What are the risk factors for antisocial behavior among low-income youth in Cape Town?

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Abstract

***Objective*:** Research in high-income countries has identified an array of risk factors for youth antisocial behavior. However, in low- and middle-income countries, despite higher prevalence of offending and antisocial behavior, there is a paucity of prospective, longitudinal evidence examining predictors. South Africa is a middle-income country with high rates of violence and crime, and a unique social context, characterized by striking income and gender inequality, and increasing number of children orphaned by AIDS. We tested predictors of antisocial behavior at community, family, and individual levels over four years. ***Methods*:** 1025 adolescents from poor, urban South African settlements were assessed in 2005 (50% female; *M*=13.4 years) and followed up in 2009. The sample analyzed consisted of the 723 youth (71%) assessed at both time points. We employed socio-demographic questionnaires and standardized scales. ***Results*:** Validity of our antisocial behavior measure was supported by cross-sectional associations with well-evidenced concomitants of youth antisocial behavior, including drug taking and truancy. Regression analysis indicated that male gender and experience of community violence, but not poverty or abuse, predicted antisocial behavior. ***Conclusion*:** Despite many South African youth experiencing abuse and poverty at the family level, our findings suggest that high levels of violence in communities may be a more important factor contributing to the development of antisocial behavior, particularly among males.

Keywords: antisocial behavior; community; HIV/AIDS; orphans; risk factors; violence.

What are the risk factors for antisocial behavior among low-income youth in Cape Town?

Decades of research from longitudinal studies has documented a set of risk factors for antisocial and aggressive behavior at individual (e.g., gender, early-onset conduct problems), family (e.g., harsh or punitive parenting practices; parental violence; poverty), and community levels (e.g., living in a neighborhood with high crime, or a gang culture) (Loeber, Farrington, Stouthamer-Loeber, & Van Kammen, 1998; Murray & Farrington, 2010). Given the high cost of antisocial behavior to societies (Scott, Knapp, Henderson, & Maughan, 2001), developing well-evidenced etiological theories and identifying malleable intervention targets remain key research priorities. Indeed, evidence from intervention studies suggests that targeting family- and social-level risk factors reduces the likelihood of children developing antisocial or delinquent behaviors (e.g., Farrington & Welsh, 2007; Knerr, Gardner & Cluver, 2013; Piquero, Farrington, Welsh, Tremblay & Jennings, 2009). Nevertheless, the majority of longitudinal research of this topic comes from high-income countries (HIC), and, despite much higher levels of crime and violence in many low- and middle-income countries (LMICs; Krug, Dahlberg, Mercy, Zwi, & Lozano, 2002), very much less is known about the causes of and prevention possibilities for antisocial behavior in LMICs (Knerr et al., 2013; Murray, Anselmi, Gallo, Fleitlich-Bilyk, & Bordin, 2013).

Overview of the South African context

South Africa is a middle income country with homicide, violent crime, intimate partner violence, and child abuse rates well above those of comparable other countries (Seedat, Van Niekerk, Jewkes, Suffla, & Ratele, 2009). Of more concern is that, in common with many other countries, youth aged 12-22 years are the most likely perpetrators of violent or aggressive crime. Indeed, approximately 35% of the prison population is under 25 years old (Clark, 2012; Department of Correctional Services, 2010). It is somewhat surprising therefore that, to date, no

prospective longitudinal studies have empirically tested the individual-, family- and social-level risk factors associated with the development of antisocial and violent behavior in youth.

First, the question of whether the same causal factors reliably identified by prospective, longitudinal studies in HIC also predict antisocial behavior in youth samples in South Africa needs to be investigated. It should be noted, however, that some of the factors that might be perceived as contributing to risk in a HIC-context (e.g., low income or bereavement) are relatively normative for many South African youth and thus it is possible that they may not be associated with risk for antisocial behavior in the same way. On the other hand, these factors may equally serve to enhance the level of risk in communities (van der Merwe, Dawes, & Ward 2012). Indeed, there may be risk factors unique to South Africa's history and the contexts in which young people are growing up, that represent important root causes for antisocial and violent behavior, including societal acceptance of gender violence; historic patterns of family disruption due to migration, and family and community violence related to patterns of alcohol abuse (van der Merwe et al., 2012). Surveys and qualitative investigations that have been carried out in recent years among youth in Cape Town (e.g., Leoschut, 2009; Burton, 2006; Leoschut & Bonora, 2007) have generated hypotheses about a number of inter-related risk and protective factors that may be causally related to the development of antisocial behavior (van der Merwe et al., 2012). These can be conceptualized within an ecological framework (Bronfenbrenner, 1979) operating at societal, community, family, and individual levels, with much of the literature (e.g. van der Merwe et al., 2012), tending to assume that key risk factors are likely to be similar to those known to be common other societies (Murray & Farrington, 2010), but with additional contextual factors such as extreme poverty and family disruption, related to historic patterns of oppression, and more recently to high levels of HIV/ AIDS infection and death.

Poverty, income inequality, and unemployment

First, widespread poverty, unemployment and income inequality have been argued to strongly undermine the social dynamic in South Africa. For example, 70% of the population in South Africa is categorized as poor, 48% of the population aged 15-25 years was unemployed in 2009 (Presidency of the Republic of South Africa, 2009). Income inequality, indexed by the Gini coefficient, is among the highest in the world. Anger and frustration at lack of opportunity and desire to gain material goods and status is hypothesized to increase the risk for antisocial behavior and crime. Nevertheless, there are many countries in the world with poverty levels comparable to those of South Africa, but without the high levels of violence. As such, it may be that it is the combination of poverty and unemployment with income inequality that contributes to high levels of antisocial behavior. Indeed, in one study of 63 countries (Wood, 2006), South Africa was found to have both the highest levels of homicide and income inequality. Other studies have reported high correlations between country-level inequality and various health outcomes, including violence (Wilkinson & Pickett, 2009) and family violence (Lansford & Deater-Deckard, 2012), although the robustness of these associations is unclear (Lynch et al., 2001).

Violence in communities and schools

Second, a more proximate cause for antisocial behavior in South Africa is hypothesized to be the frequent exposure of children to violence and crime in their homes, schools, and communities. For example, in the National Youth Victimization Study *(*Burton, 2006), 12% of youth reported witnessing violent interpersonal disputes between family members, around half of which involved the use of a weapon. In addition, 50% of youth reported knowing individuals in their community who had committed crimes, including dealing, mugging or assaulting others.

Youth are also victims of violence on a daily basis. For example, in the National Youth Life-style Survey, 52% of youth reported being hit, spanked, or caned at school (Leoschut, 2009).

At a community level, violent crime rates in Cape Town are significantly higher than those of high-crime cities in HIC. For example, homicide rates in Cape Town approach double those of Detroit. There also appears to be a disproportionate level of community violence among youth. For example, young people aged 15-34 years old account for over 90% of deaths due to homicide (Prinsloo, 2007). Related to the high levels of violence in communities, is a long tradition of male superiority in South Africa, manifested through high levels of violence and sexual violence against women (Jewkes et al., 2006), carrying of weapons, and high readiness to resort to violence to resolve disputes (see Cooper & Foster, 2008; Jewkes et al., 2006; Seedat et al., 2009). Gang-inspired masculinities are argued to be one of few options to achieve a positive identity and status for males growing up in deprived, marginalized and violent communities (Bruce, 2007; Cooper & Foster, 2008). Across a range of societies, large scale studies consistently find higher rates of antisocial behavior among males compared to females (Moffitt et al., 2001). Given the social context of South Africa, it might be expected that gender differences in antisocial behavior would be particularly pronounced (Seedat et al, 2009).

Empirical research in South Africa has tended to focus on whether violence exposure impacts on the internalizing problems of youth, including post-traumatic stress symptoms and psychological distress (e.g., Shields, Nadasen & Pierce, 2008; Ward, Flisher, Zissis, Muller, & Lombard, 2001). However, aside from risk of early death, and development of internalizing problems, experience of violence is also likely to contribute to the development of antisocial behavior among youth (Burton, 2006), although we are only aware of two studies carried out in LMIC that have tested this question empirically. First, Barbarin, Richter, & deWet (2001) found

that experience of family and community violence was cross-sectionally associated with increased levels of child aggression (aged 6 years old; *N*=625), and this effect was partly mediated through mothers' distress. Second, a recent study in a large, nationally representative sample of youth in South Africa (different from the sample in the current study), we found that community violence predicted increases in youth antisocial behavior over one year follow-up (Waller, Gardner, & Cluver, 2014).

Family-level risk factors

Third, the familial environment of youth growing up in South Africa is also argued to increase likelihood of antisocial behavior developing. In HIC, research has consistently highlighted the importance of stable family structures and particular parenting styles and practices to the development of antisocial behavior, including harsh and rejecting parenting practices (Gershoff et al., 2012; Shaw, Gilliom, Ingoldsby, & Nagin, 2003), lack of positive parenting (Gardner, Burton & Klimes, 2006) and poor parental supervision (Loeber, et al., 1998). In South Africa, it is rarer for children to grow up in a home with both biological parents; family structures and accepted norms for childrearing practice therefore differ considerably from those in many HIC (Coovadia, Jewkes, Barron, Sanders, & McIntyre, 2009). In combination with high rates of poverty, frequent migration between rural areas and cities, and children being orphaned, these family patterns may put children at higher risk of neglect, abuse and sexual violence, increasing their risk for poor mental health outcomes, including antisocial behavior.

The impact of HIV/AIDS

Finally, South Africa is currently experiencing one of the world's most severe HIV/AIDS epidemics, with 30% of pregnant women HIV-positive, and an estimated 1.9 million children AIDS-orphaned in 2010 (UNAIDS 2010), predicted to rise to 2.3, million by 2020 (Actuarial

Society of South Africa, 2005). AIDS-orphaned children experience high levels of internalizing problems, including depression, anxiety, and PTSD symptoms, which persist over time (e.g., Bhargava, 2005; Cluver et al., 2007, 2012; Nyamukapa et al., 2008). Furthermore, the poor mental health outcomes of this group appear to be further compounded by poverty, stigma, physical and emotional abuse, and bullying victimization (e.g., Boyes & Cluver, 2013; Cluver & Orkin, 2009; Cluver et al., 2013; Maughan-Brown 2010). Interestingly, there has also been speculation that children orphaned by AIDS are more likely to develop antisocial behavior, with one writer going as far as to argue that, *'this growing pool of orphans will be at greater than average risk to engage in criminal activity'* (Schönteich, 1999). Despite claims of this nature, no studies have empirically tested whether AIDS-orphanhood is *prospectively* related to developing antisocial or criminal behavior.

Current study

The current study examines risk factors associated with the development of antisocial and violent behavior among low-income youth from Cape Town. Using longitudinal data from 2005-2009, the study aimed to test risk factors at the individual, family and community level. First, we attempted to validate the measure of severe youth antisocial behavior in this context, by examining concurrent associations at time 2 between antisocial behavior scores and other youth risk behaviors, such as risky sex, taking drugs, being drunk, missing school. Second, predictors of antisocial behavior over time were examined. Hypothesized risk factors were either, (a) well-evidenced factors from studies examining the development of antisocial behavior in HIC, or (b) factors unique to the South African context that have been hypothesized to relate to the high levels of antisocial behavior documented at the population level (Seedat et al., 2009; Ward et al., 2012). Factors were tested at community, family and individual level, at time 1, including (age,

gender, AIDS-orphaned status, poverty, abuse, exposure to violence in family and community. Given the paucity of empirical evidence from studies examining risk factors for antisocial behavior among this population, the analysis was exploratory.

Methods

Participants

In 2005, 1025 young people were interviewed in Xhosa speaking peri-urban settlements around Cape Town. Sampling included household door-to-door visits in 10 settlements, nine schools, 18 community organizations, and additional purposive recruitment of street-children and child-headed households, aiming to include these important groups who are often excluded from surveys. Four-year longitudinal follow-up in 2009 achieved retention of 723 children (71%). Follow-up challenges included high mobility amongst the sample - many lived in informal settlements with no administrative systems; demolition of one informal settlement from which 189 children had been recruited in 2005; and near-impossibility of tracing street children due to high mobility and mortality. 12 interviews were curtailed due to substance inebriation of young people, or police raids. Thirty children at follow-up were interviewed in other, rural provinces, and three in prison. Less than 2% refused to participate (see xxx et al. 20xx, for further information on sampling).

Procedure

Ethical protocols were approved in 2005 and 2009 by XX University and Western Cape Education Department. Participation was voluntary and informed consent was obtained from all children and caregivers. Response rate was 99.7% in 2005, and 98.3% of those traced in 2009. All data was obtained from young people, who completed a 60 minute self-report questionnaire, assisted by interviewers, who were Xhosa-speaking social workers or community health workers.

No incentives were provided, although children received refreshments and certificates. Confidentiality was maintained, except if children were at risk of harm or requested assistance.

Measures

Sociodemographic information (time 1). Variables included youth age, gender, ethnicity, household composition, internal migration (to/from Cape Town), living in formal versus informal housing (informal defined as shack in a backyard or on its own plot), and orphanhood status, including orphanhood due to HIV/AIDS. The UN definition of orphanhood was used – i.e. loss of one or both parents among children up to age 18 (Skinner et al., 2006; UNAIDS, 2004); 425 children were AIDS-orphaned, 241 other-orphaned, and 278 non-orphaned. Eighty-one were excluded from analyses due to orphanhood by unknown causes (see xxx et al. 20xx, for full definition). Sociodemographic variables were treated as categorical variables, apart from youth age; outcome and risk variables (below) were all treated as continuous variables.

Antisocial behavior outcome at time 2. Antisocial behavior was assessed using a summed composite scale comprising items from the 11-item delinquency subscale of the Youth Self-Report (CBCL-YSR; Achenbach & Rescorla, 2001), and the 5-item conduct problems subscale of the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997). Three antisocial behavior items, adapted from the South African National Primary Schools Violence Survey (Burton, 2008) were added to the questionnaire, asking about carrying a knife or gun for protection, and gang membership. In order to increase the likelihood that the antisocial behavior items would be considered severe in any cultural context, we selected from this item-pool seven 'severe' items, including CBCL, 'vandalism'; SDQ, 'fights', 'lies or cheats', and 'steals'; additional items, 'carries gun', 'carries knife', and 'member of a gang'. The seven severe items were subjected to Confirmatory Factor Analysis in Mplus 6.0 (Muthen & Muthen, 2010) with

WLSMV estimation. Fit statistics were satisfactory (CFI=.99; TLI=.99; RMSEA=.015) and scale reliability was moderately high (α=.63). A composite score was created by summing the seven items, and this 'antisocial behavior score' was used as the main outcome in all analyses. As a further check on the severe items, all subsequent analyses were also re-run with the full item pool, i.e. including the following, don't feel guilty, have bad companions, prefer older kids, run away, truant, swear, use alcohol or drugs, get angry and lose temper. The pattern of results was unchanged. Other risky behaviors, including drug and alcohol use, and sexual risk behavior, were measured at time 2, using items from the National Survey of HIV and Risk Behavior (Pettifor et al., 2004).

Hypothesized risk variables (assessed at time 1). Potential risk and protective variables were identified through literature examining antisocial behavior among samples of youth in low/middle-income, as well as high income countries. Individual level factors included age and gender, and time 1 level of delinquency, measured by the Youth Self Report. *Family-level risk factors* were assessed as detailed below. For all indices, higher scores represent higher levels of risk:

Poverty. An index was created by summing the following: i) child hunger, based on a cut-off score of two or more days a week for two separate scales from the South African National Food Consumption Survey (Labadarios et al., 2003) assessing i) hunger and insufficient food at household level (youth were asked on how many days this week they a) went to bed hungry; and b) did not have enough food in the home) ii) lack of any employment in the household; iii) receipt of means tested social grants.

Child abuse. An index was created by summing the responses of youth about whether they experienced *physical, emotional,* or *sexual abuse,* using UNICEF scales for sub-Saharan

Africa, using conservative cut-offs for severe abuse (Cluver et al, 2011; Snider & Dawes, 2006): i) *Physical abuse* was weekly or more frequent beating with an object or deliberate harm; ii) *Emotional abuse* was weekly or more frequent exposure to verbal abuse, threats to evict children from home, or invoking evil spirits against children; iii) *Sexual abuse* was unwanted genital contact or rape.

Home violence. A summed score was used that assessed frequency of exposure to past-week verbal violence and physical violence between adults in the household.

Community level violence. This was assessed using four items from the Child Exposure to Community Violence Checklist (Richters & Martinez, 1993), adapted to reflect commonest community traumas for youth in South Africa, as identified by national police statistics (SAPS, 2004). The index was created by summing the responses of youth about whether they had, (a) witnessed someone being shot; (b) witnessed someone being stabbed; (c) been physically attacked in their community; (d) been robbed in their community.

Analytic strategy

Data were analyzed using SPSS (v19.0). First, as a preliminary check, differences in baseline sociodemographic characteristics of children retained and lost to follow-up were noted using Chi-squared tests and one-way ANOVAs. Second, the validity of the main outcome measure, time 2 antisocial behavior score was examined. A series of one-way ANOVAs were run to examine cross-sectional associations between youth antisocial score and concomitants of antisocial behavior, including truancy, drug and alcohol use, and risky sexual behavior. Third, hierarchical multiple regression was used to examine individual-, family- and community-level risk factors for antisocial behavior. We note that analyses at both time points focus only on the young people (n=723) for whom we had data at both time 1 and time 2. Nevertheless, we

analyze attrition with respect to the originally recruited sample of 1025, in order to comment on generalizability from the sample analyzed to the larger sample recruited.

Results

Preliminary data check

Prior to analysis, differences between children lost (and thus not included in these analyses) compared to those retained at follow-up were examined. Those lost were more likely to be male ($\chi^2(1)=4.18$, $p=.04$; Cramer's phi (V)=.06), older ($F(1,1022)=17.81$, $p< .001$; partial $\eta^2=.02$), and living in informal housing ($\chi^2(1) = 6.24$, $p=.01$; $V=.08$), and to show somewhat higher levels of conduct problems, ($F(1,1015)=5.6$, $p< .02$). Although follow-up of 71% was relatively high after 4 years for this highly mobile and at-risk population, generalizability of the results should be interpreted in light of the fact that some of the most vulnerable children from our original sample, and potentially those most at risk of developing antisocial behavior, were among those who had died or were unable to be traced, and were not included in the analyses at either time point.

Descriptive statistics

Descriptive statistics for continuous study variables are presented in Table 1. Additionally, 49% of the sample were female, 39% had migrated to/from Cape Town, 72% were parentally bereaved, 41% had been orphaned specifically by AIDS, and 36% lived in an informal dwelling. Partial correlations between continuous main study variables were computed, controlling for gender (Table 2). Variables assessed at time 1 showed small to moderate correlations, including associations between delinquency and the family- and community-level risk indices. Controlling for gender, time 1 delinquency, experience of community violence and age all showed modest correlations with antisocial behavior score at time 2.

Concomitants of antisocial behavior

Cross-sectional analyses were run, to examine concurrent validity of the antisocial behavior score. Specifically, youth with higher scores at time 2 were more likely to be male ($F(1,722)=17.92$, $p< .001$), older (r= .07, p <.05) regularly missing school ($F(1,721)=8.83$, $p<.01$), to have been drunk ($F(1,583)=26.47$, $p<.001$), or to have taken drugs at least once in the last month ($F(1,584)=66.52$, $p<.001$), and there was a trend toward them being more likely to have had sex before the age of 15 ($F(1,378)=3.01$, $p<.10$). Finally, in contrast to Schönteich's (1999) hypothesis, antisocial behavior scores were not associated with being orphaned (from any cause) nor with being orphaned by AIDS at time 2.

Predictors of antisocial behavior

Hierarchical multiple regression was used to examine predictors of antisocial behavior. In step 1, demographic factors and individual-level covariates were entered (gender, age, migration to/from Cape Town, living in formal versus informal housing, orphanhood status, and time 1 delinquency). In step 2, the 'home poverty', 'child abuse', and 'community violence' risk indices were entered. Table 3 shows the results from the regression analysis. The overall model was significant, $F(9, 702)=4.88$, $p<.001$. Male gender was significantly associated with higher levels of antisocial behavior ($\beta=-.16$, $p<.001$). None of the other individual-level or demographic covariates contributed significantly to the model. The inclusion of the family- and community-level risk indices in the second step of the regression explained an additional 1% of the variance in antisocial behavior, $\Delta F=2.92$, $p<.05$. The risk index of 'community violence' predicted antisocial behavior ($\beta=.11$, $p<.01$), but neither of the family-level risk indices (poverty, abuse) were significant predictors. The pattern of results was the same whether the family- and community-level risk indices were entered simultaneously or in separate models.

Post-hoc moderation analysis

The first set of models found a main effect of community violence and gender on antisocial outcomes. Inspection of descriptive data revealed gender differences in both exposure to community violence and antisocial behavior, thus a second, exploratory hierarchical multiple regression was run to examine the moderating effect of gender on the experience of community violence in predicting antisocial behavior. As before, individual-level and demographic factors were controlled for in Step 1. In step 2, the main effect of experiencing community violence was entered. In step 3, the product term was entered: 'experience of community violence × gender'. Variables were centered before creating the product term. Significant interaction effects were examined by testing if the slope of the regression lines for males versus females differed significantly from zero (Cohen, Cohen, West, & Aiken, 2003). Regression equations were used to plot mean values for antisocial behavior at minimum and maximum values of community violence experience as a function of gender (male versus female). Table 4 shows the results from the regression analysis. The overall model was significant, $F(8,703)=6.12$, $p<.001$. As before, there was a main effect of both male gender ($\beta=-.15$, $p<.001$) and experience of community violence ($\beta=.18$, $p<.001$) in predicting antisocial behavior. The inclusion of the interaction term in the model explained an additional 1% in the variance of antisocial behavior, $\Delta F=5.22$, $p<.05$. There was also a significant unique interaction effect between gender and experience of community violence ($\beta=-.11$, $p<.05$). Probing of this significant interaction effect revealed that experience of community violence predicted antisocial behavior score in males ($\beta=.16$, $p<.01$) but not females ($\beta=.01$, $p=.80$) (see Figure 1 for plots of the simple slopes).

Discussion

This study examined the development of antisocial behavior in sample of South African youth. In common with other LMIC, there is paucity of prospective, longitudinal evidence examining the development of antisocial behavior in South Africa, although much has been written about the social context and the high rates of violence and crime at a population level (Clark, 2012; Leoschut, 2009; Burton, 2006; Seedat et al., 2009; Ward et al., 2012). The current study is the first, to our knowledge, to adopt a prospective, longitudinal design to empirically test the prediction of antisocial behavior by individual-, family- and community-level risk factors among a low-income, sample of adolescents in Africa.

Male gender and antisocial behavior scores

First, the results support well-documented findings suggesting that antisocial and violent, behavior among South African youth is largely perpetrated by males, albeit a small minority of males in this sample. Male gender was strongly cross-sectionally associated with antisocial behavior and predicted higher scores at four-year follow-up. Some literature focused on the South African context links violence to conceptualizations of masculinity, influenced by a patriarchal ideology and gang culture (Seedat et al., 2009; Foster, 2012). These findings arguably support the need for current discourses about masculinity in South Africa to be challenged. One solution to youth violence is argued to involve a 'process of human development' (Simpson, 2001), which gives young males in particular, a stake in communities that does not involve antisocial or violent behavior.

Experience of community violence

Second, antisocial behavior was predicted by exposure to community-level violence controlling for earlier delinquency and sociodemographic covariates (including gender, age, migration, and orphanhood). The community violence index included youth witnessing shootings,

stabbings, being attacked, and being robbed. Given the well-documented high levels of violence exposure for youth in South Africa, it is interesting that this index of community violence still predicted antisocial behavior development over four years, even after controlling for earlier delinquency, gender, and age. The results fit with the Center for Justice and Crime Prevention's survey of youth resilience to crime, where 70% of non-offenders reported being exposed to community violence, compared to 90% of respondents within an offender subgroup (Burton, Leoschut & Bonoro, 2009). In addition to this main effect, our post-hoc analysis revealed an interaction with gender, such that this main effect of community violence on antisocial behavior is carried almost entirely by males.

Specifically, exposure to community violence at time 1 predicted higher antisocial behavior only among males. This finding highlights again the particular risk for males to develop antisocial behavior. It is unclear from the current study however, whether males are particularly vulnerable to the effects of community violence, or simply more likely to be exposed to it. High exposure for some young people will be a random event, but for others it may result from association with peer and gangs who engage in violence or other offending. Nevertheless, finding ways to challenge these processes seems an important step in reducing the transmission of violence from adult to young males within communities.

Other family-level risk factors

Third, somewhat surprisingly, neither of the family-level risk indices predicted antisocial behavior development. In studies from HIC, child maltreatment and abuse are well-documented risk factors for the development of conduct problems (Dodge & Pettit, 1993). In the current study, the 'child abuse' index, which assessed children's cumulative experience of physical, verbal and sexual abuse, and witnessing domestic violence, was not a risk factor for later

antisocial behavior. Nevertheless, this index was cross-sectionally associated with delinquency, and it may be that the follow-up period of 4 years was not able to detect significant longitudinal effects of family-level abuse on the development of antisocial behavior. In case the link between abuse and antisocial behavior might depend on the type of abuse reported, we conducted further regression analyses with each abuse type in a separate model; although abuse was associated with severe conduct problems at time 1, no type of abuse was predictive of antisocial behavior four years later. There are several possible explanations for this lack of association over time. Firstly, by time 2, when many young people were approaching older adolescence, it may be that the effects of abuse in the family are relatively less important than other variables such as peer and community influence. Secondly, it is possible that despite our definitions of abuse including only severe levels of abuse, that some of these forms of (for example) hitting in the family are considered normative in some contexts (Gershoff et al., 2012), and therefore were not predictive of severe antisocial behavior over time.

The 'home poverty' index also did not predict antisocial behavior. It is difficult to draw conclusions about this finding however, given the low-income sample being assessed. The three-item index may not have been able to adequately differentiate between different experiences of poverty within the sample, especially given the fact that all families in the sample were living in high-deprivation areas. As there may be limitations in the use of a means tested 'grant receipt' as part of a poverty index, we re-ran the regressions with each poverty measure entered separately; the results were unchanged. Alternatively, it may be that family-level variations in poverty, at this high level of deprivation, are not associated with antisocial behavior development, at least in this context, or that the experience of stark social inequalities may be a more salient influence. It is worth noting that this finding differs from the conclusions of a recent systematic

review of (mainly cross-sectional) data from another highly unequal, middle income country, Brazil (Murray et al., 2013), although these studies differed from the present study, in sampling a wider range of income levels.

Family HIV/AIDS

Finally, it is also worth noting that orphanhood by AIDS was not associated with antisocial behavior (neither cross-sectionally nor longitudinally). This finding is interesting given that it has previously been argued that parental death from HIV/AIDS will put a generation of youth at risk of criminality (Schönteich, 1999). In addition, previous longitudinal analyses with the same sample indicate that being orphaned by AIDS is strongly predictive of worsening levels of depression, anxiety and post-traumatic stress disorder over time, controlling for age, gender, baseline mental health, and sociodemographic covariates (xxx et al., 20xx). It therefore appears that while AIDS-orphanhood is a risk factor for poor mental health outcomes, the risk may be limited to internalizing problems, and that alternative factors in the ecology of youth are more important to the development of externalizing problems.

Limitations of the current study

This study has a number of limitations. First, although strenuous attempts were made to find participants after 4 years, 295 children were not traceable or had died. Analysis of the 2005 data suggests that those lost to follow-up were more vulnerable. However, as these 'lost' young people were not included in the analysis, the main implication for interpretation of the results is that the findings may not be generalizable to the slightly older, more troubled and impoverished sample originally recruited, and that, potentially, this may underestimate strength of predictors of antisocial behavior. Second, the data was entirely self-reported and youth may not have been truthful in their responses. To try and minimize social desirability effects, antisocial and sexual

behavior items appeared on a clearly marked 'confidential' section of the questionnaire, which was subsequently removed from the main questionnaire and placed in an unmarked envelope in front of participants. Nevertheless, the low base rate of youth endorsing items, such as carrying a gun or knife, relative to responses of youth on other surveys (e.g., Leoschut, 2009) is puzzling, and suggests that antisocial behavior scores in the current sample may have been an underestimate, reducing the likelihood of obtaining significant effects for predictor variables. Furthermore, our efforts to provide data to support the validity of the antisocial behavior score were limited in utilizing analyses of the present sample. Limitations in the measure of poverty were outlined earlier. Third, while male gender and experience of community violence both predicted later antisocial behavior, the amount of variance explained by models was quite small (between 5-7%). While the four-year follow up period may explain the small amount of variance explained, other unmeasured factors may contribute to the risk for developing antisocial behavior. For example, qualitative investigations have highlighted perceived income disparity, gang culture and a lack of parental involvement as salient risk factors for youth engagement in criminality (Leoschut & Bonora, 2007). Unfortunately, measures of these variables were not available in our data, but future empirical studies are needed to examine their prediction of youth antisocial behavior.

Conclusions and future directions

Despite these limitations, there are a number of strengths to the study. It is one of the first empirical studies to prospectively examine risk factors for antisocial behavior among a large, low-income sample of African youth, a population well-recognized for being at risk of developing severe forms of violent, criminal and gang-related behavior. In addition, the oversampling of child-headed households, non-school attending children, and children orphaned

by HIV/AIDS potentially increases the generalizability of the findings, and enables stronger conclusions to be drawn about risk processes for antisocial behavior among this population. Young people growing up in post-apartheid South Africa experience marginalization, impoverishment and striking levels of relative deprivation (Foster, 2012), and rates of antisocial, violent and criminal behavior are an increasingly concerning social problem (Clark, 2012). This study suggests that experience of community violence exacerbates the likelihood of developing high levels of antisocial behavior, in particular, for young men. At the same time, future empirical studies are needed to explore further the unexpected failure to find any association between experience of abuse and youth antisocial behavior, and to examine the role of family-level risk and protective factors in its development during childhood and adolescence.

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Table 1

Descriptive statistics for main study variables (continuous measures)

	N	*M*	*SD*	*Minimum*	*Maximum*
Outcome (time 2)					
Antisocial behavior score	723	.57	.93	0	6
Risk factors (time 1)					
Age	723	13.74	1.62	10	19
Delinquency	723	1.62	1.68	0	8
'Child abuse' index	723	1.00	1.05	0	6
'Home poverty' index	716	.97	.95	0	3
'Community violence' index	720	1.27	1.02	0	4

Table 2

Partial correlations among main study variables, controlling for gender

	1	2	3	4	5
1. Antisocial behavior score time 2					
2. Age	.08*				
3. Delinquency time 1	.10*	.25***			
4. 'Community violence' index time 1	.12**	.08*	.18***		
5. 'Child abuse' index time 1	-.01	-.09	.16***	.26***	
6. 'Home poverty' index time 1	.06†	.27***	.36***	.09*	.01

†p<.10; *p <.05; **p<.01; ***p<.001.

Table 3

Regression analysis examining the prediction of time 2 antisocial behavior score by time 1 individual-, family- and community-level risk factors

Step	Independent variables	β	R^2	$R^2\Delta$
1.	Gender	-.16***		
	Age	.07		
	Time 1 delinquency	.08		
	Orphan status	.01		
	Migration	-.02		
	Household type	.06	.05***	
2.	Home poverty index	.02		
	Child abuse index	-.03		
	Community violence index	.11**	.06***	.01*

†p<.10; *p <.05; **p<.01; ***p<.001. Note that the pattern of findings was unchanged when we log-transformed antisocial behavior scores. Further, we found the same pattern of effects using a fuller 15-item measure of antisocial behavior (see Methods).

Table 4

Regression analysis testing for moderation by gender on the prediction of antisocial behavior score at time 2 by experience of community violence at time 1

Step	Independent variables	β	R^2	$R^2\Delta$
1.	Gender	-.15***		
	Age	.06		
	Time 1 delinquency	-.01		
	Orphan status	.01		
	Migration	.07		
	Household type	.06	.05***	
2.	Community violence	.18***	.06***	.01**
3.	Community violence x gender	-.11*	.07***	.01**

†p<.10; *p <.05; **p<.01; ***p<.001.

Figure 1

Simple slopes showing experience of community violence predicting antisocial behavior score in males versus females