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The role of the neighborhood, family and peers regarding Colombian adolescents' social context and aggressive behavior

Contexto social y comportamiento agresivo en adolescentes Colombianos: el rol del barrio, la familia y los amigos

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ABSTRACT

Objective Examining neighborhood conditions, parenting and peer affiliations' association with adolescents' aggressive behavior. Testing various mechanisms through which neighborhood conditions influence two adolescent outcomes, both directly and indirectly (via their impact on parenting and peer-affiliation): aggression and delinquency.
Method Data regarding adolescents was taken from a self-reporting survey of 1,686 Colombian adolescents living in 103 neighborhoods of Medellin. Neighborhood-related data was taken from official government datasets, as well as two separate community surveys. Both multilevel modeling and multilevel structural equation modeling were used in the analysis.
Results The probability of an adolescent engaging in aggression in Medellin was 7.0 % and becoming involved in delinquency 0.3 %. There was also significant variation for both forms of aggressive behavior at neighborhood-level (7.0 % aggression and 14 % regarding the delinquency scale). No neighborhood condition had a direct association with adolescents' aggressive behavior; however; the neighborhood exerted an indirect influence on adolescent behavior which was mainly transmitted through families and the quality of friends within a particular community.
Conclusions Residing in disadvantaged neighborhoods did have an adverse effect on adolescents' aggressive behavior, mainly because of a lack of effective parenting strategies thereby facilitating affiliations being made with deviant peers. More efficient intervention for reducing adolescents' aggressive behavior should thus target areas having high odds of aggressive behavior and focus on improving community resources and, more importantly, on controlling adolescent peer groups, the lack of parental monitoring and inconsistent discipline.

Key Words: Adolescent, aggression, juvenile delinquency, residence characteristics, behavior mechanism, multilevel family analysis (*source: MeSH, NLM*).

RESUMEN

Objetivo Evaluar la asociación entre las condiciones del barrio, las pautas de crianza y las relaciones con amigos con el comportamiento agresivo. Además analiza diferentes mecanismos por los cuales las condiciones del barrio pueden influir directa e indirectamente (vía su impacto sobre las pautas de crianza y las relaciones con amigos) dos tipos de comportamiento: agresión y delincuencia.
Método Datos sobre comportamiento agresivo son tomados de una encuesta aplicada a 1 686 adolescentes residentes de 103 barrios de Medellín-Colombia. Datos sobre el barrio son tomados de bases de datos gubernamentales y de dos encuestas poblacionales. Para el análisis se utilizaron modelos multinivel y de ecuaciones estructurales.
Resultados En Medellín, la probabilidad de agresión de un adolescente es del 7,0 % y de delincuencia de 0,3 %. Dichas probabilidades varían significativamente entre los barrios. Aunque ninguna de las características del barrio mostró un efecto directo sobre el comportamiento agresivo, las condiciones estructurales afectan indirectamente los adolescentes influyendo las pautas de crianza y la calidad de los amigos con quienes se relacionan.
Conclusiones La pobreza en el barrio afecta el comportamiento agresivo de los adolescentes impactando las pautas de crianza y la calidad de las relaciones dentro del barrio. Intervenciones para controlar y prevenir el comportamiento agresivo deben desarrollarse en barrios con alta probabilidad de comportamiento agresivo y enfocarse no solamente en el mejoramiento físico de los barrios, sino en el fortalecimiento de las pautas de crianza y la calidad de los amigos de los adolescentes.

Palabras Clave: Conducta del adolescente, agresión, delincuencia juvenil, características, ubicaciones geográficas, conducta y mecanismos de conducta, análisis multinivel (*fuente: DeCS, BIREME*).

Adolescents' aggressive behaviour in Medellin continues being a significant public health concern despite many efforts at prevention (1). Estimates from a 2007 cross-sectional population survey of the urban area showed that 33.2 % of adolescents aged 12 to 17 years-old had engaged in a fight during the previous year, whilst 4.7 % had participated in an unarmed robbery during their lifetime, 1.6 % had engaged in a sexually aggressive act and 0.8 % had committed armed physical aggression (2).

Adolescents' aggressive behavior has thus been an area of great interest for public health and criminology researchers who have focused a large body of research on establishing its causes. Researchers have adapted Bronfenbrenner's Ecological Systems Theory (3) in an attempt at understanding the multifaceted nature of adolescents' aggressive behaviour as this explains aggressive behaviour as being the result of the interplay of

risk factors at four different levels: individual, family, peer and community. Researchers have shown that young males from a low socioeconomic background who have been victimized or witnessed violence have an increased risk of developing aggressive behaviour. Others have found strong evidence concerning the protective role of parenting characteristics and warm, supportive relationships. It has been argued that adolescents who associate with deviant peers are more likely to become engaged in aggression, substance abuse and delinquency (4-6).

There are fewer empirical studies regarding the ecological model's fourth level; however, what is available has demonstrated that the key determinants are a neighborhoods' structural and social conditions, such as the level of deprivation, the availability of services, the degree of violence, the lack of social networks within a particular neighborhood and high residential turnover (7-9).

A central principle of Bronfenbrenner's ecological theory is that adolescents' individual development should be studied from both a risk-factor approach, where the main object of interest lies in the overall effect of individual conditions and the quality of the social environment in which they live or participate, and an explanatory-approach, where research is concentrated on the mechanisms underlying such relationships (10). Empirical evidence has confirmed the importance of a neighborhood's social organization, peer groups and parenting behaviour as the main factors transmitting the effect of structural neighbourhood conditions. Evidence has indicated that a community's structural characteristics, such as concentrated poverty, low economic development and high crime levels, do affect a community's social processes and parental supervision strategies. It has been observed that parenting practice significantly predicts gang membership, in turn influencing peer violence, a factor found to directly affect individual aggression (10).

Even though there is still insufficient evidence concerning the important role played by neighborhood conditions regarding aggressive behaviour, the available research has mostly been undertaken in developed country settings. Studies have not been published in or regarding developing countries, nor have any investigations addressed this subject in Colombia. This paper was thus aimed at investigating the influence of family, peer group and neighborhood factors on adolescents' aggressive behaviour and understanding more fully how these three interrelated contexts transmit

the effect of structural neighborhood conditions regarding adolescents' antisocial behaviour.

METHODS

Data

Data about aggressive behaviour was taken from the Colombian Health Association's (ASSALUD) Survey of Adolescents living in Medellin; this cross-sectional survey examined a representative sample of 13- to 15-year-old urban non-institutionalized adolescents residing in Medellin during 2007. 1 843 adolescents answered the questionnaire, 1 788 adolescents providing sufficient geographical information for locating them in one of the city's 249 neighborhoods. Four adolescents did not answer any of the items related to being an aggressor and 98 lived in a neighborhood for which no neighborhood information was available; they were thus removed from the sample. 1 686 respondents residing in 103 neighborhoods thus formed the sample for the current study (giving a mean of 16 adolescents per neighborhood).

Data regarding neighborhood characteristics was taken from official government datasets and two independent community surveys of households in the same neighborhoods where the adolescents being studied lived.

Outcome variables

Adolescents reported their experience as aggressors during their lifetime. Table 1 gives these items' frequency distribution.

Table 1. Items included in the survey on aggression in adolescents living in Medellin, Colombia (n=1,686), 2007

Items	Never	Sometimes	Dimension
Have you eve			
made fun of someone or engaged in practical joking?	835	849	Aggression
used words to hurt someone?	1,061	621	Aggression
humiliated or despised someone?	1,323	359	Aggression
threatened someone?	1,344	341	Aggression
threatened to hit someone with an object?	1,544	142	Delinquency
threatened to wound or kill someone?	1,659	27	Aggression
stolen from someone without them noticing?	1,541	142	Aggression
defrauded or taken advantage of someone?	1,632	51	Aggression
hit another person with your fists?	1,164	517	Aggression
hit another person with an object?	1,502	182	Delinquency
thrown an object to someone?	1,421	264	Aggression
attacked someone with a knife, pocket-knife or bottle?	1,656	25	Delinquency
wounded someone?	1,646	34	Delinquency
touched someone's buttocks, legs, breasts or genitals without their agreement?	1,650	34	Aggression

Raudenbush *et al.*,'s (11) approach used in constructing criminal behavior scales for adolescents living in Chicago was followed closely, given the items' inter-relatedness; a three-level Rasch model was constructed having dichotomous items nested within adolescents within neighborhoods. This model integrated Item Response Theory with multilevel modeling techniques, thereby accounting for differences in item severity and personal propensities as well as accurately assessing how much latent trait an individual possessed. A detailed account of this methodology and its application regarding the aforementioned adolescents' survey has been provided elsewhere (12).

Rasch analysis involved the 14 aggressive behavior items and identified two uni-dimensional multi-item scales: aggression and delinquency. The last column in Table 1 indicates the items making up each dimension. The multivariate, three-level Rasch model simultaneously estimated the adolescent and neighborhood's propensities regarding aggression and delinquency on a log-odds scale as outcome variables for adolescent and neighborhood-level models.

Neighborhood-level variables

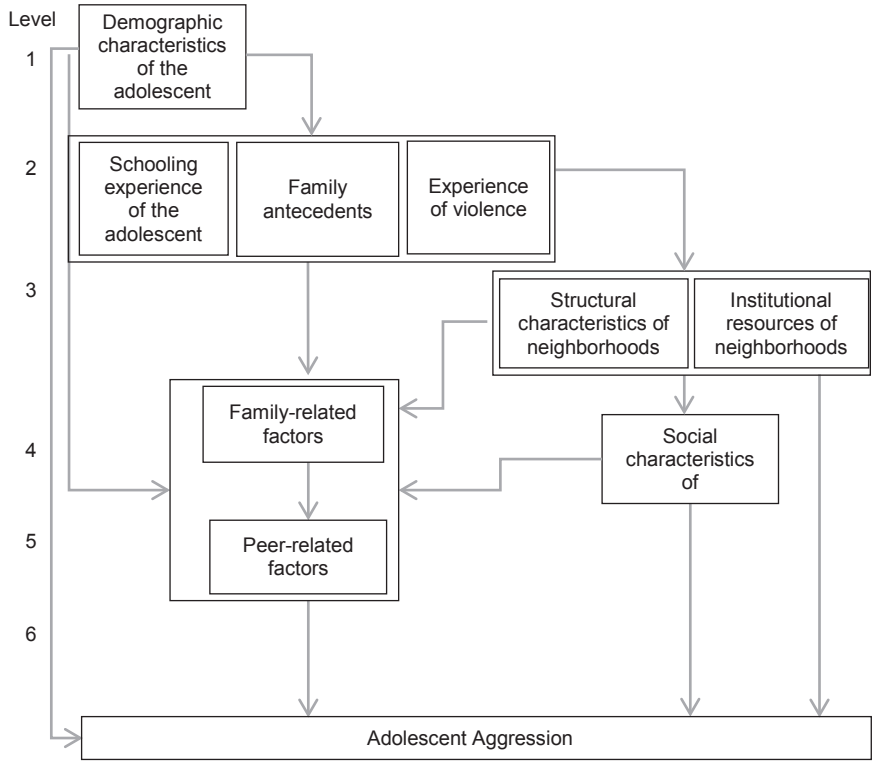
A neighborhood's structural features and social processes included in the analysis consisted of deprivation, physical and social disorder, perceived availability of community resources, homicide rate, informal social control and social cohesion, the availability of parks and recreational facilities, security and policing and social and cultural facilities. These variables were analyzed as z-scores to facilitate comparison between coefficients. A variety of statistical methods were used to construct neighborhood indicators (i.e. multilevel factor analysis, isometrics, spatial multiple membership models, geographic information systems and hierarchical Bayes procedures). In view of space limitation, these methods are not described here, but details can be requested from the authors.

Individual-level variables

Individual and family risk factors were reported by the adolescents and were included in the analysis as potential confounders. These variables included age [12,13,14 and 15 years], gender (female, male), having studied (yes, no), witnessed domestic violence (yes, no), been a victim of violence outside the home (never, victim of moderate violence, victim of severe violence), been involved in family criminality (yes, no), parental stress (yes, no).

The peer and family variables tested as being potential mediating factors were peer deviant association (low, moderate and high), peer pro-social association (low, moderate and high), having received harsh and/or inconsistent discipline (no harsh punishment, moderate harsh punishment and severe harsh punishment) and parental supervision (low supervision by both parents, low supervision by mother and high supervision by father, mother providing high supervision and father low supervision, both father and mother providing high supervision).

Figure 1. Conceptual model for the association between neighborhood characteristics and adolescent aggressive behavior



Ethical approval was not required as this study used secondary data.

Conceptual model

An important aspect of the study's research design was to define independent variables' conceptual status and how to incorporate them into the models, whether constituting confounders or mediators of

neighborhood effects (13). A hierarchical conceptual model was proposed, integrating individual and neighborhood-level theories (Figure 1) (13). The lines represent hypothesized causal chains where higher levels (1 and 2) were analyzed as potential individual-level confounders for lower level variables. For example, association between structural and social neighborhood conditions and adolescents' aggressive behaviour may have been confounded by variables on levels 1 and 2 since they were independently associated with neighborhood characteristics and adolescents' aggressive behaviour. Level 4 to 6 variables may have been on the causal pathway from neighborhood structural conditions to adolescents' aggressive behaviour.

Statistical analysis

A logistic, multivariate, three-level Rasch model was used to estimate the overall effect of neighborhood-level variables on adolescents' aggression and delinquency, adjusted by the effect of individual-level potential confounders. Taking into account the proposed hierarchy of causal relationships in Figure 1, analysis included the most distal individual confounders (age and gender, followed by education, family background and experiencing violence). Only variables having greater than 20% significance levels were retained in the analysis and variables having the lowest significance were removed on a one-by-one basis. This strategy aimed to ensure that potential confounders were kept in the model and to avoid collinearity (14). The next stage of analysis investigated the independent effects of structural and social neighborhood variables' conditioning on individual-level confounding factors. Analysis thus included the most distal neighborhood determinants (structural conditions), followed by the most proximal ones (social conditions). MCMC estimation in MLwiN 2.23 run from STATA version 11.0 (15) was used for data analysis.

Multilevel structural equation modeling (MSEM) (16,17) was used to evaluate whether neighborhood deprivation, physical social disorder and community resources were indirectly related to aggression/delinquency through their effects on social processes within a neighborhood, the quality of parenting and peer associations. All regression equations were statistically adjusted in this model for the effect of individual-level confounding variables. Given the data's cross-sectional nature, this model could not establish causality but rather explore potentially significant relationships which could then be explored in greater depth using longitudinal designs. Mplus 6.11 was used for the MSEM model.

RESULTS

Table 2 gives the multivariate, three-level Rasch model's results. The adjusted results showed that, after accounting for the effect of individual-level confounding variables, none of the structural and social neighbourhood dimensions significantly predicted adolescent aggression or delinquency.

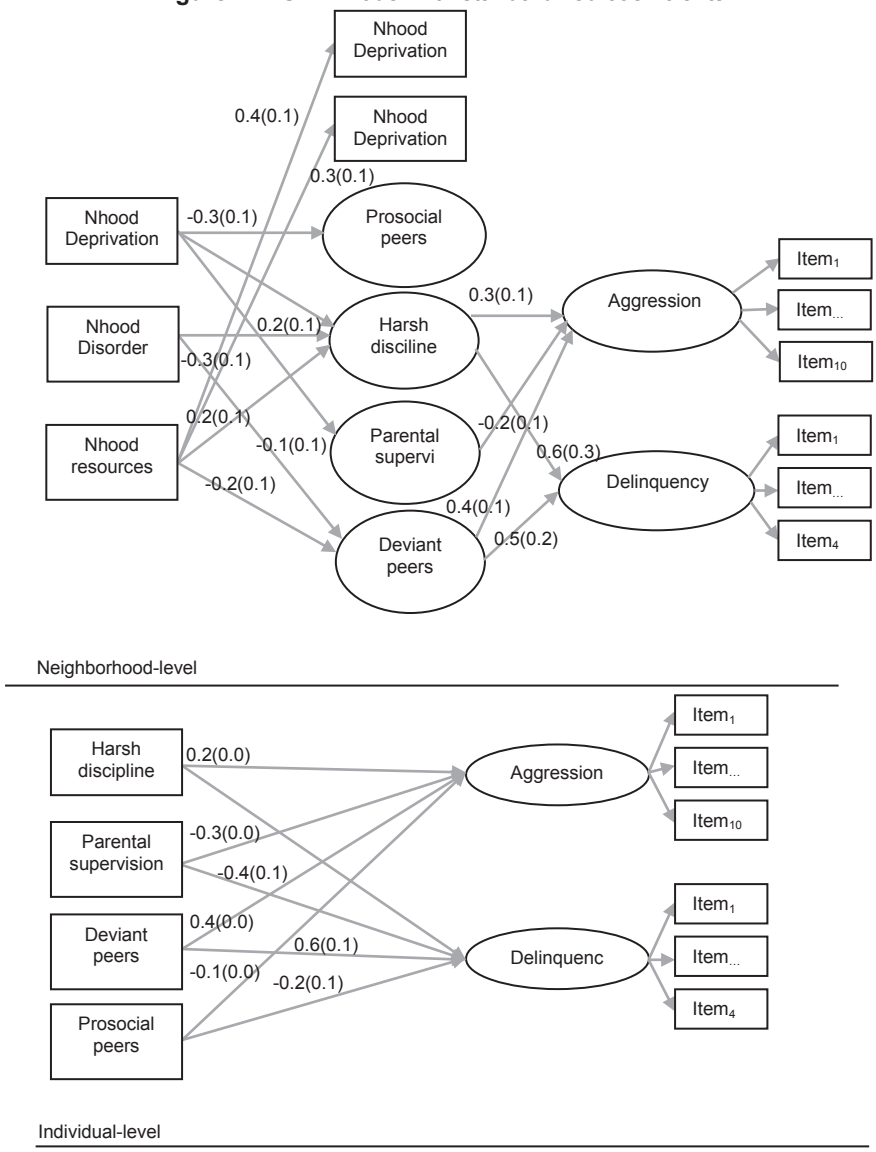
However, significant indirect effects were revealed by the adjusted MSEM results. The model depicted in Figures 2 gives individual and neighbourhood-level pathway standardised coefficients on the probit scale and corresponding standard errors. Only paths and coefficients which were significant at the 10 % level are displayed.

Adjusting by individual-level confounding factors, the MSEM model showed deviant peer associations as being the greatest influence for both types of adolescent aggressive behaviour, followed by harsh discipline. By contrast, parental supervision and pro-social peers exerted a very important protective role, particularly against delinquent behaviour. Consistent with three-level Rasch model results, neighbourhood social processes did not predict adolescents' aggressive behaviour. The left-hand side of the Figure shows that structural neighbourhood factors indirectly exerted their effect on aggression and delinquency by increasing the risk of poor parenting and greater deviant peer affiliation.

Table 2. An adjusted analysis of structural and social neighbourhood conditions' association with the aggressive behaviour of adolescents living in Medellin (2007)

Variable	Lifetime aggression Odds ratio (95 % confidence interval)	Lifetime delinquency Odds ratio (95 % confidence interval)
Hierarchical block 1		
Deprivation	1.1 (0.9-1.3)	1.1 (0.7-1.5)
Phys social disorder	1.1 (0.9-1.2)	1.2 (0.8-1.6)
Community resources	0.9 (0.8-1.3)	0.8 (0.6-1.3)
Availability of parks/recreation	1.1 (0.9-1.2)	1.0 (0.6-1.5)
Availability of cultural places	0.9 (0.8-1.1)	1.2 (0.7-1.7)
Availability policing & security	1.1 (0.8-1.2)	0.7 (0.4-1.1)
Homicide rate	1.1 (0.9-1.1)	0.8 (0.6-1.2)
Hierarchical block 2		
Social cohesion	1.1 (0.9-1.2)	1.2 (08-1.7)
Informal social control	11 (0.8-1.2)	1.1 (0.7-1.5)

Figure 2. MSEM model with standardized coefficients



DISCUSSION

This paper has investigated pathways linking neighbourhood characteristics to individual–level aggression and delinquency. The significance of the indirect effects indicated that structural neighbourhood conditions were

important for adolescents' aggressive behaviour, given that although they may not have influenced it directly, they did affect processes which were strongly related to aggressive behaviour.

MSEM model results showed that the availability of institutional resources had an indirect effect on aggression and delinquency by providing the means for families' healthy socialisation, appearing to reduce parental stress, increase better parental management practice and reduce association with deviant peers, in turn, reducing both aggressive and delinquent behaviour. Other studies have reported the same results and demonstrated how community resources provide social contexts for the creation and maintenance of social bonds amongst residents, as well as promoting the sharing of common values and goals and promoting their physical and socio-emotional wellbeing (9).

The MSEM model indicated that although neighbourhood disadvantage and disorder did not directly affect adolescents' aggressive behaviour, they indirectly influenced the way parents managed adolescents and the quality of the peers whom they came into contact with. In an effort to explain similar relationships, Rayne and Quane (18) argued that parents in less deprived neighbour hoods seemed to set clearer and better defined rules for their children and closely supervised their activities, while promoting pro-social adjustment and reducing levels of aggressive behaviour, compared to parents residing in more disadvantaged neighbourhoods. Other authors (19) have argued that poor and disorganised neighbourhoods may discourage both children and adolescents from adhering to conventional norms and produce feelings of hopelessness and patterns of socially-unacceptable behaviour. As adolescents grow older, they tend to spend more time out of home and become more influenced by their neighbourhood and the prevailing antisocial models of living there. Consequently, adolescents residing in disadvantaged communities have a higher probability of exposure to and affiliation with deviant peers than do adolescents living in more affluent neighbourhoods (9,20,21).

The consistency of the present study's findings with those in the pertinent literature (18,22-24) is of great importance, since this confirmed that the individualised risk-factor approach involves an oversimplification of the processes so involved. This study stresses the need to move beyond the black box view currently dominating neighbourhood literature towards

the exploration of the underlying mechanisms linking neighbourhoods and adolescent behaviour. The implication of such findings is that neighbourhoods are important development contexts and, as such, are potential targets for intervention designed at preventing and controlling adolescents' aggressive behaviour. However, measures enhancing parenting practice and the quality of peer association would be more effective than simply enhancing a particular neighbourhood's physical and social conditions.

This study is not without its limitations. The data was based on a cross-sectional survey and thus hinders determining whether the associations observed were causal, as there is no way of establishing temporal precedence. In particular, MSEM analysis results should be interpreted with caution as there is no watertight way to rule out reverse causality. The data used for defining neighbourhood constructs was collected in 2007 and there was no accounting for potential changes in neighbourhood conditions as time elapsed. Indirect associations could thus represent conservative estimates of the cumulated effect of diverse neighbourhood conditions. The definition of neighbourhood used here was based on that used in Medellín for administrative purposes; consequently, such areas may not represent an individual perception of neighbourhood, or the place where social interactions occur. Regarding the effect of selection bias, certain types of neighbourhood attract or repel particular types of residents and this meant that families were not randomly distributed. The methodology used in this paper could not isolate observable neighbourhood effects from the effects of unobservable individual-level characteristics possibly associated with neighbourhood characteristics. However, this problem was minimised to some extent by controlling for the effect of observed individual and family characteristics which were highly related to the odds of aggressive behaviour occurring.

Despite such limitations, the present research has provided important evidence about how neighbourhoods constrain or enhance individual-level processes related to adolescents' aggressive behaviour. Specifically, the results suggest that neighbourhood conditions' negative effects can be prevented if parenting practice is effective and the quality of relationships available within a particular neighbourhood enhanced ♦

Conflict of interest: The authors declare no conflict of interests.

REFERENCES

1. Duque L, Ungar M, Caicedo B. Addressing Youth Violence and Aggression in Colombia: Examining a Community-Wide Prevention Initiative. In: Myriam Denov RM, ed. Children's Rights and International Development: Lessons and Challenges from the Field. New York: Palgrave MacMillan 2011:129-54.
2. Duque L, Montoya N, Restrepo A. Violence witnessing, perpetrating and victimization in Medellin, Colombia. A random population survey. BMC Public Health. 2011;11(1):628.
3. Bronfenbrenner U. The ecology of human development: Experiments by nature and design. Cambridge: Harvard University Press; 1979.
4. Farrington D. Childhood origins of teenage antisocial behaviour and adult social dysfunction. Journal of the Royal Society of Medicine. 1993;86(1):13–7-–7.
5. Duncan S, Duncan T, Strycker L. Risk and protective factors influencing adolescent problem behavior: A multivariate latent growth curve analysis. Annals of Behavioral Medicine. 2000;22(2):103-9.
6. Loeber R. Key issues in the development of aggression and violence from childhood to early adulthood. Annu Rev Psychol. 1997;48:371–410-371–410.
7. Leventhal T, Brooks-Gunn J. Children and youth in neighborhood contexts. Current Directions in Psychological Science. 2003;12(1):27-31.
8. Oberwittler D. A Multilevel Analysis of Neighbourhood Contextual Effects on Serious Juvenile Offending: The Role of Subcultural Values and Social Disorganization. European Journal of Criminology. 2004;1(2):201-35.
9. Leventhal T, Brooks-Gunn J. The neighborhoods they live in: The effects of neighborhood residence on child and adolescent outcomes. Psychological Bulletin. 2000;126(2):309-37.
10. Sampson RJ. How does community context matter? Social mechanisms and the explanation of crime rates. The explanation of crime: context, mechanisms, and development. 2006;31-60.
11. Raudenbush S, Johnson C, Sampson R. A Multivariate, Multilevel Rasch Model with Application to Self-Reported Criminal Behavior. Sociological Methodology. 2003;33(1):169-211.
12. Caicedo B, Jones K. Measuring aggressive behaviour: extending statistical methods for measuring both people and places. Manuscript submitted for publication. 2012.
13. Victora CG, Huttly SR, Fuchs SC, Olinto MT. The role of conceptual frameworks in epidemiological analysis: a hierarchical approach. Int J Epidemiol. 1997;26(1):224-7.
14. Maldonado G, Greenland S. Simulation study of confounder-selection strategies. American Journal of Epidemiology. 1993;138(11):923.
15. Leckie G, Charlton C. runmlwin: Statamodule for fitting multilevel models in the MLwiNsoftware package. . Centre for Multilevel Modelling, University of Bristol. 2011.
16. Preacher KJ, Zyphur MJ, Zhang Z. A general multilevel SEM framework for assessing multilevel mediation. Psychological Methods. 2010;15(3):209.
17. Krull JL, MacKinnon DP. Multilevel modeling of individual and group level mediated effects. Multivariate Behavioral Research. 2001;36(2):249-77.
18. Rankin B, Quane JM. Social Contexts and Urban Adolescent Outcomes: The Interrelated Effects of Neighborhoods, Families, and Peers on African-American Youth. Social Problems. 2002;49(1):79-100.
19. Hoffmann J. Family Structure, Community Context, and Adolescent Problem Behaviors. Journal of Youth and Adolescence. 2006;35(6):867-80.
20. Brody GH, Ge X, Rand C, Gibbons FX, Murry VM, Gerrard M, et al. The Influence of Neighborhood Disadvantage, Collective Socialization, and Parenting on African American Children's Affiliation with Deviant Peers. Child Development. 2001;72(4):1231-46.

21. Eamon MK. Poverty, Parenting, Peer, and Neighborhood Influences on Young Adolescent Antisocial Behavior. Journal of Social Service Research. 2002;28(1):1-.
22. Chung HL, Steinberg L. Relations between neighborhood factors, parenting behaviors, peer deviance, and delinquency among serious juvenile offenders. Developmental Psychology. 2006;42(2):319.
23. Cattarello AM. Community-level influences on individuals' social bonds, peer associations, and delinquency: A multilevel analysis. Justice Quarterly. 2000;17(1):33 - 60-33 - 60.
24. Kohen DE, Leventhal T, Dahinten VS, McIntosh CN. Neighborhood Disadvantage: Pathways of Effects for Young Children. Child Development. 2008;79(1):156-69.