Violence Perpetration*

	<i>Proportion or Mean</i>	<i>Psychological Violence</i>				<i>Physical Violence</i>			
		<i>Model 1</i>		<i>Model 2</i>		<i>Model 1</i>		<i>Model 2</i>	
		<i>OR</i>	<i>95%CI</i>	<i>OR</i>	<i>95%CI</i>	<i>O R</i>	<i>95%CI</i>	<i>OR</i>	<i>95%CI</i>
<i>Nagerkelke R square</i>		0.14		0.4 5		0.1 2		0.3 9	
<i>Intercept</i>		1.87	0.72 4.86	0.1 4	0.03 0.56	0.6 7	0.29 1.58	0.0 6	0.02 0.23
<i>Girl</i>	49.60%	1.13	0.60 2.12	0.8 8	0.42 1.84	1.1 6	0.67 2.01	1.1 1	0.58 2.11
<i>Ref. Boys</i>	49.17%								
<i>Native</i>	74.00%	2.58	1.34 4.96	2.2 3	1.00 4.99	2.3 7	1.28 4.38	1.7 9	0.88 3.65
<i>Ref. Non- Native</i>	26.00%								
<i>Late Adolescent</i>	54.54%	0.82	0.44 1.53	1.0 1	0.47 2.17	1.3 1	0.76 2.25	1.3 7	0.71 2.63
<i>Ref. Early adolescent.</i>	45.45%								
<i>Not living with parents</i>	13.64%	0.25	0.10 0.64	0.5 0	0.17 1.47	1.3 8	0.58 3.28	3.0 8	1.10 8.66
<i>Living with one parent</i>	44.62%	0.67	0.32 1.40	0.7 7	0.32 1.87	0.7 2	0.39 1.32	0.8 3	0.41 1.66
<i>Refuse to answer if living with parents</i>	4.54%	0.54	0.14 2.07	0.9 7	0.19 4.96	0.8 5	0.25 2.88	1.3 2	0.30 5.73
<i>Ref. Living with both parents</i>	36.36%								
<i>Household victimization</i>	7.02%	1.37	0.36 5.27	0.8 7	0.18 4.28	5.1 3	1.36 19.41	3.6	0.75 17.28

	<i>Proportion or Mean</i>	<i>Psychological Violence</i>				<i>Physical Violence</i>			
		<i>Model 1</i>		<i>Model 2</i>		<i>Model 1</i>		<i>Model 2</i>	
		<i>OR</i>	<i>95%CI</i>	<i>OR</i>	<i>95%CI</i>	<i>O R</i>	<i>95%CI</i>	<i>OR</i>	<i>95%CI</i>
<i>Ref. No Household Victimization</i>	92.93%								
<i>Community Victimization</i>	21.07%	2.94	1.15 7.54	2.1 2	0.72 6.28	1.4 7	0.73 2.92	1.0 5	0.47 2.32
<i>Ref. No Community Victimization</i>	78.93%								
<i>Academic standing (passed all)</i>	59.91%	1.1	0.59 2.04	1.5 7	0.74 3.36	0.6 3	0.36 1.09	0.6 9	0.36 1.31
<i>Ref. Did not pass all subjects</i>	40.08%								
<i>Cross gender ties, Multiple</i>	57.43%			1.4 5	0.68 3.09			2.6 4	1.38 5.04
<i>Ref. One or less cross gender ties</i>	42.57%								
<i>Adverse relationships</i>	0.58			0.8 4	0.66 1.07			0.9 9	0.80 1.24
<i>Eigenvector centrality</i>	0.10			4.2 8	0.19 93.04			1.6 6	0.21 13.24
<i>Psychological Victimization by peers</i>	77.27%			8.2 5	3.74 18.16			5.4 9	2.90 10.42
<i>Ref. No Psychological Victimization by peers</i>	22.72%								

	<i>Proportion or Mean</i>	<i>Psychological Violence</i>				<i>Physical Violence</i>			
		<i>Model 1</i>		<i>Model 2</i>		<i>Model 1</i>		<i>Model 2</i>	
		<i>OR</i>	<i>95%CI</i>	<i>OR</i>	<i>95%CI</i>	<i>O R</i>	<i>95%CI</i>	<i>OR</i>	<i>95%CI</i>
<i>Physical Violence Victimization by peers</i>	58.67%			2.6 8	1.26 5.69			2.9 7	1.31 6.72
<i>Ref. No Physical Violence Victimization by peers</i>	42.42%								
<i>AIC</i>				272.34	225.04			329.53	279.19

Table 5*Autologistic Regression for School Peer Violence Perpetration by Type of Violence*

	<i>Psychological Violence</i>		<i>Physical Violence</i>	
	OR		OR	
<i>Intercept</i>	-0.31	-0.43	-0.81	-1.99
<i>Perpetrator Status (eta)</i>	0.50	0.57	0.42	0.44
<i>Girl</i>		-0.23		0.19
<i>Native</i>		0.84		0.44
<i>Late Adolescent</i>		0.11		0.96
<i>One parent</i>		-0.34		-0.21
<i>No parent</i>		-0.25		0.36
<i>Refuse to answer</i>		-0.61		0.35
<i>Household Victimization</i>		-0.25		1.67
<i>Community Victimization</i>		0.89		0.15

Figure 3

Perpetrator and Non-perpetrator Levels of Psychological and Physical Violence.

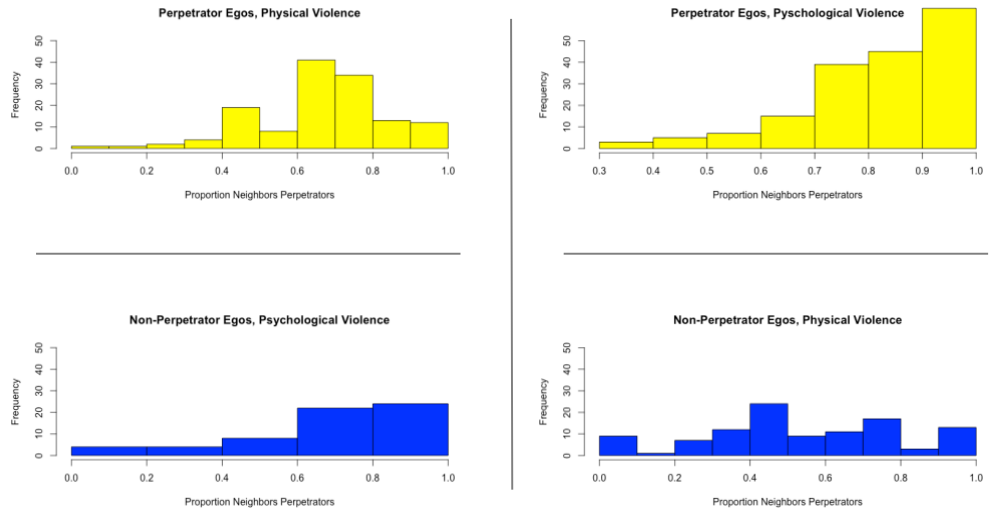
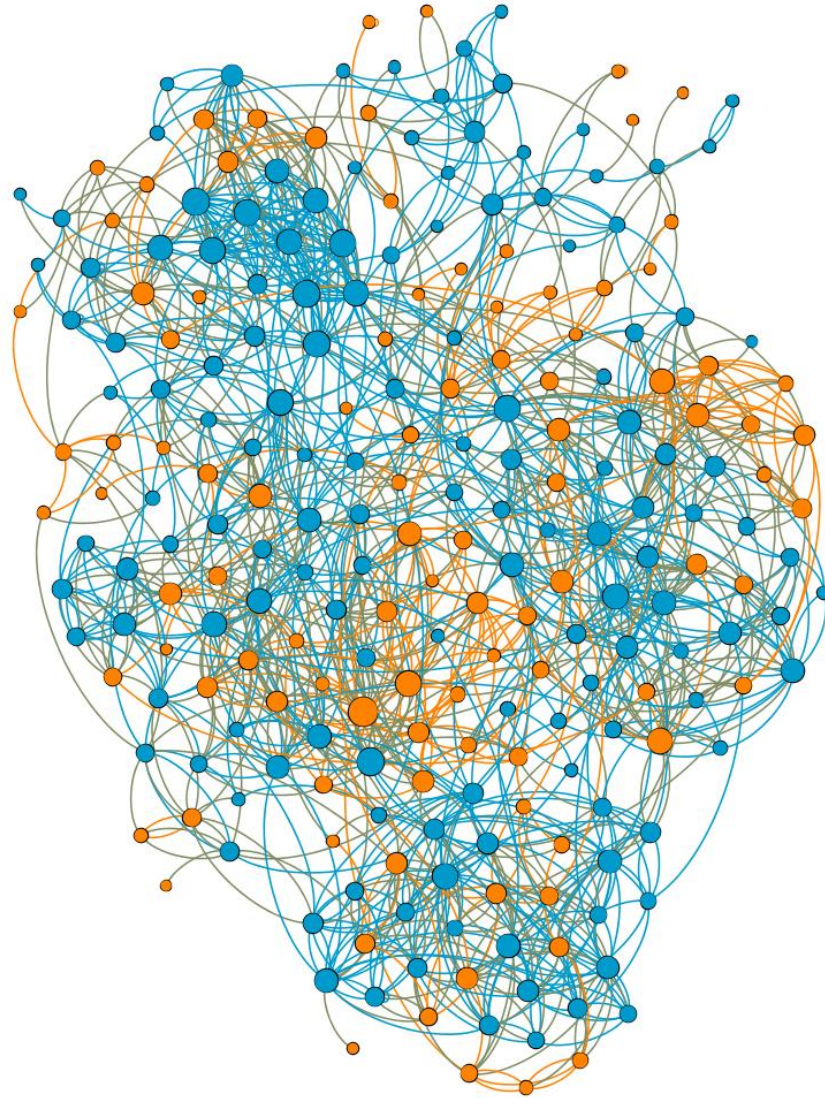


Figure 4

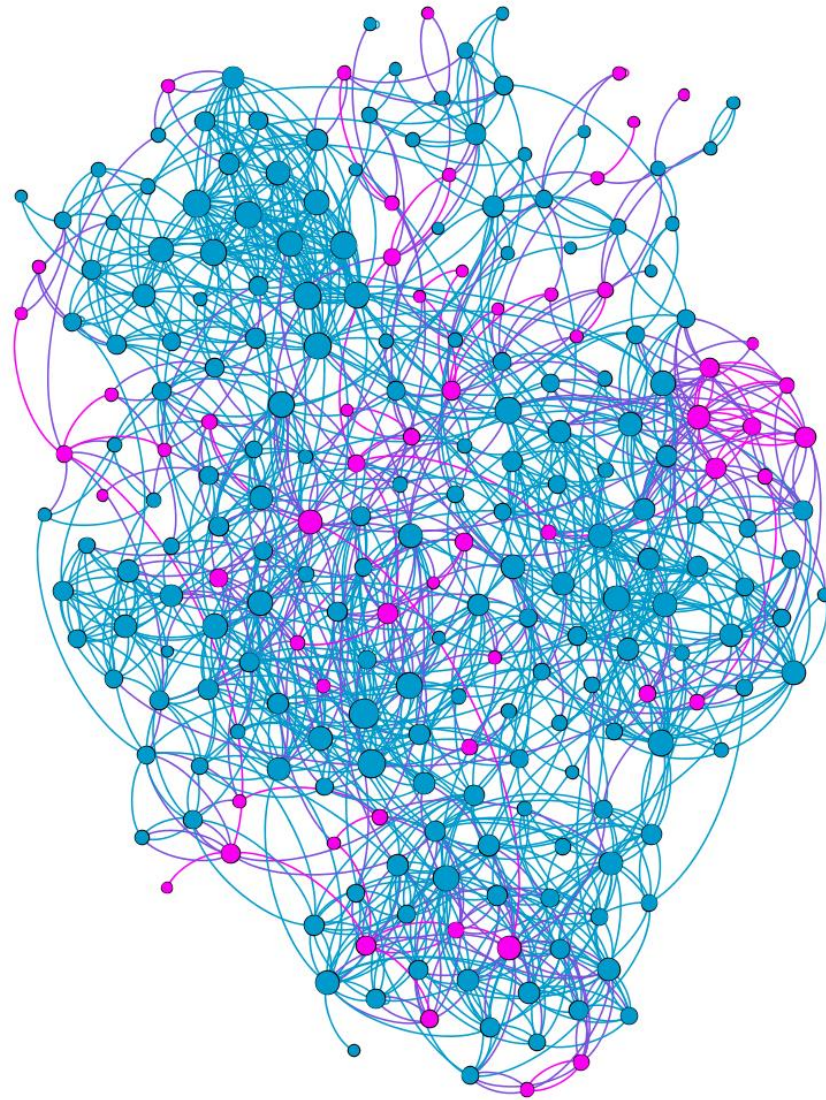
Social Networks of Physical Violence Perpetrators.



Note. Nodes represent adolescents and ties represent the nominated relationships among them. Color indicates perpetration status, such that orange is for perpetrators and blue for non-perpetrators. The size of the nodes is scaled to their degree (incoming and outgoing nominations).

Figure 5

Social Network of Psychological Violence Perpetrators.



Note. Nodes represent adolescents and ties represent the nominated relationships among them. Color indicates perpetration status, such that purple is for perpetrators and blue for non-perpetrators. The size of the nodes is scaled to their degree (incoming and outgoing nominations).

Figure 6

Simulation of the Autologistic Fitted Model for Physical Violence Peer Effects in Perpetration with and without Covariates.

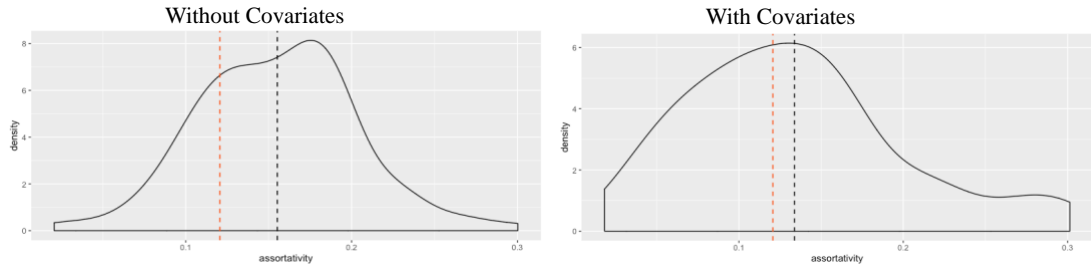


Figure 7

Simulation of the Autologistic Fitted Model for Psychological Violence Peer Effects in Perpetration with and without Covariates.

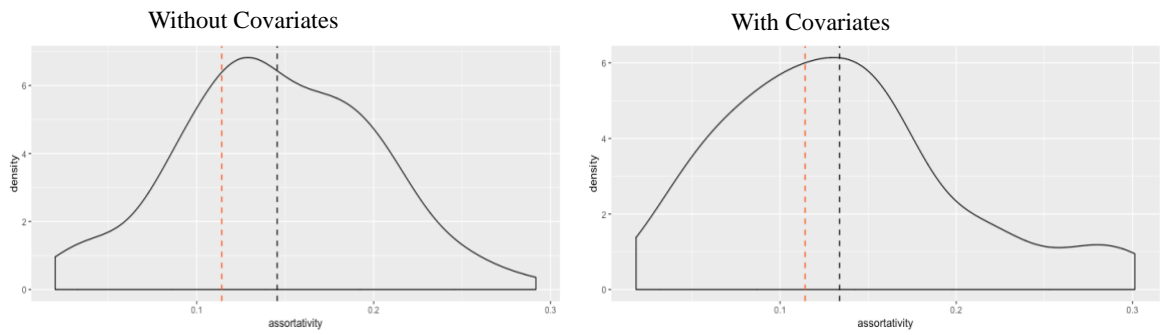


Figure 8

Mean Constrained Null Models for Violence by Victimization Status.

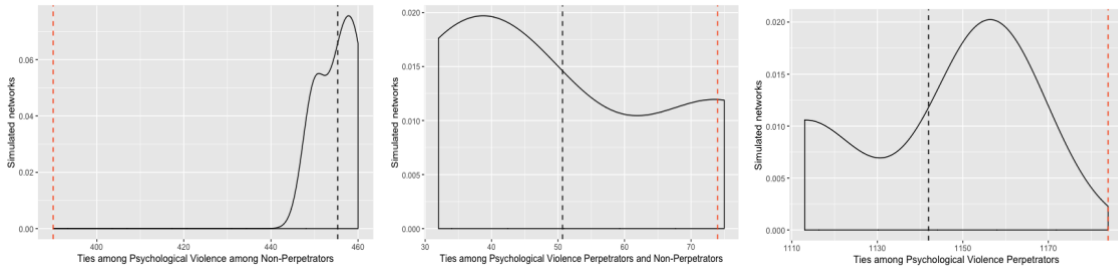
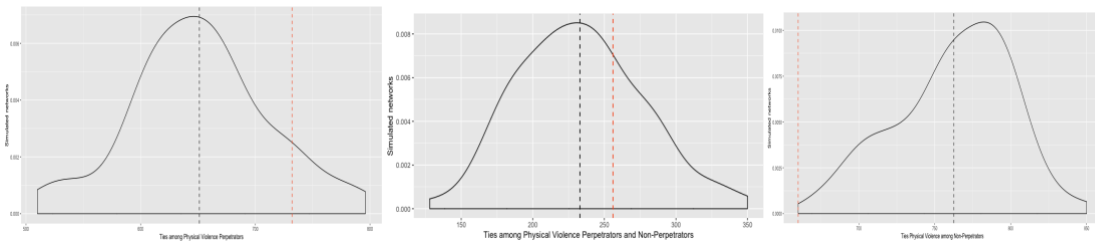


Figure 9

Mean Constrained Null Models by Perpetration Status.



STUDY III: ADOLESCENT SOCIAL NETWORKS AND INTIMATE PARTNER
VIOLENCE PERPETRATION AMONG PARTNERED COLOMBIAN RURAL
ADOLESCENTS

Abstract

Intimate Partner Violence (IPV) during adolescence is a critical public health priority given its detrimental psychological, physical, and social impacts that can persist into adulthood. Physical IPV, specifically, can have life-threatening and long-lasting effects, including substance misuse, physical injuries, suicidal behaviors, and an increased risk for future poly-victimizations. Few studies have examined physical IPV among adolescents' living in Low- Middle Income Country (LMIC) rural communities despite high incidents rates in these contexts. Utilizing school-peer social network data, this study examines 111 partnered rural Afro- Colombian adolescents' IPV experiences. Results show that the proportion of socially connected peers perpetrating physical IPV increases individual probabilities of perpetration. Conversely, the proportion of friends experiencing IPV victimization decreases with individual victimization. Bidirectional violence in the partnership was associated with the reverse status. Unlike prior research findings, social network data showed IPV victimization and perpetration were not associated with social connections to peers of similar status. However, victims and non-victims were less likely to have a school peer tie.

Keywords: social networks, Intimate partner violence, adolescent violence perpetration

Literature Review

Intimate Partner Violence (IPV) among adolescents has been identified as a global health priority given its lifelong effects that persist long after the occurrence of violence (Abramsky et al., 2011, Ellsberg et al., 2018; Spivak et al., 2014). Experiencing or perpetrating IPV during adolescence has been found to impact the long-term mental, physical and emotional well-being trajectories into adulthood (Banyard & Cross, 2008; Ellsberg et al., 2018; Park et al., 2018). This is because adolescence is a critical period for establishing values, norms, and beliefs about intimacy, relationships, and violence, which in turn shape relationships and health trajectories across the lifespan (Armour & Sleath, 2014; Cui et al., 2013; Exner-Cortens, 2014; Leadbeater et al., 2019; Marshall et al., 2011). Therefore, it is crucial to examine IPV among adolescents, given its developmental significance for establishing patterns of behaviors and cognitions related to intimate relationships later in life (Clements & Schumacher, 2010; Kidman & Kohler, 2020; Jouriles et al., 2011; Leadbeater et al., 2019;).

Both developmental systems perspective (Overton, 2013) and a social complexity approach (Hinde, 1987) suggest that individuals and their relationships are networked in multi-leveled social niches that can further inform future partnership interactions far beyond the dyad (Leadbeater et al., 2019; Hardesty & Ogolsky, 2020; Reyes et al., 2018). Thus, in the case of adolescents, the social context in which IPV occurs can affect its patterns and consequences. For example, research has shown that school (Giordano et al., 2015) and social network contexts (Cuartas & Roy, 2019; Gorman-Smith et al., 2004; Metheny & Stephenson, 2020; Shakya et al., 2020) are particularly important to consider given their primacy as adolescent socialization spaces. Furthermore, when looking at

culturally contextual factors, research has noted the need to expand the focus to incorporate societal level influences such as location (e.g., rural vs. urban; Spencer & Bryant, 2000; McDonnell et al. 2010), or the regional or country levels (e. g. LMIC status; Sardinha & Catalán, 2018). Therefore, examining LMIC rural adolescent IPV experiences and their social networks in complex violence LMIC settings, is a timely global health priority (Bourey et al., 2015; Cuevas et al., 2014; Spriggs et al., 2009)

Adolescent IPV in LMIC and High-risk Settings

Increasingly, the research has noted the importance of considering the socioeconomic and geographic environment where adolescents live for identifying factors influencing IPV experiences (Gressard et al., 2015; Gorman-Smith et al., 2004; Kamndaya et al., 2017; Swart et al., 2002). Adolescents whose lives are negotiated in regions with higher rates of economic instability or situations of conflict face an increased likelihood of violence exposure (e.g., community-wide violence and crime) and the associated consequences (Cuevas et al., 2014; Exner-Cortens et al., 2021; Johnson et al., 2015; Natukunda et al., 2019; Peitzmeier et al., 2016; Spriggs et al., 2009). These community burdens can amplify the risk for engagement in individual-level IPV risk poly-victimization (Kidman & Kohler, 2020; Taquette & Monteiro, 2019). For instance, a meta-synthesis examining the risk markers for physical partner violence among adolescents reported that neighborhood disorganization and low economic wealth were significantly related to the experience of violence (Spencer et al., 2020). Spriggs and colleagues (2009) similarly reported a positive association between family disadvantage and adolescents' experience of dating violence victimization.

Colombia's record of having the lengthiest history of internal conflict in the Americas contributes to a complex and multi-level experience with violence that researchers suggest informs adolescents' IPV perceptions and behaviors (Browne et al., 2017; Jimenez Bautista, 2018). Studies have shown that at the regional level, community violence has shaped conducts and cognitions towards violence perpetration and victimization among Colombian adolescents (Butti, 2018; Cuartas & Roy, 2014; Pasupathi et al., 2017). At least half of Colombian adolescents have experienced physical or psychological victimization themselves (Ministerio de Salud y Proteccion Social, 2019). These socio-historical experience with violence has also been linked explicitly to IPV outcomes (Rozo-Sanchez et al. 2019). For example, Rey-Anacona's (2013) study found IPV self-reports among Colombian adolescents is exceptionally high; 85.6% of adolescents reported experiencing some form of IPV victimization (e.g., physical or psychological), while 40.3% reported physical violence perpetration and victimization. Further, adolescent boys and girls both described similar levels of IPV perpetration and engagement (Rey-Anacona, 2013).

Adolescent IPV Victimization and Perpetration and Peer Social Networks

Along with the socioeconomic context, it is also useful to consider the role of school peer social networks in IPV experiences. Prior research has noted that adolescents' friendships and peer culture norms can influence both violence experiences and intimate relationship decision making (Arriaga & Foshee, 2004; Foshee et al., 2013; Hebert et al., 2019; Shakya et al. 2017; Shakya et al. 2020; Vagi et al., 2013). For example, perpetrators of IPV are more likely to be surrounded by other perpetrators of IPV (e.g.,

Ramirez et al., 2012); this is especially salient in adolescent friendship networks (Casey & Beadnell, 2010).

The peer context constitutes a social reference for this period of romantic onset, including violent and non-violent influences (Connolly et al., 2000; Stephens, D. P. & Eaton, A., 2016). A recent meta-analytic review by Garthe and colleagues (2017) found that peers' IPV engagement and being victimized by peers were associated with adolescents' IPV experiences. Further, for adolescents who experience IPV with someone they view as a partner, peers' acceptance of those relationship behavioral norms become more salient and viewed as normative irrespective of how long the relationship actually lasted (Dane et al., 2016; Volz & Kerig, 2010). This is because established partnerships are often given a different level of meaning and perceived investment in their relationship than those in which adolescents may view themselves as only casually dating (Dane et al., 2016; Volz & Kerig, 2010).

Social network methodologically guided studies further support these assertions. Studies that explicitly center on the utilization of social network analysis have consistently found evidence for selection (similarity due to an external selection, such as classrooms), homophily (the tendency to associate to similar peers), or contagion effects (social learning or influence), on overall adolescent violence experiences in peer relationships (e.g., Berger, et al., 2019; Casper et al., 2020; Faris & Felmlee, 2014; Foshee et al., 2013; Huitsing et al., 2014; Jackson et al., 2015; Shakya et al. 2017; Watling & Veenstra, 2020). Theoretical explanations utilized to explain these effects include social norms (Reed et al., 2011), normative beliefs (Beckmann et al., 2019), social learning (Garthe et al., 2017), and peer influence (Sijtsema & Lindenberg, 2018).

In the present study, we examine IPV experiences in of partnered adolescents living in a rural, resource-limited Colombian village utilizing socio-centrally mapped school peers social network data. First, we explore the association of school peers' social network IPV engagement on individual reports of both IPV victimization and perpetration, accounting for school victimization, social network position, gender, and age group. Second, we expand these individual centered analyses through examining social network ties among IPV engaged adolescents to assess the preferential tie formation among peers who share equal victimization/perpetration status in the school peers social network.

Methods

This study utilized data from a mixed-method, community-engaged research project (IsBaru) addressing adolescent social networks, violence, and health in a rural Afro-Colombian village. Institutional review board approval was granted from research institutions in both Colombia and the United States. Recruitment took place in the only public school in the community; in addition to flyers, several information meetings were held at the school for potential participants and their parents. Inclusion criteria required adolescents to be between 13 and 17 years old and enrolled in a 6th to 11th-grade class at the time of data collection. Participation was voluntary, and all eligible applicants were invited to participate. Informed consent was obtained from two parents/ primary caregivers; adolescents also gave written assent before data collection. Surveys were computer-based and took place on a local University campus. Participants were placed in gender-segregated small groups and assigned to computers set up at least six feet apart; two researchers of the same gender as the participants facilitated each room assignment.

Adolescent compensation for participation was a movie ticket and a movie meal (equivalent to 10 USD). Data collection took place during the spring of 2019.

Participants

This study focuses on a subsample ($n=102$) of adolescents that reported being partnered at the time of data collection and utilized social network data from all survey participants ($n=242$). Partnered adolescents were 45.09% girls and 54.90% boys (49.60% self-identified as girls, 49.17% as boys, and 0.81% as another gender in the survey). In terms of age, 70.05% of partnered participants were late adolescents aged 15 to 17 years old (compared to 54.54% in the total survey), and 38.23% were early adolescents aged 13 to 14 years old (compared to 45.45% in the rest of the study). The majority of the respondents identified as native to the community (74.00%; 26.00% were not), meaning they identified as belonging to Afro-Colombian *Comunidades Negras*.

Partnered adolescents. Adolescents selected the best description of their current status as one of the following options: 1) being married or cohabiting 2) engaged, having a boyfriend/girlfriend 3) having more than one boyfriend/girlfriend (follow up questions for this option requested to pick the partner that was most important to them). These responses were coded as partnered. Excluded (not partnered) respondents marked the options of not being in a relationship (currently or ever) or refused to answer. Finally, because only two partnered participants reported belonging to a third category of gender (options were boy, girl, or other), they were excluded from the analysis for lack of statistical variability. The resulting subsample was 111.

School Peers Social Network. The survey included two name generators for peer relationships. First, adolescents nominated up to ten friends attending their school with

whom they shared important matters. The second name generator asked for individuals in their community with whom they shared important matters. Therefore, adolescents could nominate up to twenty alters they considered peer relationships, and nominations could repeat across name generators.

In Colombia, individuals are given four names: two first names and two surnames (paternal and maternal familial name). Adolescents typed all four names of their nominated peers, which allowed discerning all possible relationships among survey respondents. Non-participant alters are not considered for this study. For each ego-alter (respondent- social contact) dyad in the survey, adolescents marked the occurrence of violence in the past year. We utilized these follow-up questions to assess school peer victimization as described in the next section. The school peers' social network was graphed using undirected ties among survey participants, meaning both the ego (respondent) or alter (social contact) could nominate the relationship. A graphic representation is available in figure 17.

Measures

Intimate Partner Physical Violence Perpetration and Victimization. We utilized six items from the Global Early Adolescent Study questionnaire (WHO, 2018) that described physical intimate partner physical violence exposure. We adapted and translated the questions utilizing terminology appropriate for the community of study. IPV questions in the survey were only available to those who reported being in a partnership at the time of data collection. Questions for victimization and perpetration were identical (e.g., have you? or has your partner?). The survey included three questions related to physical IPV 1) dragging, pushing, or aggressively shaking 2) slapping 3) hitting. Responses ranged

from: yes, many times; yes, once; or no. Refusal to answer or leaving the IPV questions unmarked was categorized in this study as missing data. We utilized a case deletion approach for these cases (14.18%). Any affirmative response across the three questions was coded as physical violence perpetration or victimization, accordingly.

Physical violence in school social networks. Utilizing the school peers' social network, we created an individual level dichotomic variable for adolescents who were victims of physical violence by a school peer assessing bidirectional reports. The victim or the perpetrator could describe victimization. Each ego-alter dyad registered victimization, such that adolescents reported (for each nominated relationship) if the individual had hit, thrown rocks or something else, pinched, pushed, kicked, dragged, shacked aggressively, or slapped them in the past year. Those who held at least one reported victimization in their relationships were coded as school peer physical violence victims.

Social Network Status among peers. To assess social status among school peers, we estimated the eigenvector centrality score of each adolescent. The eigenvector centrality value is a measure of influence that accounts for the connectedness of the alters that are nominated by the adolescent (Bonacich, 1972). Each individual score is estimated from the first eigenvector of the graph adjacency matrix. This eigenvector centrality will take a higher value for adolescents connected to highly connected peers in the school network.

Proportion of social network ties with victimization or perpetration status. Utilizing the school social network, we extracted the neighborhood of peers (alters at one degree) for each participant, including their victimization and perpetration status. We estimated two variables utilizing the proportion of each adolescents' neighbors who were IPV

perpetrators or victims. Here, each adolescent was assigned a value that ranged from zero to one, where zero indicated no ties to other peers with the target characteristics (victim or perpetrator, accordingly) and one if all socially connected peers were victims or perpetrators.

Covariates. We controlled for gender (girl or boy) and age. Age groups were divided into early adolescents (13 to 14 years old) and late adolescents (15 to 17 years old).

Analyses

We conducted separate analyses for victimization and perpetration. First, we explore the relationship between the proportion of school peers' IPV engagement, individual victimization at school, and social network status, over the probability of personal level engagement in IPV, controlling for gender and age, utilizing logistic regression models.

Second, we extend the analyses to the social network data to investigate potential tie formation by perpetration or victimization status in the school network. These two models statistically test preferential tie formation among IPV engaged adolescents (perpetrators or victims, accordingly) and school peers from similar (or different) status. This degree constrained null model retains the structural properties of the observed school network and randomly allocates the corresponding attribute to each adolescent in the network (IPV perpetrator or no; IPV victim or not). We restrict the null models to utilizing the mean degree of the observed school network, and the observed degree of IPV engaged adolescents (victim or perpetrator) simultaneously. In other words, each of the 1000 realizations of the null model preserves the average ties that perpetrators or victims have and the school network's overall structure, to reduce bias and serve as an empirically suitable null model for statistical testing. Each realization of the null model

is conditioned to avoid deviance of more than 5% from the observed mean degree of perpetrators/victims in the observed network. To conclude, if preferential tie formation was observed, an alternative hypothesis is tested utilizing all valid realizations of the null model and estimating a p-value under the null of non-preferential tie formation by IPV status. According to their violence engagement, we evaluate if adolescents who are perpetrators or victims would be preferentially tied in the school social network, with a probability higher than chance ($p > 0.05$).

Results

A total of 32.24% of partnered adolescents reported being perpetrators of IPV and 26.13% victims. The majority of those who reported IPV engagement were boys (72.22% of perpetrators and 93.01% of victims). The average degree (number of socially connected peers) for perpetrators was 11.57, while the non-perpetrators average was 14.02. Those who reported being IPV victims had an average degree of 12.10 compared to 13.84 of non-victims.

Logistic Regressions for IPV

The multivariate logistic regression for IPV perpetration explained a significant variance of the individual perpetration status (Nagelkerke Pseudo $R^2 = 0.36$). Boys and girls' odd ratios did not differ (OR=0.61, CI [0.18, 2.02]). Compared to early adolescents, late adolescents did not have increased probability of reporting IPV perpetration (OR=0.46, CI [0.16, 1.31]). Likewise, school victims of physical violence were not more likely to report IPV perpetration compared to non-victims (OR=1.03, CI [0.39, 2.70]). The eigenvector centrality coefficient was non-significant (OR=1.00, CI [1.00, 1.00]), meaning social network position in the school network did not affect the odds of adolescents' IPV

perpetration. The proportion of friends who perpetrate IPV in the school peers' social network had a statistically significant effect increasing the probability of individual perpetration (OR=11.65, CI [1.02, 133.43]). Finally, reporting physical violence victimization in the same relationship increased the odds of also being a perpetrator (OR=18.21, CI [5.12, 64.69]).

The multivariate logistic regression for IPV victimization explained a significant variance of the individual perpetration status (Nagelkerke Pseudo $R^2 = 0.55$). The odds ratio for boys was largely higher compared to girls (OR=22.82, CI [4.22, 123.48]). Compared to early adolescents, late adolescents did not have increased probability of reporting IPV victimization (OR=2.44, CI [0.61, 9.75]). Likewise, school victims of physical violence were not more likely to report IPV victimization than non-victims (OR=1.09, CI [0.33, 3.58]). The eigenvector centrality coefficient was non-significant (OR=1.00 CI [1.00, 1.00]), meaning social network position in the school network did not affect the odds of adolescents' IPV victimization. The proportion of friends who were IPV victims in the school peers' social network had a statistically significant effect, decreasing the probability of individual victimization (OR=17.45, CI [4.85, 62.76]). Finally, reporting physical violence perpetration in the same relationship largely increased the odds of also being a victim (OR=18.21, CI [5.12, 64.69]).

Additional Analyses

To further explore if the effects of socially connected peers' IPV engagement would differ by gender, we estimated both models, including an interaction term. No significant result or additional explained variance showed that the estimated models were different for boys or girls. Likewise, to test if the results were robust to the choice of

social network centrality (eigenvector centrality), we also tested the models including in-betweenness centrality as a predictor. Estimations remained similar to the ones reported in the previous section.

Social Network Results

The school peers' social network included 242 adolescents and 1329 ties in two components. The largest connected component of the social network had 241 nodes (adolescents) and the second one a disconnected isolate (an adolescent with no reported social ties). The graph density was 0.05 and the diameter 7. The average degree for adolescents in the school network is 13.69. The assortativity coefficients by perpetration (0.09) and victimization status (0.07) were positive and small.

The mean constrained null model statistical analysis shows that perpetrators did not have more ties among them or with non-perpetrators (see figure 20). Observed ties among perpetrators ($p=0.89$), perpetrators and non-perpetrators ($p=0.66$), and among non-perpetrators ($p=0.78$) were no different than expected by chance.

The second mean constrained null model analysis results show that victims had fewer ties with non-victims than expected by chance ($p<0.01$). Likewise, non-victims had more ties among them than expected by chance ($p<0.01$). No difference was observed for matched victim ties ($p=0.90$). A graphic representation of the mean constrained models is available in figures 20 and 21.

Discussion

These results highlight the importance of contextualizing IPV outcomes among adolescents residing in seldom studied contexts. In this case, the findings from adolescents living in a rural community situated in LMIC post-conflict settings provide

distinctive insights into the role of peers and context for informing IPV perpetration and victimization.

First, partnered adolescents in our study reported high rates of physical intimate partner victimization and perpetration as compared to other Latin American and LMIC studies, where both range between 5% and 30% (Devries, 2019 et al.; Kidman et al., 2020; Peitzmeier et al. 2016; Rey-Anacona, 2013; Rodríguez-Franco, 2010). This is an important finding given most previous research centers on the experiences of urban or national samples of adolescents. The boys and girls who participated in this study reside at the center of complex vulnerabilities in a rural village with limited services, sustained government absenteeism, poverty, crime, and a history of complex social and political conflict (Basso, 2015; CNMH, 2017; Jimenez Bautista, 2018). Global research on dating violence has noted that these socioeconomic factors are linked to increased victimization and perpetration of adolescent IPV (Cuevas et al., 2014; Jhonson et al., 2015; Gressard et al., 2015; Gorman-Smith et al., 2004; Kamndaya et al., 2017; Swart et al., 2002).

This study also highlights the importance of expanding perceptions of gender's influence on IPV engagement as boys were found to be at an increased risk for victimization, and gender disparities in victimization probabilities were reported for boys. International research on adolescent IPV tends to focus on the opposite dynamic, centering on adolescent girls' victimization (e.g., Kamndaya et al., 2017) and boys' perpetration (e.g., Peitzmeier, 2016), including a study conducted in the Colombian context (Rozo-Sanchez et al., 2019). However, our results are in line to those found with adolescent populations in other Latin American countries that utilized late adolescents and young adults' samples to investigate adolescent victimization and perpetration (in

Mexico, Cortes-Ayala, 2015; Chile, Pinto-Cortez, et al., 2021). Across both studies, the higher IPV victimization of boys was concurrent to equal rate poly-victimizations by gender and bidirectional physical aggression in romantic relationships. Given these mixed results in the broader body of adolescent IPV LMIC research, we suggest that it is important to more closely investigate dynamics such as societal level gender inequality (e.g., Gressard et al., 2015; Nivette et al., 2019) and the peer and social networks of an adolescent (Hebert et al., 2019) as they have shown to modify gender disparities in IPV engagement.

Results in this study also showed that there was bidirectional physical violence engagement in adolescent partnerships. Both logistic regression models showed victimization and perpetration were associated with each other, consistent with the literature on dyadic adolescent IPV. This may be explained by the research suggesting retaliation and conflicted relationship contexts are a reliable predictor of physical IPV among adolescents (Bookwala et al., 1992; Cortez et al., 2015; Bradley, 2015; Jennings et al., 2017; O'Leary & Smith, 2003; O'Leary et al., 2008; Watson et al., 2001). These effects have also shown to be robust across genders (O'Leary & Smith, 2003).

Victimization by peers and status in the school social network was unrelated to the risk of both IPV victimization and perpetration in the context of this study. Both social network position (Faris & Felmlee, 2011; Foshee et al., 2013) and peer victimization had been associated with adolescent IPV engagement in the literature (Hebert et al., 2019 for a review). It is important to note that our study utilized socio-centric network data instead of perceived peer engagement; thus, peers' IPV was self-reported by the alter. This is important to consider given Foshee and colleagues (2013)

pointed out that ego's indication of their social network victimization could inflate effects of peer social networks over IPV engagement. Together, these differential findings could be associated with the approaches to measuring peers' IPV engagement.

The association of peers' engagement in IPV and individual IPV status was differential according to victimization or perpetration. This study findings show a significant and large effect on the proportion of IPV engaged peers for victimization and perpetration at the individual level. First, higher proportions of IPV perpetrators in the adolescent social network increased the probability of also reporting IPV perpetration consistent with cross-cultural findings on peer effects of adolescent IPV perpetration (Hebert et al., 2019 for a recent review). Furthermore, given that the mean constrained null model findings indicated no preferential tie formation among perpetrators, it would be reasonable to assume this effect was not a result of homophily in the school network.

Finally, victimization findings operated in the opposite direction, meaning an adolescent appeared to be less likely to be a victim of IPV with higher proportions of school peers who are IPV victims. Furthermore, victims were less likely to be socially connected to non-victims than expected by chance, suggesting there could be an avoidance mechanism in this social network. Other studies addressing adolescent social networks and other forms of violence victimization had registered des-selection of victimized peers in the school context (Sentse et al., 2013; Moouttapa et al., 2004). Utilizing a longitudinal design, Turanovic and Young (2016) found that adolescents in the United States who were victims of severe forms of violence tended to be avoided by friends and eventually befriended other adolescent victims. Even when not explicitly referring to IPV, these studies' findings could partially explain our results related to

potential avoidance of victimized adolescents. The decreased probability of victimization with a higher proportion of relationships with victims could further result from adolescent's peers' reactions to this social consequence of victimization. We highlight that most IPV victims in this study self-identify as boys, which could bring a differential effect to the social process or potential protective factor of having a higher proportion of friends who are IPV victims.

Limitations and Future Directions

Although this study provides valuable evidence about LMIC rural adolescents' IPV violence and social networks, several limitations must be addressed. First, IPV reports were based only on the reporting partner, and we could not discern if our study participants were dating each other. Studies utilizing dyadic reports could assess mismatch or congruence among partners. Second, a cross-sectional, correlational, and observational design cannot detect causality, selection, homophily, or influence processes in adolescent peer social networks. Modeling these processes require longitudinal data to discern among them. This is not an uncommon limitation of socio-metric studies, especially in rural LMIC settings where balancing research resources and social network scope can be even more challenging.

Despite these limitations, this study addressed the relationship between social networks and adolescent IPV in the context of a unique population of Afro-Colombian rural, LMIC, post-conflict, and resource-limited settings. Overall, our findings suggest an association between school peers' social network engagement in IPV and the individual probability of an adolescent experiencing or engaging in IPV. However, these effects

were differential according to perpetration and victimization status, highlighting the importance of addressing violence bidirectionality and the peer social context.

Future research should focus on identifying how to enhance adolescents' ability to engage in healthy discussions about IPV specific to their cultural context and available sources of information. Our findings point to the importance of using peer relationships as leverage and intervention points for programs seeking to address IPV. This would prove to be effective in addressing individual-level outcomes and shaping larger group norms in culturally appropriate ways in this unique community context.

Table 6*Logistic Regression Model for Individual Probability of IPV Perpetration*

	OR	95% CI	
Intercept	0.27	0.10	0.73
Boys	0.61	0.18	2.02
Late Adolescent	0.46	0.16	1.31
School Violence Victim	1.03	0.39	2.70
Victim of IPV Violence	18.21***	5.12	64.69
Eigenvector centrality	1.00	1.00	1.00
Proportion of friends perpetrators	11.65*	1.02	133.43
Pseudo R ² (Nagerlkelke)		0.36	

Table 7*Logistic Regression Model for Individual Probability of IPV Victimization*

	OR	95% CI	
Intercept	0.01	0.00	0.08
Boys	22.82 ***	4.22	123.48
Late Adolescent	2.44	0.61	9.75
School Violence Victim	1.09	0.33	3.58
Perpetrator of IPV Violence	17.45 ***	4.85	62.76
Eigenvector centrality	1.00	1.00	1.00
Proportion of friends victims	0.04 *	0.00	0.83
Pseudo R ² (Nagerlkelke)		0.55	

Figure 10

Perpetrators and Victims by Gender

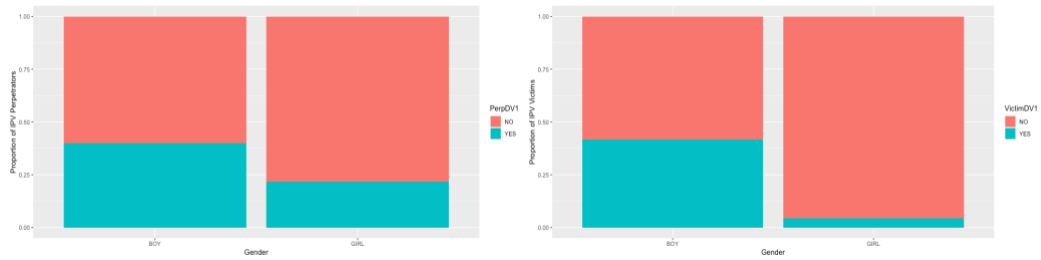


Figure 11

Perpetrators and Victims by Age Group

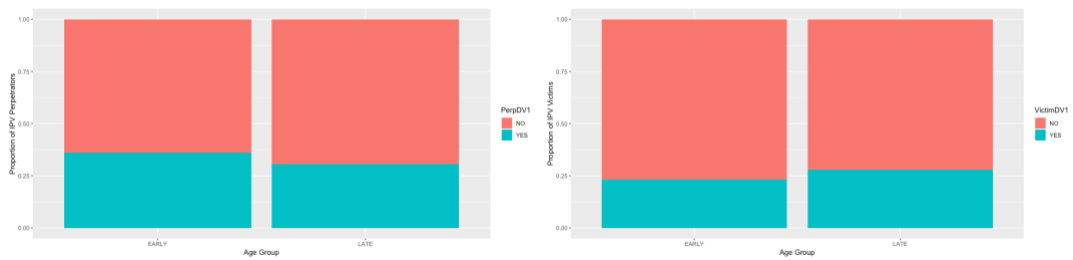


Figure 12

Perpetrators and Victims of Peer Violence

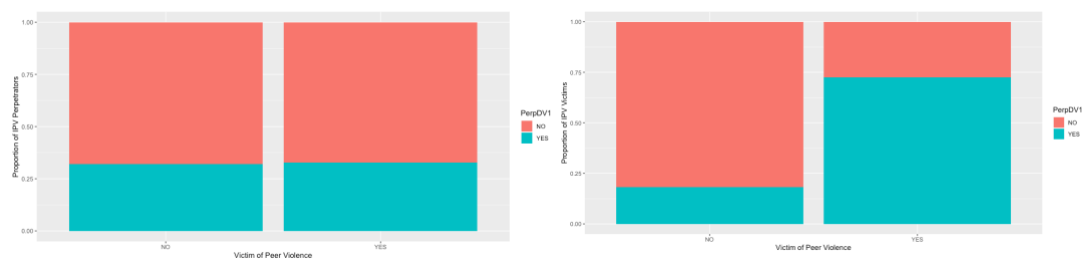


Figure 13

IPV Perpetration status by Proportion of peers who are IPV Perpetrators

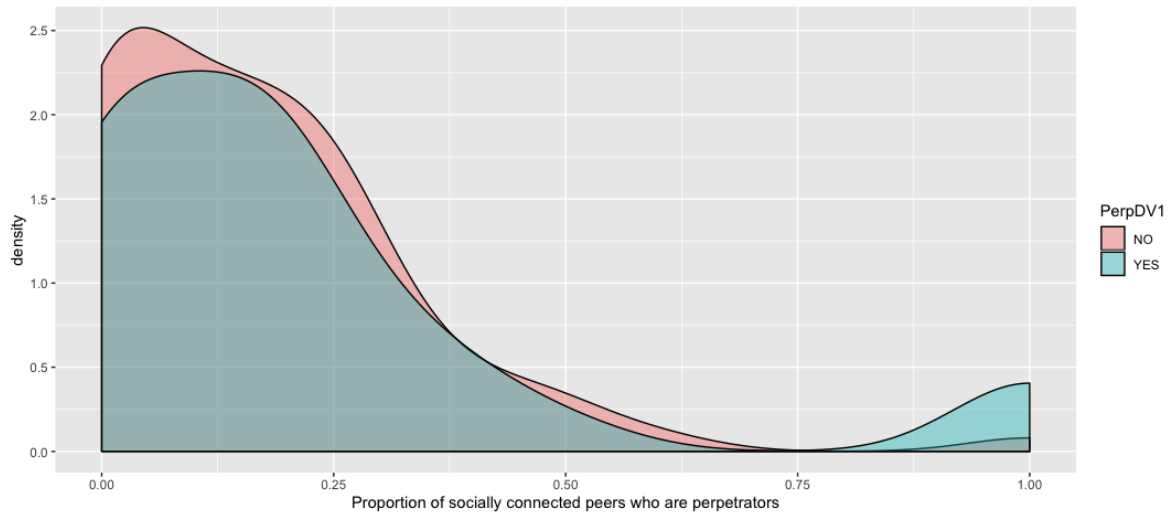


Figure 14

IPV Victimization status by Proportion of peers who are IPV Victims

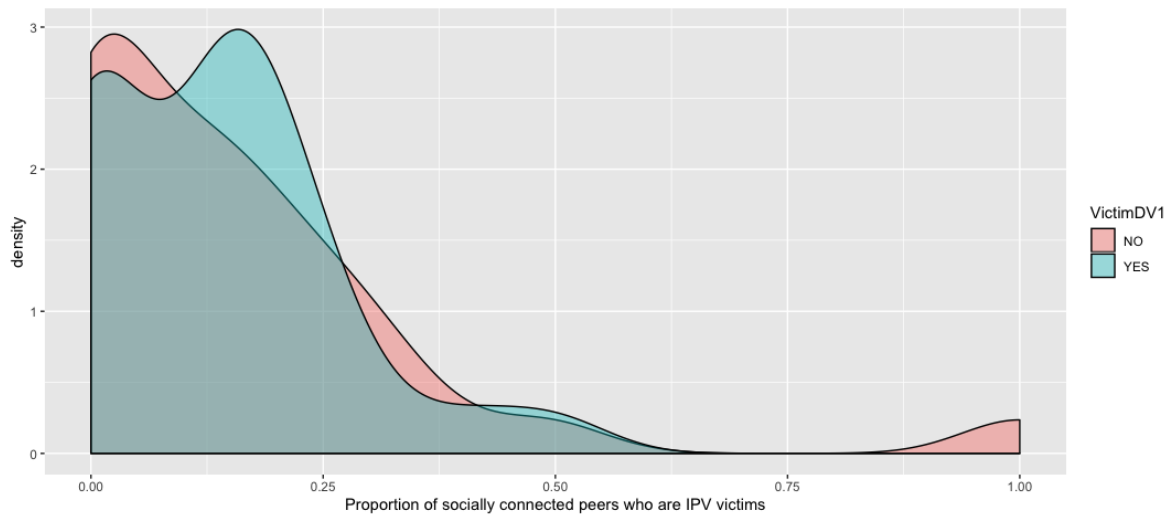


Figure 15

Probability of Perpetrating IPV and Proportion of Friends that Perpetrate IPV Victims Controlling for Age, Gender, Social Network Position, School Victimization and IPV Victimization

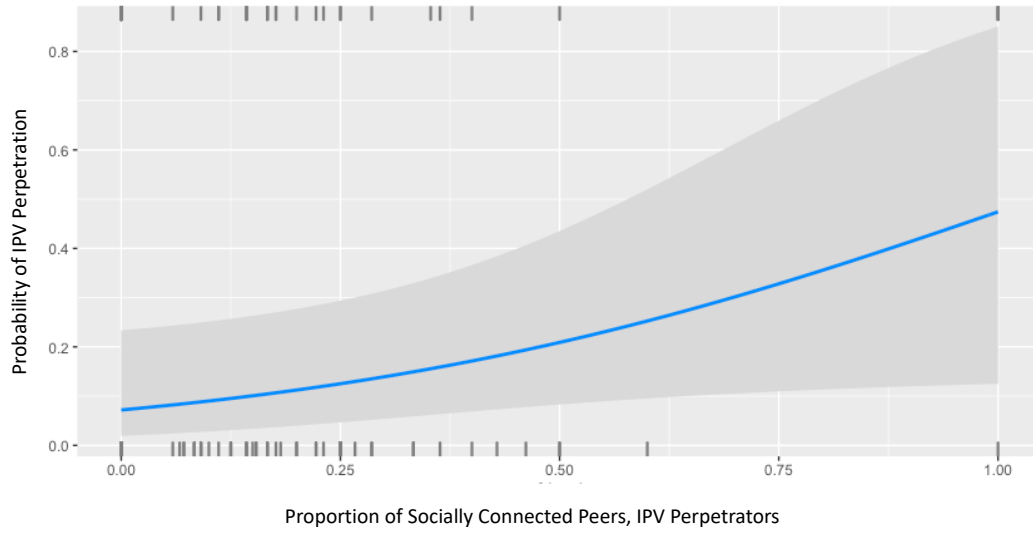


Figure 16

Probability of IPV Victimization and Proportion of Friend that are IPV Victims Controlling for Age, Gender, Social Network Position, School Victimization and Perpetrator Status.

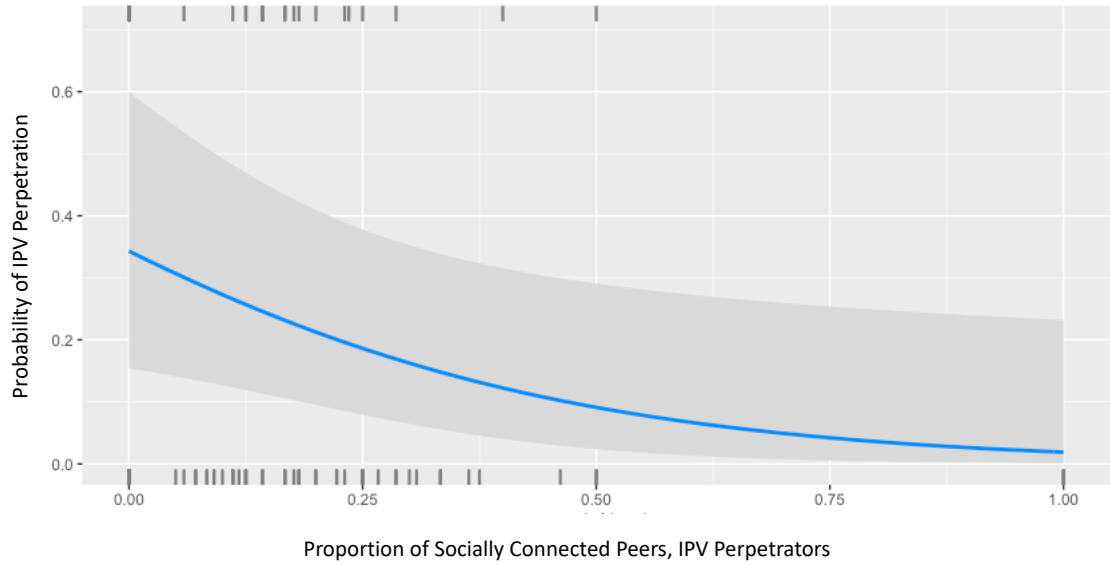
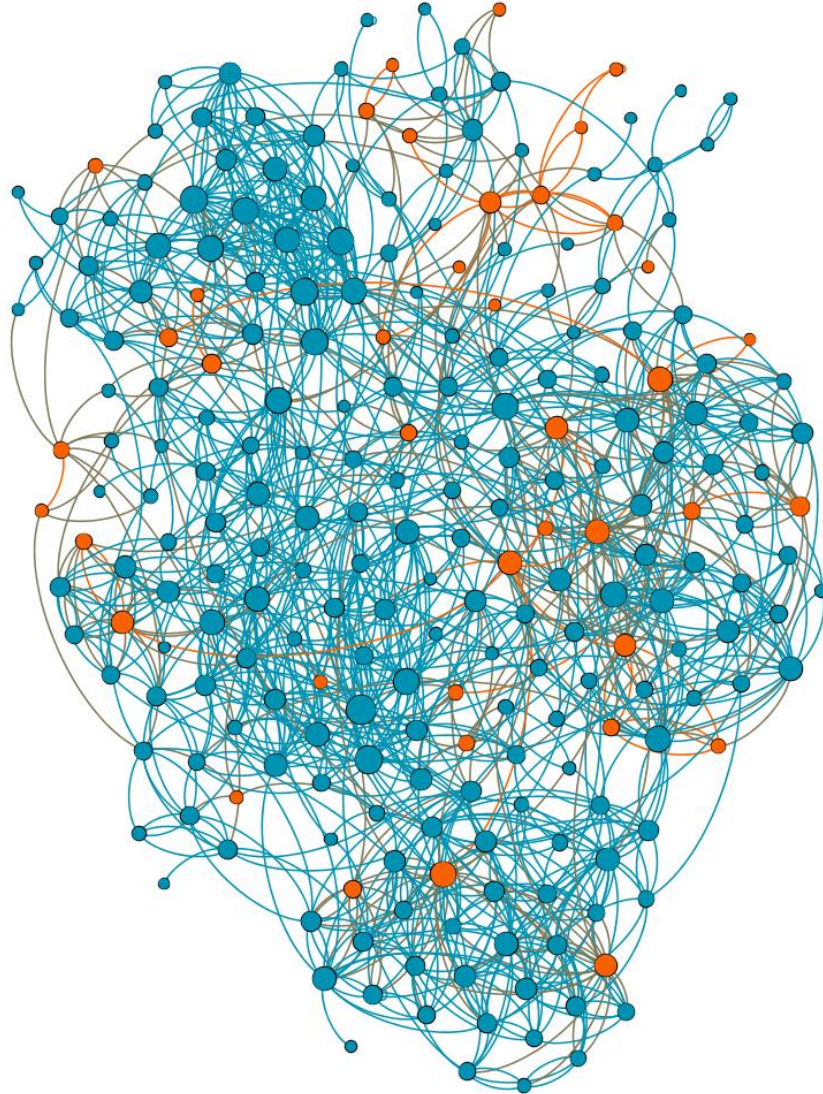


Figure 17

School Network and IPV Perpetration



Note. Nodes represent adolescents and ties the nominated relationships among them. Size of the node is indicative of the degree (number of social connections). Color indicates perpetration status. Orange nodes are perpetrators; blue nodes are non-perpetrators or non-partnered adolescents.

Figure 18

Victims, Non-victims, Perpetrators and Non-perpetrators Egos and IPV

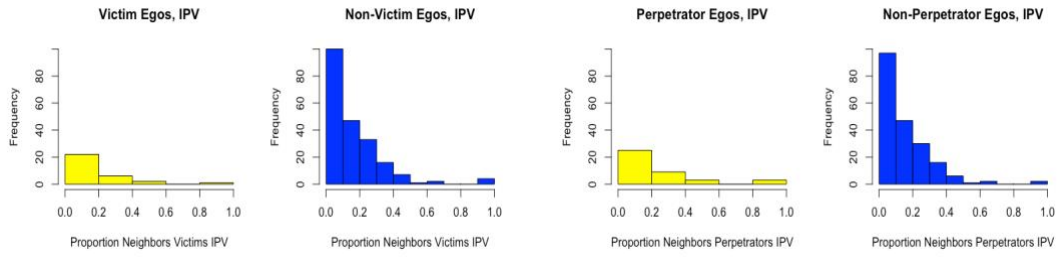
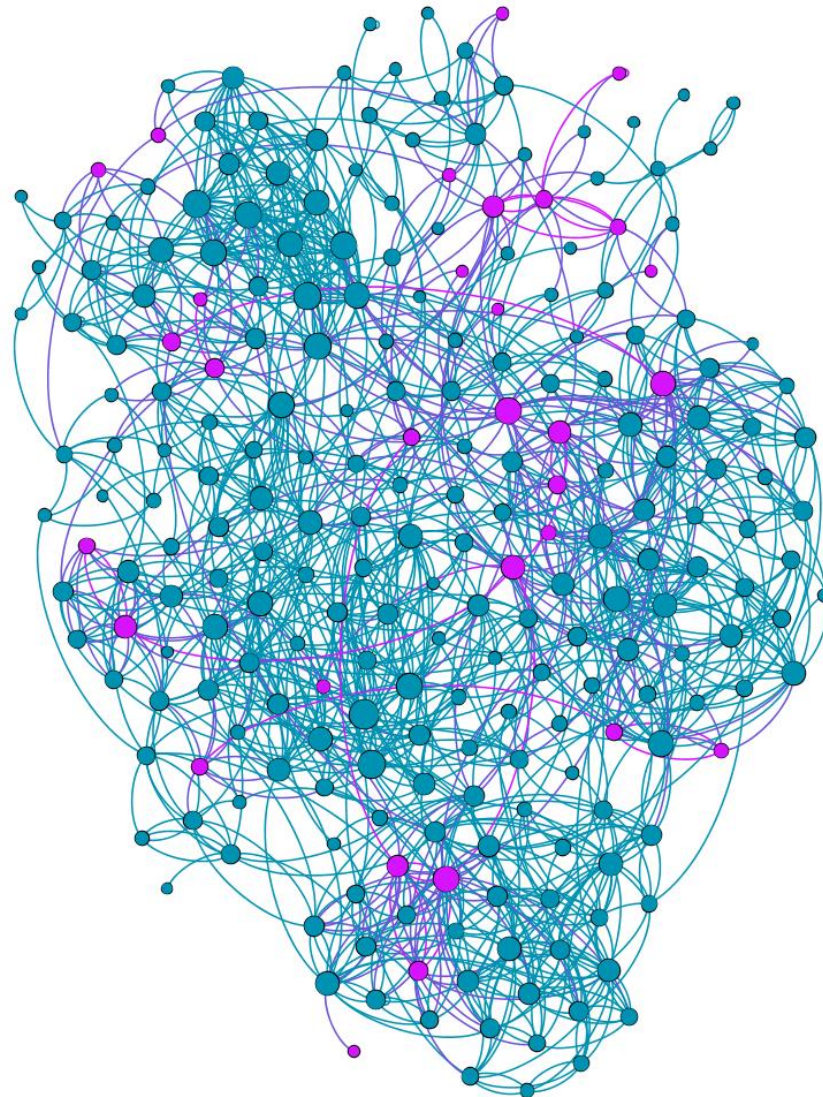


Figure 19

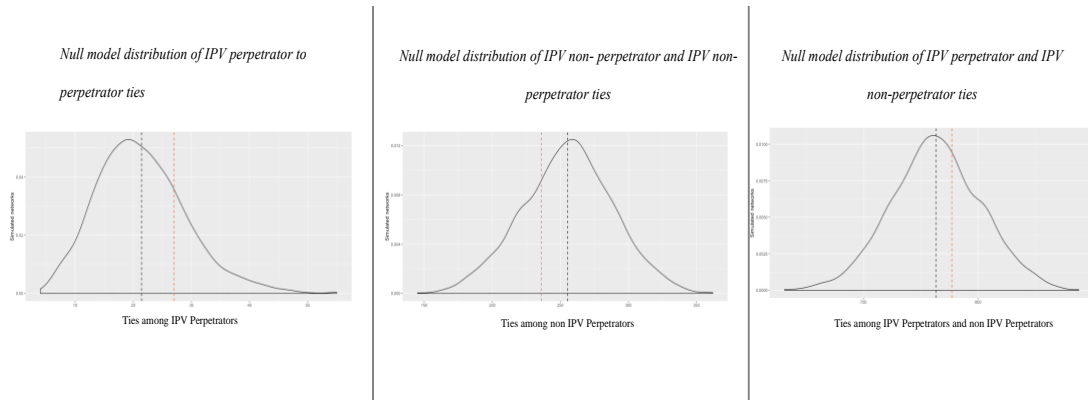
School Network and IPV Victims



Note. Nodes represent adolescents and ties the nominated relationships among them. Size of the node is indicative of the degree (number of social connections). Color indicates victimization status. Purple nodes are perpetrators; blue nodes are non-victims or non-partnered adolescents.

Figure 20

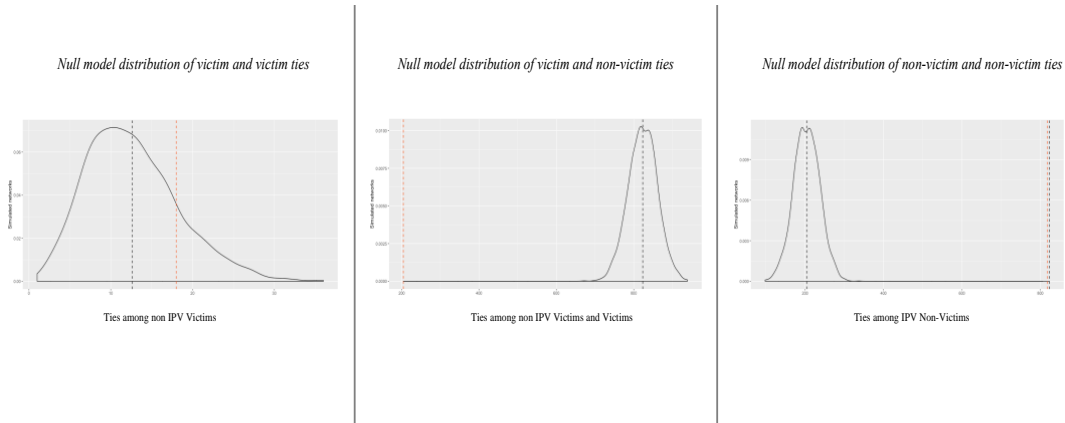
Observed ties by IPV Perpetration status in the school network and mean constrained null model realizations



Note. The Y axis represents the distribution of the mean constrained realizations of the null model. Red dashed line indicates the observed ties in the school social network. The black dashed line indicates the mean of the mean constrained model.

Figure 21

Observed Ties by IPV Victimization Status in The School Network and Mean Constrained Null Model Realizations



Note. The Y axis represents the distribution of the mean constrained realizations of the null model. Red dashed line indicates the observed ties in the school social network. The black dashed line indicates the mean of the mean constrained model.

STUDY IV: ISBARU COLLABORATION IN RURAL COLOMBIA:
REFLECTIONS ON COMMUNITY ENGAGED PARTICIPATORY RESEARCH
PROJECT

Abstract

While community-engaged research (CEnR) has increasingly focused on addressing the processes through which academics build sustainable and equitable research partnership, few have addressed the nuanced interpersonal and contextual factors shaping this process. Further, the voices of community partners' reflections are rarely included. This article describes the development, implementation, and initial outcomes of an adolescent violence study in rural Colombia that centered CEnR approaches. The IsBaru Research Project centralized tenets of CEnR through various phases of the research processes. Lessons learned include challenges of bringing together diverse groups with differing understandings and commitment to the project, and varying levels of readiness among the CEnR partners, navigating research ethics beyond institutional review board protocols, and aligning academic investigators goals with the community research interests. Drawing from the experiences of the lead authors, this paper provides reflections on the successes and tensions they experienced. Future directions are recommended for teams seeking to develop and sustain equitable academic and community partnerships across global settings.

Keywords: community-based participatory research, health research, partnerships/coalitions, training, college/community partnerships

Literature Review

One of the most common approaches researchers use to implement applied research are community centered research design (Anderson et al, 2012; Luger et al, 2020; Musesengwa et al., 2017). One form of this, community-engaged research (CEnR) involves deliberate and equitable academic- community collaborations to address common goals to improve health outcomes (Minkler & Wallerstein, 2011; Minkler, 2010). CEnR is unique from just simply being community-based research due to its assumed cooperative community- academic identification of health needs, joint design and delivery of interventions, shared data collection and evaluation of data, and contextually appropriate dissemination of results (Cargo& Mercer, 2008; Frerichs et al., 2016; Hoover et al., 2019; Ross et al., 2010; Zimmerman, 2020). This bidirectional sharing of knowledge, resources, and expertise provides the advantage of ensuring contextually unique, and rich scientific knowledge of an identified health problem while building community capacity and empowerment strategies leading to longer-term social change (Heitman & McKieran, 2004; Luger et al., 2020; Minkler & Wallerstein, 2011).

CEnR prioritization of cultural humility values and addressing inequities of power hierarchies within academic-community partnerships and in society makes it particularly useful when working in marginalized communities (Minkler, 2010). Contextually unique ethical problems that arise in community-based research are often unrelated to the traditional issues addressed in institutional review board processes (IRB; e.g. scientific integrity or participant protections; Anderson et al, 2012). More often, the concerns related to goal incongruence, inequitably power dynamics, and poor interpersonal communication processes are what lead to chasms between academic and community

partners (Anderson et al., 2012). When sensitive and culturally nuanced health issues are explored, the unquantifiable elements of participant/ community protections and scientific rigor are especially important to explore when implementing CEnR goals (Taylor et al., 2020). Working in low-and-middle-income countries (LMICs) where the needs and values shaping researcher implementation are complex (Schroeder et al., 2020; Taylor et al., 2020). This is particularly true when engaging in global health research addressing sensitive health topics intersecting influences between socio- historical experiences, systemic power structures, and the construction of knowledge about individual wellbeing cannot be separated (Taylor et al., 2020).

The reality of these multi leveled factors guide this case study of an adolescent violence project conducted in rural Colombia. The purpose of this article is to describe the development and implementation of IsBaru, a project that centers CEnR approaches to explore factors shaping rural Afro Colombian adolescents' violence perpetration and victimization. The lead author (ALR) developed a research collaborative that brought together academic researchers and community stakeholders from both the United States and Colombia to examine these phenomena. Named IsBaru, this collaboration began with the premise that the academic researchers, community leaders, educators, parents, health providers would all equally contribute throughout this process addressing adolescent's violence engagement and wellbeing outcomes. The ways in which CEnR paradigms guided ALR's development, implementation, and ongoing efforts with IsBaru are discussed in this paper from a reflexive position. Further, drawing upon follow up interviews with two key community partners, this paper highlights the centrality of equity across all phases of the research process.

Contextualizing Santa Ana & CEnR

Located in the most violent region in the world (Latin America), Colombia has the longest history of internal conflict in the Western hemisphere. Understanding Colombian rural adolescent risk-taking and violence experiences in a context of “hybrid violence” (Jiménez Bautista, 2018), demands incorporating methodologies that can adopt community, historical and cultural levels of scrutiny (Bonilla-Escobar et al., 2017; Browne et al., 2017). It is from this understanding we begin by contextualizing why we used CEnR to guide our adolescent violence research project.

Santa Ana is located in the island of Baru, in the Caribbean region of Colombia. Residents of this community have experienced long-standing history of poverty, conflict, and limited government services (ANSPE, 2014; CNMH, 2017). An emerging touristic destination, Baru has been transitioning in the last decade into a Latin American “border village” (Ceccato & Ceccato, 2017), sharing territory with translationally attractive industries (tourism, industrial). Similar to other border villages with limited government presence, this contrasting inequality and international trade has simultaneously increased illegal activities, substance misuse, sex-trafficking and gang violence (Basso, 2015; Ceccato & Ceccato, 2017). Santa Ana village, especially, has been a strategical area of territorial conflict for land and resources among Afro descendant Natives (*Santaneros*) and historical elites (e.g., corporations, government agencies) for decades. The introduction of the tourism industry has increased these tensions through the presence drug and commercial sex trafficking, and related gang violence (Basso, 2015; CNMH, 2017)

Santaneros' kinship social system is rooted in flexible relationships, where familiarity and household compositions hold extended arrangements that go beyond bloodline or residence, a long-standing social characteristic of this and other Afro Caribbean cultures (Basso, 2015). Solidarity and community safety are interwoven with communal values by geographically bounded interactions with the closest city-Cartagena. Thus, when Santa Ana became the only village on the island of Baru where teenage pregnancy and youth violent deaths increased, it was viewed as a very personal concern for all *Santaneros* (DADIS, 2019). Further, the community reported the highest concerns about street insecurity in a district wide poll that same year (Cartagena Como Vamos, 2020). Thus, to implement adolescent violence focus research within this complex community requires an understanding and implementation of efforts that address the multilayered history of international, national, regional and interpersonal violence (Taylor et al, 2020).

It is from this understanding we begin by contextualizing why we used CEnR to guide our adolescent violence research project. The unique setting in which this project took place requires working collaboratively with those that are most affected by, involved with and knowledgeable about issues directly affecting their current and long-term well-being (Anderson et al. 2012; Minkler, 2010; Minkler & Wallerstein 2011). Although guided by CEnR, there were some contextually unique issues that ALR had to negotiate to even when using this approach. Upon reflection, four foundational categories of consideration emerged as central to her ability to implement CEnR approaches successfully in Santa Ana: 1) community perceptions of research and science, 2) identifying allies & building relationships, 3) formal collaboration building, and 4)

research implementation & data dissemination. The importance of these categories for conducting research in Santa Ana, and the underlying nuanced understandings that shaped their influence are discussed below.

Community Perceptions of Research & Science

An element of the CEnR tenant is the prioritization of building of equitable relationships and engagement with stakeholders that is often overlooked in the research is the importance of exploring and addressing community partners' experiences with and understandings of research itself (Anderson et al., 2012; Hoover et al., 2019; Luger et al., 2020). This is a critical foundational step toward developing trust and understanding in relationships, particularly in communities where historical memory and intergenerational community traumas are part of larger group narratives (Musesengwa & Chimbari, 2017; Taylor et al., 2020). Studies have shown community interpretations of science, research or researcher varies based on demographic background and life experience; they may bring to mind distinct scientific disciplines, products, or experiences for different people (American Academy of Arts and Sciences [AAAS], 2018; Silva, 2015). Thus, the ways in which community members experienced prior research efforts or viewed scientific inquiry was critical for identifying both gaps in the current understanding points of influence on attitudes that inform both personal and public support for ALR's work (AAAS, 2018).

As a Colombian born, U.S. based researcher that spent time previously on the island, ALR had a basic understanding of the nuances related to research broader cultural values related to engaging in research within this specific communities. She understood why Santa Ana was a desirable site for researchers; its contrasting position between

recently accelerated economic development and the centuries old cultural traditions of a Native Black Caribbean community was an obvious rich source for data collection (Ceccato & Ceccato, 2017). This community had already captured the attention of government-funded researchers and a few social scientists due to its geographic isolation, insular community history, and plethora of social problems that are highly fundable research topics (See for example, ANSPE, 2014; Basso, 2015; CNMH, 2017; Lopez & Mercado, 2016; Pizarro, 2008). Additionally, several non-profits have recently begun providing services in an attempt to alleviate poverty, and fill gaps due to government absenteeism in Santa Ana (ANSPE, 2014). As a result, the community has had experience with scholars, social workers, and health providers attempting to or actually conducting research among its members.

Through informal and formal discussion, ALR learned Santaneros' previous experiences with health research and intervention are mixed. The elements of community's mistrust were connected to a long history of conflict for land and resources with local elites (e.g., industry, government agencies; CNMH, 2017). In terms of this actual project, researchers' presence was associated with the direct provision of social services or prelude to big private or public construction projects (Basso, 2015). She later realized this was why initial local leader questions focused on the potential political or economic interest that research may bring.

However, the initial resistance primarily centered on the process rather than the value of research. Generally, the Santa Ana community welcomes research efforts and the potential for developing scholar allies to help in gathering rigorous information needed for policy or funding decisions (Hoffman et al., 2020; Malenfant et al., 2019;

Minkler & Wallerstein 2011; Zimmerman, 2020) Thus, ALR sought to engage in CEnR research with the community versus research on the community to ensure their mutual goals were met. Through early conversations with community leaders and attending workshop sessions the community had already coordinated, she was able to understand what the agendas, goals, and questions needed to be answered. This led to revisions of initial thoughts coming about what were concerns and ideas about how to do them. The stakeholders took note of her willingness to listen, acknowledge their past experiences with researcher and sit back as an observer during their discussion processes. In the end, they reported that this acknowledgment of their past experiences and shared connection around research values decreased their hesitancy for engaging in research (Anderson et al., 2012; Cargo & Mercer, 2008; Tindana et al, 2007; Zimmerman, 2020).

Existing Research Knowledge & Skills. Another important aspect of understanding the community's experience with research was ALR's interest in identifying the actual foundational skills that already existed in the community that was central to the implementation of the project. Several of the school officials had graduate level degrees; to complete their thesis they had used advanced research skills and were knowledgeable about the research process. Further, there were local young adults who were pursuing higher education degrees seeking research opportunities. The academic researchers were able to tap into their regional skills to assist with translation, recruitment and other tasks needing specific skills sets. Together, there was a commitment among these individuals to support and contribute to research that was designed to support their community- there was just a lack of resources for them to do it by themselves.

We thought that because we have conducted research, because we have written, because we have masters, because we do such a thing that we knew how to run this type of social research. But no, with this project we learned that we had a lot to learn, and we still have a lot to learn. So, we also saw it as a learning opportunity. And it was the guarantee and the opportunity that we saw to learn.
(Collaboration Partner- School Administrator)

Research Narrative Spaces. One research and science perception concern that ALR had to address was the ways in which her informal presence in the community needed to be separated from her work. While a goal of CEnR is to be transparent and build trust across community settings (Anderson et al., 2012; Hoover et al., 2019; Luger et al., 2020; McDavitt et al., 2016), the separation of the research from her daily interactions with community members was necessary to ensure that narratives about the research and the processes were consistent and accurate. Specifically, she avoided conversations about the research in settings where individuals may not have the time, privacy, or ability to gather accurate details; she recognized that one miscommunication could start a “broken telephone” of rumors that would derail the project. Instead, she would set aside time to specifically discuss the project with anyone- this included community members directly or tangentially involved in her project. For example, it was common to run into parents during daily activities such as exercising outdoor or grocery shopping. Engaging in conversations with community members is expected in this socially dense rural context. Parents would spontaneously express opinions or pose questions on the research process. During these informal encounters, ALR invited parents to have "formal" meetings where she could thoroughly address them. Over coffee at a designated community site, the parents were given here undivided attention and were

provided with information specific to the project. This ensured that the focus was on the research in a confidential setting.

During these conversations, her position was one of cultural humility around the construction and creation of knowledge about research (Mosher et al., 2017). She welcomed questions about who she was, why she was there, and honest responses to what they thought about her kind of work. These discussions served to clarify to the community who ALR was as a researcher- including her personal background and understanding of their community and regional space. Her personal and research agenda was laid bare for critique and questioning, all of which was encouraged. By allowing for feedback this served to help the community build their own understanding of this particular research project and its purposes during one-on-one conversations (Frerichs et al., 2016; Ross et al., 2010). This type of early discussion about research generally, and the specific project is necessary as demystifying the research process ensures communities are empowered and more likely to participate as active partners in research (Frerichs et al, 2016; Goodman, Dias, & Stafford, 2010; Musesengwa & Chimbari, 2017).

More commonly, these discussions took place in more organized group settings. Open community forums, workshops and other discussions encouraged criticisms and questions. In these contexts, everyone has a chance to hear multiple perspectives and contribute to the dialogue. For example, one teacher was very adamant about not trusting researchers, and the research process. Further, he was unhappy with the ways in which researchers typically have not given value to teachers' contributions to the process in terms of time and knowledge of their own communities (e.g., children in the school). He

felt that many people came to collect data and use the children as “guinea pigs” for testing but not really contributing back to the community. Some attendees attending the workshop felt he had gone too far and apologized later for his comments. However, ALR appreciated his candor. He gave voice to his lived experiences and concerns that others less willing to speak out may share. ALR took his intervention as an opportunity to open a broader conversation on research dissemination and its limitations and advantages. She facilitated a workshop among teachers where they could decide their information needs. The workshop ended with consensual agreements about dissemination formats, topics, and priorities.

In the end, he increased both the researchers’ and community partners’ accountability and investment in the project; he followed up to ensure promises made were kept and followed deadlines that the group had established. Over time, as ALR and the collaborators continuously met the goals, he became more openly supportive and trusting of the IsBaru collaborative. This example highlights the importance of publicly embracing concerns in a research setting, and legitimately working to address them through measurable actions throughout the research process as a means of solidifying collaborations (Frerichs et al., 2016; Heitman, & McKieran, 2004; Mosher et al., 2017).

Identifying Allies & Building Relationships

Given the complexity of working in Colombia, and specifically in an understudied setting like Baru, it was critical to have established relationships with individuals affiliated with the community. Although ALR had spent considerable time in the region, she had not engaged or built relationships in the town. However, she had a decades-long friendship with the director of one of the most recognized NGOs located there, Amor por

Baru. Although he was not a native to the community, he had spent over 15 years living nearby and providing services through his organization. For example, his willingness to put long hours into difficult conversations about the education system and the government was recognized by school personnel; they recalled this when discussing the confidence, they had in him to “be respectful” of the community. Due to his clear dedication of time and strong ties to community members, he was viewed as a trusted ally that openly advocated for the community and its needs.

Despite his years of knowing ALR, EDV did not automatically introduce or provide access to the community. It was only after a town hall meeting where the issue of adolescent violence emerged as a primary concern among residents did, he seriously considered the possibility of ALR’s working with the Santa Ana community. Once he understood ALR’s research values and felt assured she understood his prioritization of the community’s needs, EDV began to identify ways in which she could help them address adolescent violence in the community.

He first introduced ALR to the local community health center (CHC) Coordinator via phone six month before she arrived. The CHC Coordinator had worked in the community for over 15 years and was integral to adolescent health service provision through workshops, HPV vaccine uptake, sexually transmitted infection (STI) treatments, and other concerns relevant to the larger study goals. She also plays a pivotal role in introducing ALR to key stakeholders that worked directly with adolescents in the community (e.g. nurses, social workers). Over several conversations, EDV and the CHC Coordinator shared priority community needs, identified the skills and resources ALR could best contribute, and points of intersecting goals. Together, they invited ALR to

visit the community to see if key stakeholders would be receptive to her work. EDV began by introducing her first to members of a Women's Council (WC); these were the parents or other primary caregivers of the adolescents that would eventually be recruited into the study. These women played an important role in the community; their views during the community town hall meetings identifying key community concerns were given great value. Thus, they became important allies and advocates for the project, and were central in its implementation success. The combined supports of the WC and CHC led to the regional Department of Health and District Education leadership to become involved. Specifically, ACRM, the principal of the local public school, became an active leader in the developing collaborative group, serving as an advocate for his students and teachers in the process.

Together they agreed that a collaborative should be established to address concerns; thus, IsBaru was formed. They began by identifying appropriate initial first steps for gaining experience working together while addressing concerns identified by the WCC and CHC Coordinator. When throwing out related research ideas, a concern about how to handle possible health crises arising from participating arose; how could they access physicians or mental health providers if a child was in need? This led to discussions with government agencies on the mainland who were willing to provide services; but did everyone have the universal health insurance card to access these services? The distance to travel to the city to sign up meant that many did not have the card. Also, most recent Venezuelan refugees had not gone into the city to register for this healthcare access, despite their eligibility. To respond to these needs, which would also directly impact a potential research project, the new IsBaru Collaboration used this as an

opportunity to organize a full day “Affiliation Campaign” to provide residents an opportunity to subscribe to the national health system. Anyone on the island was welcomed to come and register for full government subsidized health coverage. It was purposefully held at the school given its status as a public institution ensuring no one viewed it as a selective gathering or something controlled by a private organization. This community event was critical for showing the residents that key community organizations worked well together, were willingly partnering with ALR, and that community needs were being prioritized over an external researcher's individual goals.

Formal Collaboration Building. These early efforts were the foundation of the formal IsBaru Research Collaboration. The name was created by ALR to explicitly identify those directly involved and responsible for the project’s implementation and outcome dissemination. Those working with this collaboration were responsible for carrying out the research project goals and providing information to stakeholders. Given the scope of the problems identified by the WCC, CHC and school, the inclusion of a small group of interdisciplinary researchers was more advantageous than ALR working individually with community members. She brought together diverse expertise which served to promote creativity and foster greater innovation applicable to the specific community (Heitman, & McKieran, 2004; Hoover et al, 2019; Ross et al., 2010; Taylor et al., 2020). Thus, in addition to the community allies and community members, ALR academic allies were also invited to join the collaboration. This included FM and OLS from a national university, and DPS and PM from institutions in the United States.

However, the success of the Affiliation Campaign and greater endorsement of ARL’s efforts did not mean that these academics and the IsBaru Collaboration could

begin their work. Specifically, the Colombian Government has developed legal protections that block unauthorized research or intervention efforts in their territory in recognition of the unique cultural tradition of *Santaneros*. Thirty years ago, the community was granted an ethnic protected status which gives them the power to accept or reject the implementation of projects affecting the region or will have an impact on their population (Cuesta Rentería & Hinestroza Cuesta, 2017). For recognized Black and indigenous ethnic communities, this policy provides protections from any form of intervention without prior community approval- even from government entities (Cuesta Rentería & Hinestroza Cuesta, 2017). Similarly, the local public school received an “ethno-educational institution” designation, meaning the curriculum can, and should be adapted to the traditions of Santa Ana. Both of these protections are overseen by the local *Comunidades Negras* (Black Communities Council), with a corresponding *Consejo Comunitario* (Community Council). Thus, ALR formally presented herself and proposed work to both councils, answering all of their questions. Once they approved the research project, ALR received their formal letter of support that she was required to submit to her Colombian university partners’ Institutional Review Board (IRB). While these formal designations and processes are understood within Colombia, it is often overlooked by foreign researchers not familiar with the diverse intersectional identities and histories of the country (Taylor et al., 2020).

Beyond this, the same concerns EDV had about ALR coming to Baru to do work were relevant to the larger academic research team. As the steps for formalizing the collaboration got underway, EDV served as an active gatekeeper. He continuously scrutinized design and implementation plans, academic researchers stated ambitions,

training protocols, and values of those seeking to enter Santa Ana with ALR from the position of prioritizing what was best for the community over the long term. During early discussions, EDV attended planning meetings attended by ALR, OLS, FM and their students on the mainland. Tense discussions about what could (versus what should) be done in the community took place. EDV focused on the benefits of the planned IsBaru project's work to the community- especially the children these academicians planned to recruit. Throughout this relationship building process, EDV continually pressed the academic research team to identify not only what they sought to do, but also what would be the impact of their work once they left. Sometimes these goals aligned with the community's needs- sometimes they did not. Essentially, EDV was centering the CEnR goal of equitable ownership and direction in these early collaboration building discussions by forcing discussions about who has power and the implications of these through this process (Anderson et al., 2012; Hoover et al., 2019; Zimmerman, 2020). This proved to be important as over time these gatekeeping efforts ensured transparency and equitable power sharing were the focus throughout all collaboration activities.

When considering how to build trust and commitment among broader community members, ALR created opportunities to ensure everyone gained something by being a part of the IsBaru Collaboration research process. A common approach for bringing together everyone to identify goals in CEnR focused research is through the use of community meetings and workshops (Aldred, 2011; Heitman, & McKieran, 2004; Minkler & Wallerstein 2011). More than simply an open forum to talk about a research project, CEnR views these gatherings as opportunities for everyone to actively contribute to the project by voicing concerns, suggestions or providing feedback. Over time, these

workshops can help individuals solidify their understanding of how much, where and why they want to be a part of the collaboration (Frerichs et al., 2016; Heitman, & McKieran, 2004; Minkler, 2005; Musesengwa & Chimbari, 2017). Further, holding meetings that served to allow contributions during the early collaboration building stage ensured that ALR was able to create spaces where everyone could become contributors to and owners of the IsBaru project outcomes.

We felt that our voice was heard and was present. In that first meeting, where for the first time we felt like, like “we’re not going to continue”. I tell you this now because I had not told [ALR].... But then I noticed that there was a consensus and [everyone] was listening. I remember the first meeting with Ana... that we told her that we wanted to learn the whole process, so it would not be just another activity... Even in that we felt heard. (ACRM)

Another benefit of these workshops was that they provided both general community members and community collaborators to really see who ALR was in relation to the IsBaru Collaboration- beyond what was presented on paper or in formal discussions. Specifically, the CEnR goal of equitable ownership and direction was modeled in these early collaboration building settings (Anderson et al., 2012; Hoover et al., 2019; Zimmerman, 2020). ALR consciously took on the role of either facilitator alongside the community leaders. An ambiguous title with overlapping definitions, the CEnR research has primarily characterized the facilitation role as someone who champions diverse ideas, serves as a linking agent and forwards change processes (Cranley et al., 2017). By taking this more guiding rather than directive role, ALR was providing insights about who she was as an individual in this context, her values as researcher and how she viewed them as individuals and members of this unique

community (Frerichs et al., 2016; Heitman, E. & McKieran, L. (Minkler, 2005; Minkler & Wallerstein 2008). Her positionality as an external community member, potential internal ally, and researcher with an agenda could be examined and questioned.

With all that humility and all that knowledge that [ALR] has, she never told us "you are wrong" although surely many of the things we said were- we had biases, and... practically, when we had the meetings, we would say something incorrect, she would guide us with the question until we were able to understand where research was heading or where we should aim. It was also a learning experience in that sense. The conversations were almost always about learning- for both. And much to thank the whole team. They never told us, "You are crazy, this isn't like that". And although we could understand that under the limitations that we have, with the knowledge we have been able to say things that could not be done, but that in some way you were guiding us to make the right decision without telling us "this is not like this." (ACRM)

Research Implementation & Data Dissemination

Much of the research on CEnR focuses on the dynamic implementation phase of research; issues related to consent, stakeholder engagement, and data collection processes are often centered in these discussions (Anderson et al., 2012; Hoover et al., 2019; Luger et al., 2020). However, in the context of Colombia, there are unique nuanced, underlying factors that shape successful research implementation processes due to differing protocol, cultural, and legal issues. These are further complicated by institutional policies that differ depending upon often changing regional, political and leadership dynamics that dictate the who, what and why things can take place (Taylor et al., 2020). The resources

needed, research design process, and findings dissemination plan are shaped by these realities; we discuss each of these below.

Importance of Appropriate Funding Mechanisms. In the first year of collaboration building and discussing community needs, ALR was awarded a mentored training grants from the Global Health Equity Scholars (GHES) Program, funded by the National Institutes of Health (NIH FIC D43TW010540). This 12-month research training fellowship partners researchers at select institutions in both the United States and LMICs to examine global health issues. This funding focus allowed ALR to prioritize both her own and the community's research goals and bring together a larger group of Santa Ana community partners and academic collaborators (including a LMCI junior faculty, four faculty mentors, 12 undergraduate and four graduate research assistants based in both Colombia and the United States). From a research specific perspective, the mixed methods, socio-centric, cross sectional and observational study expertise that ALR's diverse faculty and mentor contributors were able to bring to the project was invaluable. This allowed for the collection of diverse data and opportunities for creating larger networks of support for the project. Further, their contributions established opportunities for training in both qualitative and quantitative methods, opportunities for publishing and resource sharing that contributed to increased community capacity building- all hallmarks of CEnR (Cargo & Mercer, 2008; Ross et al., 2010; Zimmerman, 2020).

Another unique aspect of this award was the insider- outsider nature of the research team was considered a strength by the funder. ALR was awarded a Pre-Dissertation Fellowship for researchers at American institutions seeking to engage in global health research under the mentorship of scholars both in the United States and in

the country where the research is conducted. Thus, this funding mechanism not only provided funds for her to develop and implement a project, but increase capital in the areas of expertise, training, cross cultural engagement, and multi-site participation. Taylor et al. (2018) noted that having geographical ‘insiders and outsiders’ in their study gave a more wholistic view to understanding violence in the region. The U.S. - Based researchers in their study brought a comparative and theoretical lens to the work that was not shaped by daily realities of living in an LMIC setting. Simultaneously, the researchers from Colombia provided a more pragmatic perspective about the socio- historical realities of implementing health research within Colombia (Taylor et al., 2018).

Receipt of this funding was critical for implementing a study that utilizes CEnR frameworks; only a small percentage of global health research funds are allocated towards context-specific research that is especially important for LMICs (Hoffman et al., 2020). Historically, global health funding has been steered to efforts that contribute to the containment of threats such as infectious diseases before they reach the United States and promoted global security, stability, and prosperity (Moran, 2016). Within Latin America, almost half of all spending for research is funded via governmental sources; in contrast, roughly one third is publicly funded in Europe, the United States, and China (Silva, 2015). Thus, in regions where there is conflict and economic instability, research funding, particularly for community level projects, would be considered a low priority. Further, options for securing research funds through external international sources is both competitive and limited (Moran, 2016; Silva, 2015).

Another strength of this funding mechanism was its provision of intensive mentored training for junior scholars and LMIC researchers; this meant the realities of

what is required in the learning process and developing a research program was a priority. This focus allows for greater exploration in developing the research focus, rather than the traditional narrowing in on a specific topic to investigate (Malenfant, Nichols, & Schwan, 2019; Moran, 2016). For those seeking to apply CEnR principles, having the resources to build a collaboration and established shared goals is critical (Anderson et al., 2012; Hoover et al., 2019; Luger et al., 2020; McDavitt et al., 2016). Funding that not only provides the monetary resources to support the work, but also built-in time and flexibility for potential changes to portions of the project focus and goals ensures that the dynamic realities of community research are acknowledged (Minkler, 2010; Moran, 2016;).

Theory & Methodological Considerations. To understand foundational meanings, develop tools for assessment, and develop appropriate resources for intervention, policy or making sustained social changes that benefit a community, it is critical that researchers take a long-term view and actual commitment to this work. This requires not simply developing research relationships but understanding the communities from a socio historical standpoint (Minkler, 2010; Ross et al., 2010). For the IsBaru project, this involved using a wholistic approach to examining the phenomenon of adolescent violence, not just focusing on specific variables of interest. A modification of Bronfenbrenner's (1979) model of Human Development guided discussions about the different levels of reality that informed adolescent violence meaning, behavior and outcomes specifically in the context of Santa Ana. Bronfenbrenner's ecological systems theory fame's an individual's development as occurring across a complex system of relationships affected by multiple levels of the surrounding environment, from immediate

settings of family and school to broad cultural values, laws, and customs (Bronfenbrenner, 1979). This approach is particularly effective when working with marginalized or understudied communities as it illustrates the concurrent immediate and historical factors shaping individual and community experiences (e.g. Aston, 2014; Eriksson, Ghazinour, & Hammarström, 2018; Grant & Guerin, 2014; Richard, Gauvin, & Raine, 2011) Using this framework to bring together differing perspectives about factors influencing adolescents' experiences provided diverse points for intervention for integration into the research process (Eriksson, et al., 2018). For example, the concept of time addressed at the chronosystem level was appreciated by the community stakeholders; the community's unique historical slavery legacy, generational inequalities, and memories of times before and after significant gentrification changes was central to narratives about adolescent violence. Thus, the selection of measures, design of questions, and guiding theoretical paradigms reflected these salient concerns (Eriksson, et al., 2018; Richard et al., 2011).

The Bronfenbrenner model discussions also ensured that a collaborative theoretical and methodological decision-making process occurred, a central tenet of CEnR research. Through this gathering social and historical information, we were able to effectively analyze the methods proposed- qualitative focus groups, and quantitative surveys. Discussions centered on what information would be gathered with each data collection approach, and identifying modes of data collection most culturally appropriate, key components of CEnR (Minkler, 2005; Minkler, 2010; Ross et al., 2010). These efforts also contributed to guiding theory development and the analysis of the data, ensuring stakeholder input and feedback was centered (Minkler, 2005; Minkler, 2010;

Ross et al., 2010; Zimmerman, 2020). This ensured that all community and collaborative members were not only a part of the data collection process, but also directly contributed to the construction of the ways in which the study was designed and implemented. More importantly, their contributions were recognized as valuable and critical to the project's success as evidenced by ALR's centering of their voices when making decisions about the theories and methodological approaches driving the study.

[The workshops] a team... and we interacted. And this left us [the Bronfenbrenner ecological model] - we still use it here as a model- [to illustrate] how the students relate to each of the systems which are present. We said "we really want to be part of this process." [ALR] showed that our voice was important in the process. Later, the approach was well received by our teachers because everyone thought that, well, "They talked with us, we had meetings, and we made the decisions". Those workshops were not just about the research as it planted the seed of listening to the teachers. (ACRM)

Ethics and Practice. The traditional ethical practices for implementing research were followed, including securing approval from IRBs at universities both in Colombia and the United States. Additionally, the appropriate steps for securing consent of adolescents and their parents, and the securing of approval letters from applicable organizations. However, beyond these typical protections, the IsBaru collective took additional steps to ensure human rights protections contextually relevant were addressed. Specifically, time was spent thinking through "what if" scenarios, and ensuring they were always "eight steps ahead" of any potential problems. This required regular meetings with all partners where there was active reflection about the practice- not only the paper- of ethical treatment of participants. Specifically, close attention was paid to issues related

to community perceptions of contextually appropriate compensation, cultural meanings of privacy, equitable access, and easily accessible mental and physical health supports.

An example of this was the adolescent compensation for participation; it was a movie ticket and a movie meal (equivalent to 10 USD). Those who also participated in the focus groups received an additional local gift basket of school goods (equivalent to 5 USD). This compensation was determined through much discussion with community collaborators during the planning phase of the research study. These conversations did not center as much on what could be paid, but what was ethical. To mitigate this concern and align with CEnR goals, the compensation was determined by what most benefited those in the region and the participants (Heitman & McKieran, 2004; Hoover et al., 2019; McDavitt et al., 2016; Minkler, 2005). To ensure that individuals did not feel coerced or unduly influenced to participate it was determined that paying for a group activity would be most appropriate. This served a dual purpose of providing a unique opportunity for these adolescents (no movie theater was located in their village), and logistically realistic plan for the research team on the ground; travel to the partner university could easily include a stop for these activities. Further, providing a local gift for focus group participants was viewed as an appropriate symbol of appreciation among community members.

This is just one example of how unique cultural norms shape research processes across diverse contexts. As noted by Taylor et al, (2020) just because the research is being conducted in Colombia not all in Colombian systems work the same. Specifically, each region has differing processes, systems and norms that can further differ by cultural biases about the community, individuals and phenomena being studied. Thus, it is critical

that CEnR leaders think beyond practice on paper to practice in real life. This required that community stakeholders be directly involved in the administration and implementation of the project. While not viewed as normative in traditional academic research approaches, this would align with CEnR efforts to both center and validate the power of non-academic contributors throughout research processes (Heitman & McKieran, 2004).

I think that was one of the conditions that [school-based collaboration members] gave Ana. Not just being present but knowing in detail what was going to be done and be part of the decisions that were going to be made in the research. Second, that protocol of the management of the information, of the privacy- there's a lot of delicate information that not even I know what happened or who said it. We could know what was said but not who said it. And that security, that right that our community and our kids have, was guaranteed. That also guarantees us, knowing the situation, but not the person. So, it gives us the security that we could continue forward. (ACRM)

Dissemination. It was critically important for ALR that she avoid the “rape model of research”; this occurs when research abruptly leaves a community after collecting the information they need (McQueeney & Lavelle, 2015; Reinhartz 1985; Schroeder & Gefenas, 2012; Schroeder et al., 2020). In line with CEnR goals, plans have been established and are in process to ensure that the ALR and her collaborating researchers give back to participants and concretely continue to address the needs and interests of the Santa Ana community (Anderson et al., 2012; Luger et al., 2020; McDevitt et al., 2016). Although we are just now beginning research presentation and publication processes, we have established foundational goals and agreements about mutually beneficial modes of

data delivery. Dissemination of analytical and conclusive results will be both in academic sites of output (e.g., research journals and scientific conferences) and produced in appropriate language forms (e.g. local language, non- academic, English and Spanish). Further, the data are being provided via accessible presentation formats, including PowerPoints, research briefs and white papers.

Consistent with the value of effectively engaging our partnership at all phases of the research process and attending differential timing of research and community needs (Anderson et al., 2012; Luger et al., 2020; McDavitt et al., 2016), the collaborative agreed the first document to jointly prepare was a report for the school to use in their advocacy for resources and training around adolescent well-being concerns. After finalizing the data collection, ALR facilitated a workshop among the school personnel, including teachers and the psycho-social team. The purpose was to create a short-term dissemination product adapted to their information needs. The participants formulated analysis questions in small groups and created conceptual models to answer them, utilizing the survey variable names. After presenting their work to each other, the school decided on a final "model" of information needs, specifying interest topics. Specifically, they chose the types of statistical graphs, language, and formats (40 printed copies and digital). This book is a particularly important document considering the fact that community members deserve access to the knowledge made possible through their participation and engagement (Frerichs et al., 2016; McDavitt et al., 2016; Schroeder & Gefenas, 2012). As evidence that this research project was- and continues- to be a two-way flow of information, the text highlights the ways in which opportunities to explore

the implications of research findings from a local perspective were integrated into the process. Further, serves as a document of mutual respect and value for research input.

Points of Tension and Negotiation

Clearly, CEnR can be more entangled than traditional research. It is this complexity that makes it more representative of real-world conditions, increasing its translational value. However, there are some additional points for consideration that have not been addressed or need further discussion when examining the strengths and limitations of using CEnR in culturally and globally unique settings.

Time commitments. Time is a concern for all CEnR researchers as it involves building partnerships, negotiating, planning and communicating (McQueeny & Lavelle, 2015; Reinharz 1985; Ross et al., 2010). These are time consuming activities over and above regular research responsibilities. ALR's background provided her with some basic cultural understandings and experiences with the community of Santa Ana. Further, her established relationships helped solidify her credibility within the community. But she still spent more than ten of her 12 months building and negotiating relationships before data collection actually began. While this was not the initial plan- her timeline had her beginning data collection in month three- upon reflection she realized how important the delay was. The adolescents' depth of discussions in the focus groups, and willingness to share accurate information during the long survey process was directly a result of the relationship ALR built with students and her acceptance within the community. One adolescent, for example, reported reprimanding a peer who was not taking the data collection seriously; this girl shared that ALR's giving of her own time to the community showed how important this project was and the importance of capturing accurate data.

Similarly, two years since the funding period ended ALR is still in regular contact with the research team. She is in the writing stages of her dissertation, yet regularly continues to communicate with key stakeholders. Some are formal meetings to gather their feedback. Others are quick phone calls or zoom chats to provide data and resource information needed by the community. Thus, the time commitment for CEnR cannot be measured with a clock or calendar- rather it is about the combined quality and depth of one's investment as a person. This is particularly relevant to consider when working with non- WEIRD communities. Some note that polychronism is central to Latin American societies' functioning, such that more than focusing on linear goals (e.g. deadlines), time is a people-oriented concept (Pumariega, 2009; Gierlach, Belsher & Beutler, 2010). The funding period may end, but the concept of the existing research project may still be a reality for individuals, particularly if it was impactful for the community. ALR's impact as a researcher will be measured by her maintenance of relationships and ability to continue supporting the community. Otherwise, she will be seen as a "one hit wonder" researcher who came in, made great changes, and contributed to the community for a specified period- but was never heard from again (McQueeney & Lavelle, 2015; Minkler, 2005; Reinhartz 1985). As such, researchers that value CEnR need to consider the practical and relational impact of time and their long-term commitment to the project when designing, implementing and ending studies, particularly in non- WEIRD settings.

Mental Health & Well Being. Related to the varied levels of time commitment are the impacts of engaging in emotional & relational labor when engaged in field research (McQueeney & Lavelle, 2015). Emotional labor involves the management of one's feelings in accordance with culturally defined rules and guidelines, while relational

labor is the energy involved in building and maintaining connections (McQueeney & Lavelle, 2015) This cannot be avoided when doing CEnR research as trust, equity and collaboration require researchers to move from a neutral position to one of engaged actor. This falls in line with research challenging the notions that scientists are unbiased and unattached to the research; instead, it is asserted, researchers are a part of their work. Thus, when called upon to become part of a collaborative research process with the very individuals that are centered in the research, CEnR scholars will have to acknowledge the ways in which relationships and emotions inform their process (Heitman & McKieran, 2004; McQueeney & Lavelle, 2015; Reinharz 1985). Although building close and collaborative relationships are hallmarks of CEnR, there are legitimate concerns in terms of the toll it can take on researchers' well-being (Heitman & McKieran, 2004; Hoover et al., 2019; McDavitt et al, 2016; Minkler, 2005).

The ability to negotiate equitable partnerships in the community research process while simultaneously finding space to separate from her researcher identity was stressful. During data collection, there were several homicides and assaults that directly impacted adolescents in the study, both as peers and where victims were potential participants. Additionally, given the focus on violence and adolescent risk taking, she was privy to very stressful experiences shared by participants. Unfortunately, in this setting ALR was physically isolated from her core support system. This was compounded by the fact that internet and cell phone connectivity was also unreliable, so consistent access to sources of support was an ongoing challenge. Thus, ALR had to identify ways in which to engage in community activities outside of her identity as a researcher. Toward this end, she maintained her commitment to regular exercise (e.g., running or yoga). Also, she chose to

live in a neutral area- a rural home halfway between the community and the touristic center. Finally, she brought her dog; along with providing support, he was also a form of socialization (he also became the project's official mascot).

This does not mean that ALR was unsafe or alone as the community members fully embraced and welcomed her contributions. However, this also meant that boundaries had to be established. Many saw her as someone who could provide insights and supports due to her training and skills set. This need to balance emotional labor and power is important as when trusting and equitable dynamics are developed in research relationships academic researchers may be perceived as bringing services or equipped to fulfill community needs like a service provider (Ross et al, 2010; Terpstra et al., 2011). This is because researchers can become viewed as one who has both expertise, participants' best interests at heart and the necessary resources to offer (Terpstra et al., 2011). An example of this occurred whenever individuals approached ALR with requests for advice. Parents would ask ALR to speak with their daughter if she was engaging in risky behaviors (e.g., hanging out with gang members), or would seek her out for information about potential learning disabilities their child may be experiencing. While she felt pulled to be supportive of these families, ALR recognized that she needed to avoid being seen as an expert on these issues and engaging in activities outside the focus of the research study. Thus, she would direct parents to accessible institutions with expertise on the issues. This was a step toward balancing her relationship with community members and her own role (McQueeny & Lavelle, 2015; Minkler, 2005; Reinharz 1985).

Final Considerations

Overall, IsBaru is an example of how researchers can equitably involve individuals and communities in actions to create cultures of health. As evidenced throughout the stages of this project, key stakeholders engaged efforts to identify and address shared values around adolescent violence, collaborate across school and community sectors, and create more equitable approaches to addressing long term community well-being concerns. The IsBaru collaboration has established a standard of equity and inclusion that the community and researchers can work from when implementing future researchers in the community.

[IsBaru Collaboration] is not only the voice of the researchers. It is the voice of the school, and the voice of the community... It's having the possibility of not only interpreting with the results of one's instruments but also understanding what the people who interact directly with the kids are saying- and that is valuable. Not only that, but [the research process] was an intervention itself, because there were teachers that came back changed from [the activities]. They came more interested in getting to know the students closer; more interested in working and getting to know the reality of them. So, I think that it was a two-way lesson. (ACRM)

CONCLUSION

In response to calls for culturally centered global health research to study adolescent violence perpetration and victimization, the current dissertation examined experiences within social networks of 242 adolescents attending the public school in a Colombian Afro-Caribbean village. Utilizing a social complexity theoretical approach (Hinde, 1987; Bukowski et al., 2018; Rubin et al., 2006) the first three empirical studies in this dissertation framed LMIC rural adolescents' experiences of victimization and perpetration, utilizing non-deficit and non-comparative assessments, and positioned on adolescents' meanings of their social history of violence. Community, peer, and intimate partner violence involvements were conceptualized across the three studies as individual experiences of interactions occurring within relationships, further arranged in social networks, and ultimately interpreted in their historical and socio-cultural settings (Hinde, 1987; Laursen, 2018). Together, results from this dissertation highlight the significance of assembling cross-disciplinary angles, systemic approaches, and community-centered perspectives to addressing the experience of violence among adolescent understudied populations (LMIC, rural, post-conflict villages; Butti, 2018; Bonilla-Escobar et al., 2017; Lynam et al., 2020; Neal et al., 2020). To highlight the process of the overall research design and implementation the fourth study reflects on the community-university collaboration to underline equitable efforts in global health adolescent research among not readily available populations (Malenfant, Nichols, & Schwan, 2019; Minkler, 2010; Ross et al., 2010). Specifically, the benefits and limitations of following community engaged research (CEnR) values are explored in this closing paper.

This dissertation is innovative in its use of mixed methods social network analysis methodology to analyze adolescent violence; this methodological approach allows for a comprehensive examination of the critical social processes occurring at this phase of the lifespan while simultaneously accounting for cultural specificities unique to the target population. A pivotal developmental period for socio-cultural processing, it is during this transitional age between childhood and adulthood that the size and relative influences of social networks shifts/ expands to include peer and romantic relationships (Blakemore & Mills, 2014; Icengole et al., 2019; Steinberg & Moris, 2001; Wrzus et al., 2013). Consequently, a distinctive feature of this lifespan period is the exceptional social influence that school peers have on identity development and risk-taking behaviors, including those related to violence (Bukowski et al., 2018; Rubin et al., 2006; Veenstra et al., 2018). However, these changes are informed by the broader societal dynamics unique to adolescents' cultural contexts; for this reason, explorations of adolescents' relationships and interactions must include cultural understandings of familial and friendship ties in their community (Laursen, 2018; Rubin et al., 2006). These cultural familial and community influences were central to the findings of the three studies in this dissertation. *Santaneros'* extended arrangements of flexible kinship and strong community relationships were salient to adolescents' understandings of violence in their community and across their peer networks.

Large community cultural experiences also informed findings in this dissertation, as highlighted by the importance of incorporating multi-level angles and social complexity approaches to adolescent violence research in LMIC rural settings. High-risk contexts characterized by community violence, historical conflict, geographic

segregation, and poverty place adolescents at enhanced risks for violence victimization and perpetration, and associated negative health outcomes (Cecil et al., 2017; Devries et al., 2019; Finkelhor et al., 2011; Riberio et al., 2009; Sanchez de Ribera et al., 2019; Taylor et al., 2016). This also has longer term implications as adolescent victims of violence are more vulnerable to repeated victimization and at greater risk for experiencing poly-victimization across the lifespan (Finkelhor et al., 2007; Finkelhor et al., 2011; Kaminer et al., 2013). Poly- victimization is prevalent in Latin American contexts, with as many as 89% of adolescent victims reporting experiencing multiple types of violence, including community and household violence (Le et al., 2018; Miranda et al., 2021; Pinto-Cortez et al., 2021). However, prior to this current work, little was known about what key factors and salient influences are putting rural adolescents at risk for victimization or perpetration within this culturally unique context. The simultaneous assessment of school, community, and household ties in adolescent social networks (along with their violent interactions) was critical to characterize concurrent types of victimization across settings. For example, in study one, social network data showed that physical and psychological violence victimization occurred across relationships, including those described as supportive at the school, household, and community settings.

Ample evidence in cross-cultural research demonstrates the correlation between violence victimization and perpetration (Blum et al., 2019; Crooks, 2011; Kimber et al., 2018; Mendez-Lopez et al., 2021; Ribeiro et al., 2009;). This interconnection expands to other forms of violence (e.g., household victims as school violence perpetrators) and has been referred to as a “cycle of violence” (Patel, 2011). Qualitative findings in study one show that adolescents in this setting are aware of these cycles, such that they identify the

street, household, and school victimizations as inter-connected. Furthermore, empirical evidence associating poverty, poor family functioning, community violence, and violence engagement among LMIC adolescents supports their assertions (Gorman-Smith, 2004; WHO, 2015; Sanchez de Ribera et al., 2019).

However, these violence cycles operate differently for each type of violence. For example, the findings of the study two in this dissertation do not support the association between non-school victimization and school perpetration. These non-significant quantitative associations between household/community victimization and school perpetration should be read considering my operationalization of these constructs. Non-school violent interactions in this study were only observed as reported in dyadic structures, as part of nominated relationships. The quantitative instrument did not capture pervasive and fatal forms of street and household violence, such as those described in the qualitative findings (study one; e.g., rape, homicide). Therefore, these results only correspond to victimization within existing relationships. Having collected concurrent qualitative and quantitative data from the same group of adolescents was critical to contextualize and define the scope and these types of limitations across studies. Understanding the links of multiple forms of violence among rural, high-risk, LMIC, resource-limited adolescent populations is enriched through diverse instruments and practices that enable various levels of scrutiny (Dejonckheere, 2019; Kallemeyn et al., 2020; Lynam et al., 2020).

The use of socio-centric data in the first three studies of this dissertation was especially suitable for quantifying social effects beyond the dyads. Empirical findings in the growing social network literature have consistently shown selection, influence,

homophily, and contagion for diverse forms of victimization and perpetration (Faris & Felmlee, 2014; Foshee et al., 2013; Huitsing et al., 2014; Sijtsema & Lindenberg, 2018; Valente et al., 2004; Watling & Veenstra, 2020). However, most of this cross-cultural evidence on adolescent violence (in social networks) centers on urban school contexts located in the developed world, while the majority of the adolescent population experiencing violence currently lives in LMIC settings (Casper et al., 2020; Devries et al., 2019; Gallupe et al., 2019). Given the unique contextual factors that adolescents negotiate in high-risk communities in LMIC settings, it is critical to minimize the scarcity in socio-centric studies among these populations (Bedoya et al., 2019; Blum et al., 2019; Browne et al., 2017; Nguyen et al., 2020). For instance, study three in this dissertation showed that a socio-centric approach enabled capturing the relationships between an ego's intimate partner violence engagement and their peers' similar status. This assessment would not have been possible utilizing a different study design. Furthermore, assessing violence with self or peer reports only, has been shown to introduce biases (Branson & Cornell, 2009). Therefore, adolescent socio-centric studies centering on understudied populations can further document similar patterns or point cross-cultural differences of the global majority.

Finally, given that this dissertation focused on an under studied population living in a culturally unique context, it was critically important to examine how this rich body data was gathered via research design and implementation processes. Having to travel to another country, coordinating research resources, negotiating accessibility, and creating equitable community partnerships in socially vulnerable LMIC populations is not only challenging but directly affects a researchers' ability to gather rich, quality and

comprehensive data. Further, given the sensitivity of the topic and the relative remoteness of the context, cross-disciplinary and community collaborations would be critical for achieving this. Toward this end, study four in this dissertation reflects on the experiences of seeking and developing a sustainable academic and community partnership within this rural Afro- Caribbean Colombian village. Expanding on traditional discussions about the importance of using culturally sensitive and scientifically rigorous designs, this paper highlights the strengths and limitations of the efforts to bring together diverse stakeholders with differing purposes, meanings, and timelines for the research process (Mosher et al., 2017; McQueeney & Lavelle, 2015; Taylor et al., 2020). Guided by CEnR values, this dissertation project's use of equitable practices through the entire research process not only established shared investments in the project across the research team, community stakeholders, and participants; these values further ensured the alignment of academic goals with local efforts to understand and prevent adolescent violence in ways that empower and center the communities' larger cultural value systems (Anderson et al., 2012; Kallemeyn et al., 2020; Taylor et al., 2020).

Taken together, the current dissertation provides unique insights into the experiences of a population of rural adolescents living in Colombia. Findings across studies underscore the importance of examining specific violent types (school, community, household, intimate partners') within the dyadic, social network, and socio-cultural dynamics that inform them. This social complexity approach proved to be especially sensitive for a community enduring pervasive forms of societal level violence (conflict, illegal traffic, crime), government absenteeism, and multi-generational conflicts. This research provides information about appropriate points for intervention

and capacity building that intervention designers, researchers and policymakers can draw upon to address violence among adolescents in this community. Future research could replicate these studies, while addressing limitation, in populations experiencing similar larger cultural shifts globally.

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PUBLICATIONS & PRESENTATIONS

- Garmendia, C., Gorra, L., Rodríguez, A.L., Trepka, M., Veledar, M.,
Madhivanan, P.(2018). Effects of Including Studies Identified by the U.S. Food
and Drug Administration as having Research Misconduct on Results of Meta-
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Rodriguez, A., Eaton, A., Schreber-Compo, N., Madhivanan, P. (2021,
July). Adolescent Violence in rural Colombia: A Social Complexity Approach. Oral
presentation. Networks 2021, Network Science Society Annual Conference.

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- Rodríguez, A.L., & Stephens, D. (2019, June). *Domestic Violence among recently immigrated women in Miami: an ecological perspective*. Poster presentation for the Society for the Psychological Study of Social Issues Annual Conference, San Diego, CA.
- Rodríguez, A.L. & Stephens, D. (2018, August). *Attitudes towards Gender and Intimate Partner Violence among college students: A Network Analysis*. Poster presentation for the American Psychological Association Annual Conference- Division 35 Session, San Francisco, CA.
- Rodríguez, A.L., Jaramillo, A., Stephens, D., Montes, F., (2018, June). *Black PhD Students' social & academic networks and their influence on attrition, adjustment and achievement emotions*. Poster presentation for the NetSci Network Science Society Annual Conference, Paris, France.
- Rodríguez, A.L., Montes, F., Sarmiento, O., Ruvalcaba, Y., Jaramillo, A.M, Magariño, L., Madhivanan, P., (2018, June). *Applications of Network Meta-Analysis in Health Sciences: A Systematic Review and characterization of published studies*. Poster presentation for the NetSci Network Science Society Annual Conference, Paris, France.
- Rodríguez, A.L., Ruvalcaba, Y., Eaton, A., Stephens, D. P., & Madhivanan, P (2018, June). *The Effectiveness of American College Sexual Assault Interventions in High-Risk Settings*. Poster presentation for the Society for the Psychological Study of Social Issues (SPSSI) Annual Research Conference, Pittsburg, PA.
- Rodríguez, A.L., Stephens, D. P., Brew E. & Madhivanan P. (2017, March). *Network Analysis of the relationship between Wife Beating and Gender Beliefs among young adults in Mysore, India*. Poster presentation for the Association for Women in Psychology Conference. Milwaukee, WI.
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