Cash plus care: social protection cumulatively mitigates HIV-risk behaviour among adolescents in South Africa

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Objectives: It is not known whether cumulative 'cash plus care' interventions can reduce adolescent HIV-infection risks in sub-Saharan Africa. This study investigated whether parental AIDS and other environmental adversities increase adolescent HIV-risk behaviour and whether social protection provision of 'cash' or integrated 'cash plus care' reduces HIV-risk behaviour.

Design: A prospective observational study with random sampling (<2.5% baseline refusal, 1-year follow-up, 96.8% retention).

Methods: Three thousand five hundred and fifteen 10–18 year-olds (56.7% girls) were interviewed in South Africa between 2009–2010 and 2011–2012. All homes with a resident adolescent were sampled, within randomly selected census areas in two urban and two rural districts in two provinces. Measures included potential environmental risks (e.g. parental HIV/AIDS, poverty), social protection: receipt of cash/food support (e.g. child grants, school feeding), care (e.g. positive parenting) and HIV-risk behaviours (e.g. unprotected sex). Analyses used logistic regression.

Results: Cash alone was associated with reduced HIV risk for girls [odds ratio (OR) 0.63; 95% confidence interval (95% CI) 0.44–0.91, $P = 0.02$] but not for boys. Integrated cash plus care was associated with halved HIV-risk behaviour incidence for both sexes (girls OR 0.55; 95% CI 0.35–0.85, $P = 0.007$; boys OR 0.50; 95% CI 0.31–0.82, $P = 0.005$), compared with no support and controlling for confounders. Follow-up HIV-risk behaviour was reduced from 41 to 15% for girls and from 42 to 17% for boys. Girls in AIDS-affected families and informal-dwelling boys had higher HIV-risk behaviour, but were less likely to access integrated social protection.

Conclusion: Integrated cash plus care reduces male and female adolescent HIV-risk behaviours. Increasing adolescent access to social protection may be an effective HIV prevention strategy in Sub-Saharan Africa.

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As children grow into adolescence, their HIV risk is a formidable concern. In 2012, an estimated 160 000 adolescents became infected in sub-Saharan Africa. In the same region, adolescent AIDS deaths have doubled since 2003 [1]. Meta-analyses suggest limited effectiveness of stand-alone HIV-prevention programmes, leading to arguments for 'combination prevention' approaches, targeted at highest risk groups, which

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include biomedical, behavioural and social components [2].

Social protection interventions remain undertested for possible effects on adolescent HIV-prevention [3]. An exception to this is emerging evidence from the region showing that small, regular and unconditional cash transfers to poor households can reduce adolescent girls' HIV-risk behaviours, both in randomized trials and in national government programmes [4–6].

But this evidence raises further questions. If cash transfers can reduce some HIV risks, are there HIV-prevention benefits of adding other forms of social protection, such as care and support, to cash or food provision: 'cash plus care'? The adverse childhood experiences (ACE) studies show that cumulative stressors can increase negative sexual outcomes [7], but to date, no known studies examine the obverse, whether cumulative support can protect against youth HIV-risk behaviour. Models of child resilience, tested in high-income countries, suggest cumulative positive effects of intervening simultaneously in different spheres of a young person's life [8].

But we are rightly cautious in extrapolating evidence from high-income countries and on other youth outcomes, to HIV risks in sub-Saharan Africa. In the region, governments are showing increasing interest in 'cash' and 'cash plus' provision. But there is a need for rigorous testing of effects on adolescent HIV risks, and in 'real-world conditions', that is when programmes are delivered at scale by governments and non-governmental organizations (NGOs).

There are also particularly high-risk groups within adolescents. Environmental factors associated with HIV-risk behaviour include informal housing, poverty, school nonattendance [3] and being AIDS-affected or orphaned [9,10]. It is important to assess whether high-risk groups are accessing effective interventions. Finally, given established sexual differences in HIV risks, it is essential to test whether effects of social protection differ by sex.

This study has three aims: first, to identify environmental factors predicting HIV-risk behaviour among adolescents; second, to examine whether social protection (cash alone and integrated cash plus care) is associated with adolescent HIV-risk behaviour in girls and boys; third, to assess rates of access to social protection amongst highest risk and lower risk adolescents.

Materials and methods

Participants and procedures
The sample included 3516 children and adolescents aged 10–18 years (56.7% girls), interviewed at baseline (2009–2010) and followed up at 1 year (2011–2012). Refusal rate at baseline was less than 2.5% and follow-up retention rate was 96.8%. Two urban and two rural health districts with more than 30% antenatal HIV-prevalence were selected within two South African provinces: Mpumalanga and the Western Cape. Within health districts, sequentially numbered census enumeration areas were sampled using random number generation until sample size was reached. In each area, every household was visited and included in the study if they had a resident adolescent. In each household, one randomly selected adolescent was interviewed face-to-face for 60–70 min. All questionnaires, information and consent forms were translated and checked with back-translation into Xhosa, Zulu, Sotho and Shangaan, and adolescents participated in the language of their choice.

Ethical protocols were approved by the Universities of Oxford, Cape Town and KwaZulu-Natal, and all Provincial Health and Education Departments. All interviewers were trained in working with vulnerable youth, and voluntary informed consent was obtained from adolescents and primary caregivers. No incentives were given, apart from refreshments and certificates of participation. Confidentiality was maintained, except where participants were at risk of significant harm or requested assistance. Where participants reported recent abuse, rape or risk of significant harm, immediate referrals were made to child protection and health services, with follow-up support. For past abuse or rape, referrals were made to support services and to HIV/AIDS services where appropriate.

Measure
Adolescent HIV-risk outcomes were measured at baseline and follow-up, using scales from the National Survey of HIV and Sexual Behaviour amongst Young South Africans and the SA Demographic and Health Survey [11] for eight risks associated with youth HIV infection in high-prevalence contexts. 'Transactional sexual exploitation' was sex in exchange for food, shelter, school fees, transport or money; 'age-disparate sex' was having a sexual partner more than 5 years older than the adolescent [11]; 'past-year initiation of adolescent sexual activity' was first having vaginal or anal sex, with a partner of either sex in the past 12 months; 'unprotected sex' was 'sometimes' 'rarely' or 'never' using condoms when having sex in the past year (versus 'always' using condoms or no sexual activity); 'multiple sexual partners' was having more than two past-year partners [12]; 'casual partners' was having 'one-night stands' or sexual partners who were not regular boyfriends/girlfriends; 'sex whilst using substances' was having sex whilst drunk or using any drug (e.g. crystal methamphetamine, marijuana). 'Pregnancy' was becoming pregnant (girls) or making someone pregnant (boys). Risk behaviours were combined into a scale, and dichotomised as one or more HIV-risk behaviour versus none at baseline and follow-up.

Social protections were measured at baseline and follow-up for 12 components. 'Child-focused cash transfer receipt' was measured as household access to either a child support or foster child grant [13]. 'School feeding' was daily, free meals provided at school, and 'free school transport' and 'free school uniform' were also measured; 'access to food gardens' was receiving food from a school or community garden; 'food parcels' were regular, reliable provision of food parcels to the household. 'Soup kitchen feeding' was regular provision of free meals from a community centre. 'Home-based carer support' was at-least monthly household visits from a home-based caregiver, nurse or volunteer providing medical and social support. 'Teacher social support' was social, practical and emotional support from a teacher, using a standardized scale used previously in South Africa [14]. 'School counsellor' was past-year school-based counselling and 'positive parenting' was measured using a validated Alabama Parenting Questionnaire subscale [15] and included primary caregiver praise and warmth. 'Free schooling' was measured, but not included in this analysis due to local reports of extensive obligatory 'top-up' payments. Evidence suggests that in order to show effects, social protection requires sustained and predictable duration as well as current receipt [16]. Consequently, each type was dichotomized into receipt/no receipt, with positive coding requiring exposure at both baseline and 1-year follow-up. After categorical principal components analysis, social protections were categorized, dichotomized into no support, economic support (labelled cash) and combined economic and psychosocial support (labelled cash plus care). This study aimed to examine the effects of social protection in real-world conditions in a Southern African context. In order to maximise utility, we measured cash and care services that are typically provided by governments, NGOs and families. These were identified in consultation with the South African National Departments of Social Development, Basic Education and Health, PEPFAR-USAID, UNICEF and Save the Children, in qualitative pilot research and with our 'teen advisory group' of adolescents.

Potential environmental risks

Six environmental risks were included, measured at baseline and follow-up. 'AIDS-affected adolescents' were AIDS-orphaned, living with AIDS-unwell caregivers or both. Given low levels of testing and HIV-status knowledge, parental AIDS-death and illness were determined using verbal autopsy methods [17], validated in previous studies of adult mortality in South Africa, (sensitivity 89%; specificity 93% [18]). In this study, determination of HIV/AIDS required reported HIV-positive status with $CD4^+$ cell count less than 350 cells/μl, or a conservative threshold of at least three AIDS-defining illnesses, for example Kaposi's sarcoma or shingles. 'Poverty' was measured using an index of access to the eight highest socially perceived necessities for children, corroborated by more than 80% of the population in the nationally representative SA Social Attitudes Survey

[19]. 'Older adolescence' measured age and dichotomized by at least 15 years at follow-up. Urban/rural location, formal/informal housing, household employment, sex of primary caregiver, migration between homes and school nonenrolment were measured using items adapted from the South African census. Regression models used socio-demographics measured at baseline, except for the 'AIDS-affected' variable. Due to evidence that recent parental illness/death is associated with both immediate and lasting negative outcomes for adolescents, this was coded as positive if AIDS-affected at baseline and/or follow-up.

Analyses were disaggregated by sex and conducted in eight stages on the longitudinal sample ($n = 3401$). As few adolescents ($n = 9$) below 12 years old reported any sexual activity, the dataset was limited to adolescents aged 12–18 years, excluding 305 boys and 428 girls from further analyses and yielding ($n = 2668$). First, sociodemographic characteristics of the sample were examined, and potential sex differences tested (Table 1). Second, associations between potential environmental risk factors and HIV-risk behaviour were examined using multivariate logistic regression. Model 1 included potential risk factors (being AIDS-affected, poverty, age, urban/rural location, formal/informal housing and school nonenrolment). Model 2 additionally controlled for baseline HIV-risk behaviour, in order to determine whether potential factors predicted HIV-risk behaviour independently of prior HIV risk. By using dichotomous variables of 'any HIV-risk behaviour' at baseline and follow-up, this comprised the most conservative measure of risk behaviour incidence, namely one or more risk at follow-up where there was no risk at baseline.

Third, numbers of adolescents receiving each social protection component were calculated, and social protection types were excluded where numbers reached were too small for analysis. Fourth, categorical principal components analysis confirmed that the retained social protections loaded adequately onto a single component to be treated as a scale. Fifth, a cumulative 'cash plus care' scale was hypothesized: no support (0), cash/food support (1) (based on existing evidence of impacts of cash transfers, and adding school feeding and food gardens) and integrated cash plus care (2) (adding positive parenting and/or teacher support) and coded both as ordinal and as dummy variables for use in regression models. Sixth, in order to check for consistency across risk behaviours, a partial correlation matrix tested direction of effect for each individual risk behaviour with the cash plus care scale.

Seventh, potential predictors of receipt of social protection, identified in previous studies [5] (age, urban/rural location, formal/informal housing, poverty, more than moves between homes, female primary caregiver, good parental discipline, household unemployment), were examined using multivariate logistic regression. Any variables that were significantly associated with receipt of cash plus care for either sex (boys: age, informal; for girls:

Table 1. Sample characteristics and HIV-risk behaviours, disaggregated by sex.

Sociodemographic variables	Baseline			Follow-up		
	Male	Female	P	Male	Female	P
Mean age (SD)	14.17 (1.63)	14.29 (1.66)	0.061	15.39 (1.74)	15.54 (1.78)	**0.025**
Female, n (%)	1170 (44%)	1498 (56%)	**<0.001**	1170 (44%)	1498 (56%)	**<0.001**
Poverty – mean number of necessities lacking	2.60 (2.29)	2.76 (2.33)	0.081	2.60 (2.34)	2.91 (2.37)	**0.001**
No job in the household, n (%)	261 (22%)	376 (25%)	0.093	255 (22%)	362 (24%)	0.150
Lives in informal dwelling, n (%)	349 (30%)	471 (31%)	0.370	232 (20%)	321 (21%)	0.302
Western Cape, n (%)	578 (49%)	782 (54%)	–	578 (49%)	782 (54%)	–
Mpumlanga, n (%)	592 (51%)	716 (46%)	0.151	592 (51%)	716 (46%)	0.151
Lives in urban area, n (%)	592 (51%)	717 (48%)	–	588 (50%)	714 (48%)	–
Lives in rural area, n (%)	578 (49%)	781 (52%)	0.161	582 (50%)	784 (52%)	0.184
Child moved homes >2, n (%) (Baseline); Moved home in the past year, n (%) (follow-up)	377 (32%)	558 (37%)	**0.007**	46 (4%)	82 (6%)	0.064
Female primary caregiver, n (%)	1012 (87%)	1354 (90%)	**0.002**	1021 (87%)	1325 (89%)	0.351
Very good parental discipline and monitoring, n (%)	134 (8%)	183 (9%)	0.772	77 (5%)	157 (8%)	**0.014**

HIV-risk behaviour	Baseline			Follow-up		
	Male	Female	P	Male	Female	P
Sex using alcohol or drugs, n (%)	30 (3%)	36 (2%)	0.791	52 (4%)	36 (2%)	**0.003**
Inconsistent condom use, n (%)	113 (10%)	129 (9%)	0.290	153 (13%)	176 (12%)	0.301
2+ sexual partners in the past year, n (%)	119 (10%)	64 (4%)	**<0.001**	185 (16%)	120 (8%)	**<0.001**
Transactional sex, n (%)	19 (2%)	44 (3%)	**0.027**	30 (3%)	58 (4%)	0.061
Age-disparate sex, n (%)	14 (1%)	51 (3%)	**<0.001**	31 (3%)	45 (3%)	0.585
Past year sexual debut, n (%)	29 (3%)	99 (7%)	**<0.001**	192 (16%)	202 (14%)	**0.035**
Casual sex, n (%)	32 (3%)	11 (1%)	**<0.001**	51 (4%)	5 (<1%)	**<0.001**
Pregnancy, n (%)	4 (<1%)	46 (3%)	**<0.001**	6 (1%)	71 (5%)	**<0.001**
Any sexual risk behaviour, n (%)	178 (15%)	240 (16%)	0.569	391 (33%)	431 (29%)	**0.010**

Percentages are rounded to the nearest percentage. Significant P values are bolded. Significance levels are associated with χ^2 from either a 2×1 contingency table (Sex), a 2×2 contingency table (all HIV-risk variables) or one-way ANOVA (age and poverty). –, not applicable due to 2×2 contingency table (i.e. sex × Urban/Rural Location, sex × province).

age, informal, poverty, more than two moves of home) were included as covariates in all subsequent regression models, in addition to controlling for environmental predictors of HIV-risk behaviour.

Eighth, independent effects of 'cash' and integrated 'cash plus care' on HIV-risk behaviour were examined with multivariate logistic regression in a series of steps, using dummy variables against a base category of no social protection. Model 1 controlled for environmental factors that had significantly predicted either HIV-risk behaviour or receipt of social protection. Model 2 additionally adjusted for baseline HIV-risk behaviour in order to determine whether social protection predicted HIV-risk behaviour independently of prior risk.

Results

Sociodemographic and risk behaviour characteristics

The mean age at baseline was 14 for girls and boys (Table 1). One-third of adolescents lived in informal dwellings, and one-third had moved homes more than two times. Participants lacked a mean of 2.3 out of eight basic necessities, and 45% of boys ($n = 523$) and 52% of girls ($n = 771$) were AIDS-affected at either baseline or follow-up. Prevalence of more than one HIV-risk behaviour for girls at baseline was 16% ($n = 240$) and at follow-up was 29% ($n = 431$), and for boys at baseline was 15% ($n = 178$) and at follow-up was 33% ($n = 391$). At both baseline and follow-up, boys reported more multiple partners and casual sex, and girls reported more transactional and age-disparate sex, past-year sexual initiation (baseline) and pregnancy.

Environmental predictors of adolescent HIV-risk behaviour

Multivariate logistic regressions, controlling for sex (Table 2, Model 1), and additionally adjusting for any baseline HIV-risk behaviour (Model 2) identified environmental predictors of incident HIV-risk behaviour at follow-up. Predictors of risk were being AIDS-affected for girls (AIDS-orphaned/having an AIDS-unwell caregiver) [odds ratio (OR) 1.50; 95% confidence interval (95% CI) 1.14–1.97, $P < 0.004$], and living in

Table 2. Logistic regression models showing associations (unadjusted and adjusted for baseline HIV-risk behaviour) between potential environmental predictors and HIV-risk behaviour for boys and girls.

	One or more HIV-risk behaviours (girls)		One or more HIV-risk behaviours (boys)	
	Model 1: unadjusted OR (95% CI)	Model 2: adjusted OR (95% CI)	Model 1: unadjusted OR (95% CI)	Model 2: adjusted OR (95% CI)
AIDS-affected	1.56 (1.20–2.05)**	1.50 (1.14 – 1.97)**	1.13 (0.85–1.51)	1.12 (0.84–1.51)
Poverty	0.99 (0.93–1.05)	0.99 (0.93–1.05)	1.00 (0.94 – 1.07)	0.993 (0.93–1.06)
Age	2.01 (1.83–2.20)***	1.84 (1.67 – 2.03)***	1.79 (1.63 – 1.96)***	1.68 (1.53 – 1.85)***
Urban location	0.86 (0.66– 1.13)	0.80 (0.60–1.05)	0.903 (0.68–1.21)	0.86 (0.64–1.15)
Informal housing	1.38 (1.03– 1.85)*	1.33 (0.98–1.79)	1.84 (1.35–2.51)***	1.55 (1.12 – 2.14)**
School nonenrolment	1.48 (0.75–2.94)	0.85 (0.45–1.91)	2.98 (1.15–7.72)*	2.61 (0.99 6.89)
HIV-risk behaviour (baseline)	–	2.74 (1.95–3.84)***	–	2.70 (1.86–3.93)***

Notes: Model 1 adjusts for being AIDS-affected, and baseline age, poverty, informal housing, urban location and school nonenrolment. Model 2 additionally adjusts for baseline HIV-risk behaviour. CI, confidence interval; OR, odds ratio.
*$P < 0.05$.
**$P < 0.01$.
***$P < 0.001$.

informal housing for boys (OR 1.55; 95% CI 1.12–2.14, $P < 0.008$). For both sexes, risk behaviour increased with age.

Does social protection reduce incidence of adolescent HIV-risk behaviour?

Proportions of adolescents receiving each component of social protection are summarized in Table 3. There were no sex differences in social protection access, apart from girls receiving more home-based carer support. Types of social protection that reached less than 100 out of 3401 adolescents were excluded due to low numbers (food parcels: 0.1%, $n = 3$; soup kitchen 0.4%, $n = 10$, home-based caregiver: 0.7%, $n = 18$, school counsellor 3.7%, $n = 98$; free school transport 0.9%, $n = 8$; free school uniform 0.6%, $n = 7$). Five types of social protection remained: child grant 55.7% ($n = 1486$); positive parenting 24.9% ($n = 664$); teacher social support 7.9% ($n = 211$); free school meals 72.3% ($n = 1930$); food garden 4.9% ($n = 132$).

Categorical principal components analysis established [20] that the remaining social protections loaded onto two components, together accounting for 46.4% of total variance. Weightings on the first component comprised child grants (loading 0.59); school feeding (0.50); food gardens (0.54) (eigenvalue 1.2, 23.9% variance), teacher social support (0.45) and positive parenting (0.34). This first dimension was suitable for describing overall social protection provision [21,22], and choice of the numerical analysis level provided equidistance between categories [23]. A weighted index of the categories correlated very closely with a simple summation (Spearmans rho 0.98, $P < 0.001$). The second dimension (eigenvalue 1.1, 22.0% variance) distinguished the three 'cash' variables (child grants, school feeding, food gardens) and the two 'care' variables (positive parenting, teacher support) [24]. The social protections scale was therefore grouped into three ordinal categories of no support (0), 'cash' (1) and 'cash plus care' (2).

Partial correlation matrices investigated directions of effect for all individual risk behaviours against social protection. For all individual behaviours, associations were small, but as provision increased from no support to cash plus care, rates of risk behaviour reduced (girls range −0.01 to −0.08, boys range −0.01 to −0.10). The only exception was of the past-year variable 'made someone pregnant', which was only reported by eight boys and showed no associations. This variable was retained in the scale in order to maintain comparability between sexes.

Multivariate logistic regressions tested associations of cash, and combined cash plus care (represented by dummy variables, taking 'no support' as the reference category) with incidence of HIV-risk behaviour (Table 4, Fig. 1a, b), controlling for factors predicting HIV-risk behaviour or receipt of social protection, and additionally controlling for baseline HIV-risk behaviour (Model 2).

For girls, after adjusting for significant cofactors and baseline risk and compared with no support, cash support was associated with a reduction in the odds of incidence of HIV-risk behaviour (OR 0.63; 95% CI 0.44–0.91, $P = 0.02$) and cash plus care was associated with a greater reduction: halved incidence of HIV-risk behaviour (OR 0.55; 95% CI 0.35–0.85, $P = .007$). Raw percentages of HIV-risk behaviour at follow-up showed a reduction from 41.2% amongst girls with no support, to 24.5% with cash support, and 15.4% with cash plus care.

For boys, after adjusting for significant co-factors and baseline risk compared with no support, cash support alone was not associated with reduction in HIV-risk behaviour, but cash plus care was associated with a halved incidence of HIV-risk behaviour (OR 0.50; 95% CI 0.31–0.82, $P = 0.005$). Being older, having moved home more than times, being AIDS-affected (for girls) and informal dwelling (for boys) all remained significant predictors for adolescent HIV-risk behaviour. Raw percentages of HIV-risk behaviour at follow-up showed

Table 3. Number and proportion of adolescents receiving types of social protection by sex and high-risk group.

	All girls (n = 1498)	All boys (n = 1170)	P	AIDS-affected (n = 1294)	Not AIDS-affected (n = 1374)	P	Over 15 (n = 1781)	Under 15 (n = 887)	P	Informal housing (n = 940)	Formal housing (n = 1728)	P
Any cash/food provision	885 (59.1%)	717 (61.3%)	0.265	807 (62.4%)	795 (57.9%)	**0.018**	1076 (60.4%)	526 (59.3%)	0.586	709 (78.4%)	893 (51.7%)	**0.001**
Cash plus care	397 (26.5%)	282 (24.1%)	0.165	298 (23.0%)	381 (27.7%)	**0.006**	384 (21.6%)	295 (33.3%)	**0.001**	156 (16.6%)	523 (30.2%)	**0.001**
Child-focused cash transfer	852 (56.9%)	634 (54.2%)	0.165	734 (56.7%)	752 (54.7%)	0.300	882 (49.5%)	604 (68.1%)	**0.000**	484 (51.5%)	1002 (58.0%)	**0.001**
School feeding	1064 (71%)	866 (74%)	0.087	936 (72.3%)	994 (72.3%)	0.996	1202 (67.5%)	728 (82.1%)	**0.000**	815 (86.7%)	1115 (64.5%)	**0.001**
Free school transport	13 (0.9%)	9 (0.8%)	0.780	12 (0.9%)	10 (0.7%)	0.569	15 (0.8%)	7 (0.8%)	0.886	12 (1.3%)	10 (0.6%)	0.057
Free school uniform	12 (0.8%)	7 (0.6%)	0.537	13 (1.0%)	6 (0.4%)	0.810	13 (0.7%)	6 (0.7%)	0.877	1 (0.1%)	18 (1.0%)	**0.006**
Access to food gardens	67 (4.5%)	65 (5.6%)	0.201	65 (5.0%)	67 (4.9%)	.861	76 (4.3%)	56 (6.3%)	**0.022**	2 (0.2%)	130 (7.5%)	**0.001**
Food parcels	2 (0.1%)	2 (0.1%)	0.713	1 (0.1%)	2 (0.1%)	0.599	0 (0%)	3 (0.3%)	**0.014**	2 (0.2%)	1 (0.1%)	0.254
Soup kitchen feeding	8 (0.5%)	2 (0.2%)	0.128	4 (0.3%)	6 (0.4%)	0.590	8 (0.4%)	2 (0.2%)	0.373	7 (0.7%)	3 (0.2%)	**0.021**
Home-based carer support	15 (1%)	3 (0.3%)	**0.020**	14 (1.1%)	4 (0.3%)	**0.013**	14 (.8%)	4 (0.5%)	0.319	1 (0.1%)	17 (1%)	**0.008**
Teacher social support	121 (8.1%)	90 (7.7%)	0.715	86 (6.6%)	125 (9.1%)	**0.019**	130 (7.3%)	81 (9.1%)	0.098	49 (5.2%)	162 (9.4%)	**0.001**
School counsellor	55 (3.7%)	43 (3.7%)	0.996	53 (4.1%)	45 (3.3%)	0.260	77 (4.3%)	21 (2.4%)	**0.011**	32 (3.4%)	66 (3.8%)	0.586
Positive parenting	376 (25.1%)	288 (24.6%)	0.774	281 (21.7%)	383 (27.9%)	**0.001**	387 (21.7%)	277 (31.2%)	**0.000**	119 (12.7%)	545 (31.5%)	**0.001**

Significant P values are bolded.

a reduction from 42.1% with no support, to 17.0% with cash plus care.

Do highest risk adolescents receive more social protection?

Highest risk adolescents (Table 2) were AIDS-affected girls and boys living in informal housing, and HIV-risk behaviour increased with age. For receipt of cash alone, there were no differences by sex and age, but higher likelihood of cash receipt amongst AIDS-affected adolescents (62%, $P = 0.018$) and informal dwellers (78%, $P < 0.001$). For receipt of cash plus care, overall rates were far lower than of cash alone. There were no sex differences, but highest risk groups were less likely to receive cash plus care: AIDS-affected adolescents (23 compared with 28% for non-AIDS-affected, $P = 0.006$); older adolescents (22 compared with 33% for younger adolescents, $P < 0.001$) and informal dwellers (17 compared with 30% in formal homes, $P < 0.001$).

Discussion

This study demonstrates important potential HIV-prevention benefits of a basket of social protection. Findings support the emerging evidence-base of risk reductions for adolescent girls associated with unconditional household-level cash transfers [4,5]. But they also suggest that cash may need to be combined with care to maximize effects. Girls accessing cash/food support showed reductions in HIV-risk behaviour, but when cash was integrated with care, the protective association was increased: incidence of girls' HIV-risk behaviour was halved. For boys, cash/food alone had no effect on risk, but integrated cash plus care was associated with halved incidence of risk behaviour. Cash plus care shows a potential pathway to provide boys, heretofore difficult to reach, with effective interventions.

However, access to social protection was mixed. Some large-scale government programmes showed wide reach, with more than 50% of adolescents receiving a child-focused cash transfer or school feeding. Others showed lower reach, for example school counsellors, transport and uniform provision (all <5%). Some services, provided by NGOs or government, showed low reach, for example food parcels, home-based caregivers and food parcels (all <1%). And, only a minority of adolescents received 'care' through positive parenting (25%) or teacher support (8%). This variation has a number of implications. First, it strongly supports government intentions to continue to expand and increase age limits for child-focused grants and suggests possibly similar benefits in other sub-Saharan African states. Second, it supports expanding the reach of NGO or school-based services such as food gardens. And third, it suggests value in providing skills to those

Table 4. Logistic regression models showing associations (unadjusted and adjusted for baseline HIV-risk behaviour) between cash, combined cash plus care and HIV-risk behaviour for boys and girls.

	One or more HIV-risk behaviours (girls)		One or more HIV-risk behaviours (boys)	
	Model 1: unadjusted	Model 2: adjusted	Model 1: unadjusted	Model 2: adjusted
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Cash support	0.61 (0.43–0.88)**	0.63 (0.44–0.91)*	0.78 (0.52–1.16)	0.77 (0.52–1.16)
Integrated cash plus care	0.50 (0.33–0.77)**	0.55 (0.35–0.85)**	0.49 (0.30–0.79)**	0.50 (0.31–0.82)**
AIDS-affected	1.55 (1.18–2.03)**	1.47 (1.12–1.93)**	1.11 (0.83–1.48)	1.11 (0.83–1.49)
Informal housing	1.22 (.89–1.67)	1.16 (0.85–1.59)	1.63 (1.18–2.27)**	1.40 (0.99–1.96)
Older age	1.93 (1.76–2.12)***	1.78 (1.611.96)***	1.76 (1.60–1.94)***	1.66 (1.50–1.83)***
Lacking 4+/8 basic necessities	1.13 (0.83–1.54)	1.16 (0.85–1.59)	1.07 (0.76–1.50)	1.08 (0.77–1.53)
Moved home 2+ times	1.55 (1.15–2.08)**	1.55 (1.15–2.10)**	1.54 (1.13–2.12)**	1.50 (1.09–2.07)*
HIV-risk behaviour (baseline)	–	2.58 (1.86–3.58)***	–	2.63 (1.81 – 3.82)***

Model 1 adjusts for baseline age, poverty, informal housing, urban location and school nonenrolment. Model 2 additionally adjusts for baseline HIV-risk behaviour. CI, confidence interval; OR, odds ratio.
*$P < 0.05$.
**$P < 0.01$.
***$P < 0.001$.
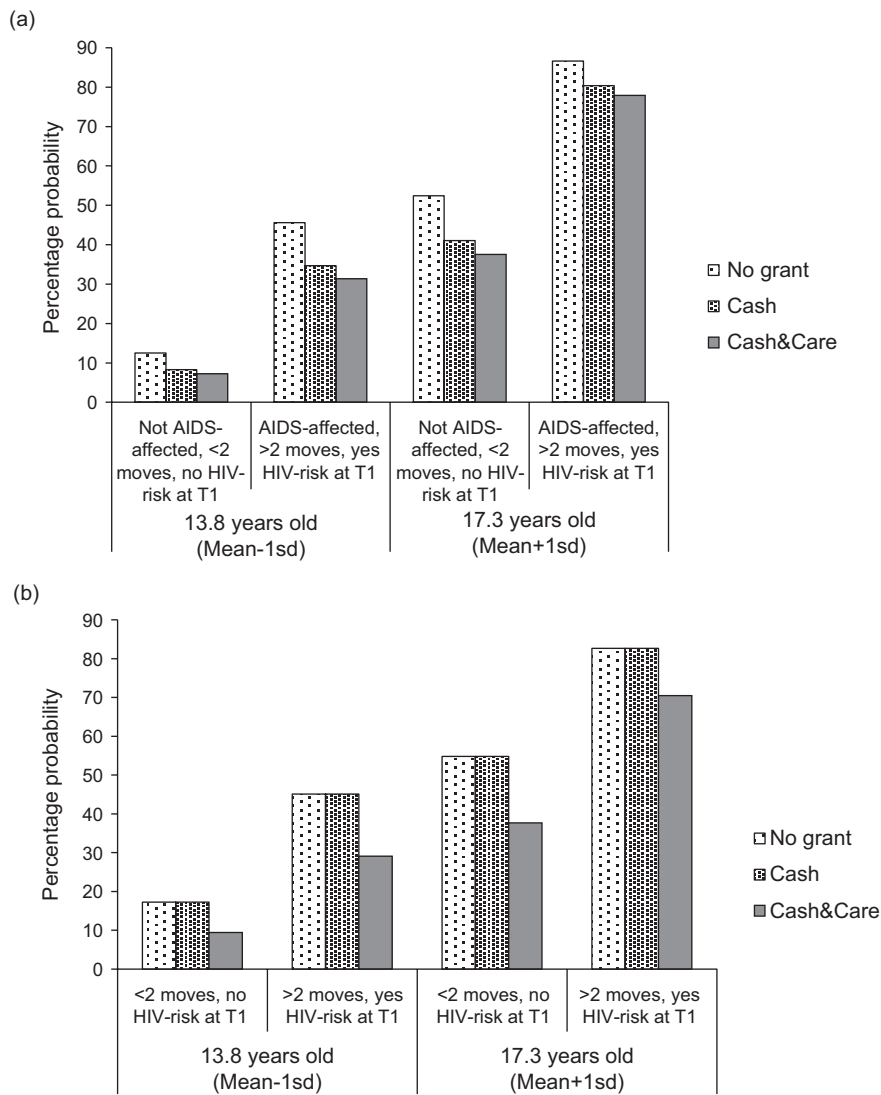
Fig. 1. (a) Percentage probability of girls HIV-risk behaviour at Time 2, as mitigated by cash or cash and care. (b) Percentage probability of boys HIV-risk behaviour at Time 2, as mitigated by cash or cash and care.

providing care for adolescents, through parenting programmes or teacher training.

Findings also provide longitudinal evidence of highest risk adolescents. As would be expected, older adolescents had increased risk behaviour, but elevated risks were also associated with socioeconomic vulnerability: specifically AIDS-affected girls and boys living in informal homes. These comprise sizeable population sub-groups. In South Africa, one in five households live in shacks [25], and estimates suggest 1.1 million AIDS-orphaned children, with several further millions living with AIDS-unwell caregivers [1]. For these adolescents, access to social protection is likely to have substantial prevention benefits.

However, highest risk adolescents received the lowest rates of integrated social protection. AIDS-affected and informal-dwelling adolescents were more likely to receive cash support, but much less likely to receive integrated cash plus care. Older adolescents were equally likely to receive cash support as younger adolescents, but less likely to receive integrated cash plus care. These findings suggest the need to increase access to integrated social protection amongst those most at risk, namely AIDS-affected, poorest and older adolescents.

This study has a number of limitations. First, although this was a prospective study, nonrandomized designs allow for less certainty regarding causality, and these exploratory findings should be tested in randomized controlled trials. However, randomized trials usually take place in a carefully managed and monitored setting, and the South African context provides a unique opportunity to examine the impacts of social protections in real-world conditions. This study took place in urban and rural areas and included large-scale, government-administered 'cash' programmes, NGO provisions and 'care' at family and school level. Second, all study sites were high HIV-prevalence health districts, and thus in South Africa were low income, African-majority areas [12]. Consequently, findings cannot be generalized to high-income areas or to other ethnic groups. Third, the randomly selected communities did not include any prisons or areas where children lived on the streets, and further research should examine effects of integrated social protection in these especially high-risk settings. However, the study benefited from within-sample variation and included five language groups within urban and rural areas in two provinces. Fourth, it would be valuable to monitor associations between social protection and HIV-risk behaviours over an extended time period. Fifth, although the study used scales previously utilized in national surveys, self-reported risk behaviour should ideally be validated with biomarkers of HIV or sexually transmitted infections.

Despite these limitations, this study provides important evidence to inform combination prevention for adolescents in Southern Africa. It demonstrates strong HIV-risk behaviour reductions associated with cash plus care provided by government, NGOs, schools and families. Although studies have shown negative effects on youth sexual risk of cumulative stressors [26,27], this study demonstrates protective effects of cumulative positive experiences. We need to focus not only on ACE, but also on 'Generating Resilience through Affirmative Childhood Experiences', or GRACE.

This sample comprised high HIV-prevalence areas in South Africa. It is notable that cumulative social protection showed feasibility and effects in these real-world contexts that present multiple challenges to service provision, for example poor infrastructure in rural areas, crime and political violence in urban sites. Findings suggest that scale-up of services, and improving reach to vulnerable groups of adolescents, is a potentially effective component of adolescent HIV-prevention. Findings also suggest that country-wide government-endorsed provisions (such as grants, school feeding) and large-scale NGO provision (such as food gardens) are permeating into these high-HIV communities. In contrast, supports such as food parcels, soup kitchens, home-based caregiving, free school transport and uniforms had such low permeation that they had to be dropped from our analysis.

Experience has taught that integrating cash and care into HIV-prevention programming presents practical challenges. Barriers to multisectoral programmes not only include distinct budget streams, different agencies or departments, but also perhaps more pertinently ideological, disciplinary and professional differences. Indeed, the fields of social protection, care and support, and HIV-prevention have at times been seen as competing priorities. But this study, alongside other recent findings, provides compelling evidence to the contrary. Ensuring youth access to integrated cash plus care may be difficult, but it is also an essential step towards an AIDS-free generation.

Acknowledgements

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