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Impacts of cash transfer and "cash plus" programs on self- perceived stress in Africa: Evidence from Ghana, Malawi, and Tanzania

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ABSTRACT

Poverty and poor mental health are closely linked. Cash transfers have significantly expanded globally. Given their objectives around poverty reduction and improving food security, a major chronic stressor in Africa, cash transfers may affect mental health outcomes. We examine impacts of three large-scale government cash transfer or cash plus programs in Ghana, Malawi, and Tanzania on self-perceived stress using an innovative, newly adapted measure for rural African settings. Linear regression models were used to estimate treatment impacts. We find that cash transfers reduced self-perceived stress in Malawi, but programs in Ghana and Tanzania had no impacts on self-perceived stress. These mixed findings, combined with recent reviews on cash transfers and mental health, suggest that cash transfers may play a role in improving mental health. However, cash alone may not be sufficient to overcome many challenges related to poverty, and complementary programming may also be needed to improve mental health.

1. Introduction

Poverty is closely linked to poor mental health (Lund et al., 2011), therefore anti-poverty programs in the form of cash transfers may have the potential to improve mental health (Zaneva et al., 2021; Zimmerman et al., 2021). State-sponsored cash transfer (CTs) programs have expanded rapidly and now reach an estimated 1 billion people worldwide. In Africa specifically, the number of CTs has tripled between 2000 and 2015 and are currently being implemented in 40 out of 48 countries (World Bank Group, 2015). While the primary objective of cash transfers is poverty reduction and poverty-related outcomes, such as improved food security, there has been increased interest in examining secondary impacts on outcomes such as mental health, given poverty's potential role in the production of poor health outcomes (Galea et al., 2011; Kontodimopoulos, 2022; Lim et al., 2012).

A large body of evidence demonstrates that cash transfers have been successful in reducing poverty and food insecurity (Davis et al., 2016; Hidrobo et al., 2018), increasing school attendance (Baird et al., 2014), increasing health-seeking and some physical health outcomes (Bastagli et al., 2019; Lagarde et al., 2007; Owusu-Addo & Cross, 2014; Pega et al., 2017; Ranganathan & Lagarde, 2012), and reducing violence (Baranov et al., 2021; Buller et al., 2018; Peterman et al., 2017, 2022). Many of the aforementioned outcomes are chronic stressors –i.e., poverty, food insecurity, and violence– or closely associated with stress. Thus, there is reason to believe that cash transfers can reduce stress.

Similarly, recent reviews on cash transfers and mental health suggest these programs may also contribute to improved mental health, as defined by depressive symptoms, psychological distress, salivary cortisol, behavior problems, self-esteem, geriatric depression, quality of life, neurotic disorder, and trauma symptoms (J. McGuire et al., 2022; Zaneva et al., 2022). While reviews indicate an overall beneficial effect, some evidence is mixed, with cash transfers sometimes having null or

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heterogeneous impacts based on demographic characteristics such as income and gender (Bartoš et al., 2022; Zaneva et al., 2022; Zimmerman et al., 2021). Given the mixed findings, the authors of these reviews conclude that more research is needed on cash transfers and mental health, including unpacking mechanisms linking cash transfers to mental health (Zimmerman et al., 2021), more long-term follow-up, comparison of cash transfers with other interventions (Joel McGuire et al., 2022), comparison of heterogeneous impacts by type of recipient, and more research on young children (Zaneva et al., 2021).

Psychological stress – which is defined as the perception that environmental demands exceed an individual's coping capacity (Lazarus & Folkman, 1984) – is a determinant of mental health outcomes. As such, stress may be a better outcome to evaluate with cash transfers given its proximity to program objectives (Vos et al., 2015). Building off prior research, we assess whether large-scale, government-implemented cash transfer or cash plus programs reduce stress among extremely poor populations in Africa (Ghana, Malawi, and Tanzania). We evaluated the effect of cash transfer programs using an innovative, newly developed measure of self-perceived stress in Ghana and Tanzania, and an existing measure of self-perceived stress in Malawi.

1.1. Mutually reinforcing links between poverty and mental health

The link between poverty and mental health has been explained by two theories. The social causation hypothesis suggests the conditions of poverty, such as chronic stress or food insecurity, increase the risk of individuals becoming mentally ill (Johnson et al., 1999; Lund et al., 2011). Conversely, the social selection/social drift hypothesis proposes that individuals with mental illness are more likely to experience poverty in their lifetime due to increased out-of-pocket health expenditure caused by illness, loss of income and employment, and stigma (Dohrenwend et al., 1992; Saraceno et al., 2005).

Guided by the social causation and social drift hypotheses, stress may simultaneously act as mediator between poverty and mental health, as well as be reinforced by poverty. In the social causation framework, poverty and resource-limited circumstances can induce psychological stress (Lazarus & Folkman, 1984). Psychological stress is a determinant of mental health –including anxiety and depression– and a key driver of disability in low, middle- and high-income countries (Vos et al., 2015), which in turn may further cause economic constraint, in line with the social drift hypothesis. Moreover, poverty and low socio-economic status (SES) can lead to increased exposure to chronic stressors and stressful life events, and in combination, limit the attainment of coping resources – financial, social, or psychological (Adler et al., 1994; Cohen, 1988; Cohen & Janicki-Deverts, 2012; Hamad et al., 2008; Hobfoll, 1989; Pike & Patil, 2006). Additional work on the "psychology of poverty" has highlighted how poverty increases stress, and in turn, affects economic behavior (Haushofer & Fehr, 2014), further reinforcing the loop between poverty and poor mental health. Individuals who are poor often face liquidity constraints and uninsurable background risks, which increase the risk of negative income and health shocks. In combination, these induce stress and affect economic choices which may further reduce income, through increased risk aversion (Haushofer & Fehr, 2014). Collectively, this evidence indicates social causation and social drift may interact in a vicious cycle with stress as an intermediary, and thus positions stress as a consequential touchstone.

1.2. Effects of stress on health

Stress is a keystone of disease, thought to play an etiologic and/or exacerbating role in the development of many diseases, including anxiety disorders and depression (Slavich & Irwin, 2014; Slavich & Shields, 2018), and other chronic outcomes (Cohen et al., 2007; Leserman, 2008). It is hypothesized that stress can give rise to poor health, which prior research providing evidence of chronic stress-induced molecular changes, including physiological alterations that initiate or accelerate the development of disease (Cohen et al., 2007; Epel et al., 2004; McEwen, 1998), elevated levels of inflammation and cortisol (Slavich & Irwin, 2014), epigenetic changes (Johnstone & Baylin, 2010; McEwen, 2017), and immune system dysregulation (Cohen et al., 2012). Further, socioeconomic factors have specifically been linked to these biological changes as well (Adler & Newman, 2002; Baum et al., 1999), such as accelerated immunosenescence (Aiello & Dowd, 2013; Emeny et al., 2021), heightened antibody response (Aiello & Dowd, 2013), and impaired regulation of the immune system (Stark et al., 2001). In addition to the myriad associations between stress and health, stress also has important implications for well-being, violence, substance misuse, caregiving, and internalizing behaviors (Alloush & Bloem, 2022; Peterman et al., 2017; Santiago et al., 2012), further emphasizing its importance as an intervention target.

1.3. Evidence on cash transfers, mental health, and self-perceived stress

Scientific interest in the effects of cash transfers on mental health has rapidly expanded: between 2020 and 2022, there were at least seven systematic reviews and meta-analyses on the subject. Overall, the synthesized evidence indicates cash transfers result in benefits to mental health (J. McGuire et al., 2022; Ridley et al., 2020; Romero et al., 2021; Thomson et al., 2022; Zaneva et al., 2022), however, some reviews have been mixed (Bartoš et al., 2022; Zimmerman et al., 2021). A key detail that has emerged from some of these reviews is the importance of intervention context. One review of 12 studies covering 13 interventions examining mental health (broadly defined including depressive symptoms, childhood social or behavioral functioning, post-traumatic stress disorder, self-esteem, stress, self-efficacy, future outlook, and hopefulness) impacts of cash transfers on young people aged 0–24 years found 11 out of 13 studies reported positive impacts on at least one mental health indicator; however, a meta-analysis of seven of these studies did not find significant impacts of cash transfers on depressive symptoms (Zimmerman et al., 2021). Of note, results from the review suggest the impact of cash transfer differs with socio-economic context, culture, design of the intervention, conditionality of the cash transfer, and specific mental health endpoint. Nevertheless, another meta-analysis that examined the impacts of cash transfers on more narrowly defined mental health outcomes (internalizing symptoms) among children 0–19 years did find significant, protective effects of cash transfers on mental health (Zaneva et al., 2021). Joel McGuire et al. (2022) found overall positive impacts of cash transfers on mental health in a meta-analysis of 38 studies with no age restrictions, but that unconditional cash transfers (those that do not require compliance with certain behaviors to maintain eligibility for payments) had larger positive impacts than conditional cash transfers. Previous research has posited that the requirement to comply with conditions may increase distress levels (Baird et al., 2013; Prencipe et al., 2021).

Much research investigating stress as a mediator between socioeconomic status (SES) and poor health has used cortisol as a biomarker of stress (Aiello & Dowd, 2013), including some cash transfer evaluations (Fernald & Gunnar, 2009; Haushofer & Shapiro, 2016). While the biomarker is alluring due to its discrete measurement, cortisol is problematic in measuring the link between socioeconomic status and stress due to high intraindividual variability (Dowd et al., 2009; Segerstrom et al., 2017). Specifically, cortisol follows a diurnal pattern, thus the timing of measurement is a key predictor for cortisol levels and obfuscates the valid measurement of stress in individual experiences. This is particularly true if cortisol is measured only once. Additionally, low SES results in a blunted cortisol diurnal pattern, which adds further complexity to using cortisol to measure stress when socioeconomic factors are being specifically interrogated (Agbedia et al., 2011).

Empirical findings on the relationship between cash transfer programs and self-perceived stress specifically has been mixed, particularly in African contexts. Four studies set in Kenya and Malawi have found cash transfer programs led to significant reductions in perceived stress

(Angeles et al., 2019; Haushofer & Shapiro, 2016, 2018; Molotsky & Handa, 2021), whereas two studies conducted in Kenya and Zambia did not find cash transfers had an impact on perceived stress (Haushofer et al., 2020; Hjelm et al., 2017). However, each of these studies evaluated perceived stress with the Perceived Stress Scale (PSS), which may not be an appropriate measure for a rural, African context, given that it was developed and validated among literate populations in the US (Hjelm et al., 2017). An impact evaluation of the Child Grant in Mozambique found a decrease in self-perceived stress following the intervention (Mozambique, 2022). Participants in a qualitative study in Ghana reported enrollment in a cash transfer program led to less stress (Barrington et al., 2022).

The PSS Was developed in a high-income setting, where participants were highly literate and native English speakers (Cohen et al., 1983). Thus, some of the items used to assess the underlying construct of stress, such as "anxiety" are either difficult to understand in different languages and dialects, or may be repetitive as translated in comparison to other items, rather than conveying the nuance intended. To better measure stress in an agrarian African context, Hall and colleagues conducted a qualitative study to define key stressors experienced and coping behaviors employed (Hall et al., 2019). Then, incorporating these learnings, Palermo and colleagues adapted an existing stress measure, the Life Distress Inventory (LDI) (Thomas et al., 1994), to better reflect the experiences reported in Hall et al. (2019). The new measure is called the Enhanced Life Distress Inventory (ELDI), and was shown to have adequate psychometric properties, including internal consistency and construct validity (Palermo et al., 2020). In the current study, we assess the impact of cash-transfers on self-perceived stress by using the ELDI in Ghana and Tanzania, and the LDI in Malawi. This is the first study to use the ELDI to measure the impacts of cash transfers on self-perceived stress. Additionally, the cash transfer programs under study were conducted among geographically and demographically different samples (program descriptions below), and thus will allow for investigation of treatment effects across diverse recipient types.

Based on the aforementioned literature, we hypothesize that cash transfers and related "cash plus" programming, defined as cash transfers in combination with complementary interventions and/or linkages to existing services (Roelen et al., 2017), can reduce self-perceived stress. We used data from national cash transfer programs in three countries (Ghana, Malawi and Tanzania) to test this hypothesis.

2. Program descriptions, data, and methods

2.1. The Malawi social cash transfer program

The Malawi Social Cash Transfer Project (SCTP) is an unconditional cash transfer program administered by the Ministry of Gender, Children, Disability and Social Welfare (MGCDSW) and oversighted by the Ministry of Finance, Economic Planning and Development. The program reached 163,000 households across 18 districts by end of 2015. The overarching objective of the SCTP is to reduce poverty and hunger and increase school enrolment rates in the ultra-poor labor constrained households. The eligibility in SCTP is governed based on a household being ultra-poor (i.e., unable to meet basic and essential needs) as identified through community-based targeting (via Community Social Support Committees) combined with a proxy means test PMT) and labor constrained (i.e., household members unable to work). The PMTs used information on household composition and individuals' "fit for work", asset ownership, and condition of the dwelling (i.e., floors, roof, water source, toilets).

Recipient households received bimonthly payments (USD $5.88, equivalent to approximately 17 percent of median per-capita consumption at the baseline) at a local pay-point. The SCTP is unconditional, and the amount transferred differs depending on household size and household composition with additional cash for households with primary and secondary school-aged children. Due to inflation, the transfer level was increased to 23 percent of median pre-program consumption in May 2015 (Malawi SCT Evaluation Team, 2016).

The Malawi SCT evaluation was a cluster-randomized controlled trial (RCT) executed by the University of North Carolina at Chapel-Hill and the Center for Social Research at the University of Malawi. The RCT was implemented in Mangochi and Salima districts. Two administrative units known as Traditional Authorities (TA) were selected in both districts for the study (Jalasi and M'bwana Nyambi and Jalasi in Mangochi, and Maganga and Ndindi in Salima) in September 2012 through simple random sample procedure. Subsequently, 7 TAs were included in the study in Salima, and 8 participated in randomization in Mangochi. In the second stage of selection, 29 village clusters (VC) (14 in Mangochi and 15 in Salima) were randomly selected June and July 2013, in Salima and Mangochi, respectively, performed in meetings between government officials and other stakeholders (Malawi SCT Evaluation Team, 2014).

Data collection for base-line survey was carried out between June and September 2013. At baseline, data were collected from 3531 SCTP-eligible households. Subsequently, VCs were randomly assigned to the study arms, resulting in 14 treatment VCs with 1678 households and 15 control VCs with 1853 households. Follow-up surveys rounds were conducted in November 2014–February 2015 and again in October–November 2015. Topics in the questionnaires covered household composition, education, health, labor, transfers, time use, social safety nets, consumption, economic activities, social safety nets, shocks and coping strategies, among others. The 2015 round also collected data on self-perceived distress in life from the main respondents/care givers.

2.2. Ghana livelihood empowerment against poverty (LEAP) 1000

In Ghana, the LEAP 1000 was designed with the aim to reduce stunting among children by providing them support in a very crucial phase, the first 1000 days of life. The program targeted pregnant and lactating women or women with children under 1 year old, living in 10 districts in Northern Ghana (selected according to poverty and nutrition indicators[1]). Women who applied and met a proxy means test eligibility criterion during the targeting phase (March–July 2015) were enrolled in the program. The program provides cash to eligible households (with a bimonthly benefit ranging between GH₵ 64 (USD $4.48) and GH₵ 106 (USD $7.41), depending on the number of eligible household members) and free enrollment to the National Health Insurance System.[2]

The Ghana LEAP 1000 was a longitudinal, mixed-methods evaluation conducted by UNICEF Office of Research – Innocenti, the University of North Carolina at Chapel Hill (UNC–CH), the Institute of Statistical, Social and Economic Research (ISSER) of the University of Ghana, and Navrongo Health Research Centre (NHRC). The evaluation was conducted in 5 of the 10 original districts, namely Yendi, Karaga, East Mamprusi in the Northern Region, and Bongo and Garu Tempane in the Upper East Region. The proxy means test was used to identify a comparison group, in which households close to the cut-off were selected for increased comparability and thus allowed for use of regression discontinuity design (RDD).

Baseline surveys were conducted in July–September 2015, resulting in data collected from 2497 households. LEAP 1000 payments started in September 2015, with a panel design used as no new beneficiaries were added after baseline collection. Endline surveys were conducted in June–August 2017, resulting in 2331 households being re-interviewed. Survey topics included household economic well-being, time use,

[1] The Leap 1000 is an extension of the Leap intervention (implemented in 2008). Leap 1000 targets districts not covered by Leap and focuses on mothers and newborn who were not explicitly targeted by the Leap intervention (which was aimed at targeting households with elderly, people with disability, and orphan and vulnerable children).

[2] Ethical approval for the quantitative study was provided by the Ethics Committee for the Humanities of the University of Ghana.

health, child health and nutrition, health insurance enrolment and access to health care, social support, self-perceived stress, shocks, and more.

2.3. Tanzania adolescent cash plus programme

The Tanzania *Ujana Salama* ('Safe Youth' in Swahili) Cash Plus Model for Safe Transitions To A Healthy And Productive Adulthood was developed to improve adolescents' productive and health capabilities. It is targeted to adolescents aged 14–19 years old and is layered onto a larger social protection program, the Productive Social Safety Net (PSSN), which aims to increase income and consumption, improve vulnerable populations' ability to cope with shocks, invest in human capital, and increase access to improved social services. The PSSN reaches one million households nationally and benefits comprise 1) a bi-monthly cash transfer (maximum 18 USD per month, equivalent to 21% of pre-program expenditures among households) (Rosas et al., 2016), 2) a public works program (PWP) during the lean season; and 3) a livelihood enhancement (LE) component. PSSN is implanted by the Tanzania Social Action Fund (TASAF), a government agency, and targeting is conducted in four-stages: 1) geographical targeting to identify and select districts, wards and villages; 2) community targeting to identify extremely poor and vulnerable households in selected villages; 3) a proxy means test (PMT) to verify and minimize inclusion errors among non-poor households; and 4) a community validation test to confirm the results of the community targeting and PMT.

The Cash Plus program "*Ujana Salama*" was implemented between January 2018 and July 2019 by TASAF, with technical assistance from UNICEF and the Tanzania Commission for AIDS (TACAIDS). It is comprised of 1) livelihood and SRH life skills training; 2) mentoring and asset transfer (80 USD); and 3) supply-side strengthening of adolescent-friendly HIV and SRH services and linkages to existing SRH and HIV services for adolescents. Ujana Salama was targeted to all adolescents aged 14–19 years at baseline living in PSSN households in treatment communities.

The evaluation of the *Ujana Salama* was conducted by the UNICEF Office of Research - Innocenti, University at Buffalo, and EDI Global, in collaboration with the Tanzania Social Action Fund (TASAF), TACAIDS, and UNICEF Tanzania. The evaluation design was a cluster randomized controlled trial conducted in four districts (Rungwe, Busokelo, Mbeya, Mufindi) in the regions of Iringa and Mbeya. Randomization of 130 villages (65 treatment, 65 control) was conducted during a public randomization event in July 2017 after baseline data were collected. PSSN households and youth in control villages continued to receive the PSSN, while those in the treatment villages received with additional Ujana Salama intervention.

The evaluation was comprised of four rounds of data collection, including baseline (2017), Round 2 (2018), Round 3 (2019), and Round 4 (2021). Data used in the current study come from Rounds 1 and 3. Interviewers were conducted with adolescents, covering topics related to time use and livelihoods, physical and mental health, sexual and reproductive health, gender attitudes, and more.

2.4. Ethics statement

In all studies, interviews were conducted with respondents in a private place. For youth aged 17 years and below, informed consent was obtained from the parent or main caregiver and the youth, and informed assent was obtained from youth. Individuals aged 18 years and above provided informed consent for their participation. Research assistants were also extensively trained on ethics of human subject research and accompanying field protocols. The Malawi SCT evaluation study was approved by the UNC Internal Review Board (IRB) and Malawi's National Commission for Science and Technology (NCST), National Committee for Research in Social Sciences and Humanities (UNC IRB Study No. 14–1933; Malawi NCST Study No. RTT/2/20). The LEAP 1000 evaluation study was approved by the Ethics Committee for the Humanities of the University of Ghana. The trial is registered in the International Initiative for Impact Evaluation's (3ie) Registry for International Development Impact Evaluations (RIDIE-STUDY-ID-55942496d53af). Ethics approval for the Tanzania Adolescent Cah Plus study was granted by the National Institute for Medical Research (NIMR/HQ/R.8a/Vol.IX/2784) and the Tanzania Commission for Science and Technology (COSTECH). The study was retrospectively registered with the Pan African Clinical Trial Registry (PACTR) as PACTR201804003008116.

2.5. Measures

Self-perceived stress was measured using the Life Distress Index (LDI) in Malawi and the Enhanced Life Distress Index (ELDI) in Ghana and Tanzania. The LDI measures self-reported stress across areas of social life and functioning (Thomas et al., 1994; Yoshioka & Shibusawa, 2002). The original LDI is comprised of 18 items across four sub-scales. Each item has seven response options, ranging from "no distress" to "extremely distressed." The overall life distress is measured on a 10–50 LDI sub-scale, social distress (3-15), life distress (6-30), while financial distress is measured on a 1–5 LDI sub-scale. The LDI has been shown to have good reliability and construct validity (Yoshioka & Shibusawa, 2002). The Malawi SCT evaluation used a shortened, adapted version of the LDI with 10 items and 5 responses possible (ranging from no distress to very distressed). Items implemented are provided in Appendix 1. Responses to items were summed to create the overall scale and sub-scale (possible range from 10 to 50).

The ELDI was adapted from the LDI and informed by qualitative research to better capture self-perceived stress in a rural African context (in Ghana, Malawi, and Tanzania), including among low-literacy respondents (Hall et al., 2019). It measures distress in the areas of finances, employment, education, hygiene, environment, health, substance abuse, violence, crime, romance, family, friends, and pregnancy, and it is recommended to analyze the three resulting sub-scales (Palermo et al., 2020). For each of 12 items assessed, response options range from 0 (no distress) to 3, with a higher score indicating more stress. Items in each sub-scale are as follows: economic and health-related well-being (EHRW; including stress from financial situation, failure of business or farm, access to education, food and water, health; range 0–15), risk/security (stress from substance use, violence, theft; range 0–9) and relationships (stress from relationships with partner, family, friends, or from current or future pregnancy; range 0–12). The ELDI has been shown to be internally consistent and have construct validity in Ghana, Malawi, and Tanzania (Palermo et al., 2020). Among studies included in the current analysis, stress measures were only measured at follow-up (not baseline) in Ghana and Malawi, while in the Tanzania Adolescent Cash Plus study, ELDI was collected at all waves.

2.6. Power

The impact evaluations from which we leverage secondary data for the current analyses were not powered with self-perceived stress as a main outcome. Rather, power calculations were run separately for each of the three original impact evaluations based on indicators for key poverty and child well-being outcomes. For example, the Ghana sample was powered based on primary outcomes stunting, wasting, and underweight, and it was determined that a sample size of 2500 households (1250 comparison and 1250 treatment) was needed to detect treatment impacts on these outcomes (Ghana LEAP 1000 Evaluation Team, 2016). The Tanzanian sample was powered based on calculations related to primary outcomes pregnancy, transactional sex, physical violence, and sexual violence, and it was determined that 65 clusters with 9–18 adolescents each were required for minimum detectable effect sizes of 5-percentage point changes for binary outcomes (Tanzania Cash Plus

Evaluation Team, 2018). In Malawi, primary outcomes included children's height-for-age, household consumption, children's schooling, and household livestock ownership, and it was estimated that approximately 1659 households per treatment arm would be needed across a minimum of 29 clusters (Handa et al., 2013).

2.7. Statistical analyses

First, to understand whether characteristics were balanced at baseline between the study arms in each country, we regressed characteristics onto treatment status to test for significant differences. In Ghana, we further controlled for the PMT score, and in the Tanzania Cash Plus Study we further controlled for district and district size, which are sampling design characteristics. We also tested for selective attrition (Appendix 3) to examine whether there were differences between treatment and control/comparison groups among background characteristics within 1) the attritors sample and 2) the panel sample (i.e., those interviewed at both waves).

Next, to estimate treatment impacts on our outcomes of interest, we estimated cross-sectional models at endline with a binary treatment indicator. Our outcomes of interest (EDLI and LDI) were only available at endline for two of the three countries (Ghana and Malawi), and our model choice is justified by the experimental nature of the study designs in Malawi and Tanzania (cRCTs) and the quasi-experimental (RDD) design in Ghana. Supporting the internal validity of the study designs, a high level of balance was reported in all three studies across treatment arms, as detailed further in baseline evaluation reports (statistically significant differences between study arms were only found in 5% of 374 indicators examined in Tanzania, <5% of outcomes out of 500 in Ghana, and 4.9% out of 366 outcomes in Malawi) (Ghana LEAP 1000 Evaluation Team, 2016; Malawi SCT Evaluation Team, 2014; Tanzania Cash Plus Evaluation Team, 2018).

The model (run separately for each country) is estimated as follows:

$$Y_{it} = \beta_0 + \beta_1 T_i + \beta_2 X_{i0} + \varepsilon_i \quad (1)$$

where Y_{it} denotes the outcome of interest for individual i at time t = 1; T is a dummy variable indicating treatment, and the coefficient β_1 denotes the estimated treatment impact. X_{i0} is a vector of covariates (values at baseline), including the main respondent's characteristics, household characteristics, and community-level characteristics; and ε_{it} is the error term. One exception among the respondent characteristics is that virtually all respondents in Ghana LEAP 1000 were female, so we omitted respondent sex from the regression in Ghana. Also in the Ghana analysis, given the RDD nature of the study design, we further controlled for the PMT score. This is because treatment and comparison groups were sampled around a PMT cut-off and therefore will have different PMT scores by design. All the standard errors were clustered at the community level.

Controls were selected based on characteristics associated with higher levels of stress in African settings (female sex, increasing age, and low education status) (Hamad et al., 2008; Myer et al., 2008; Sipsma et al., 2013). Respondent-level covariates included age (years), sex, and whether they had any formal education. We further controlled for household-level covariates including household size and whether the head of household was female, as larger households and those headed by females tend to be poorer and more food insecure in these settings (Brown & Van de Walle, 2021). We use baseline indicators of all controls to avoid capturing mediating impacts of the cash transfer programs. Community-level covariates included binary variables for sampling design indicating district of residence, and a binary indicator for community size (large v. small) in Tanzania Cash Plus sample. We did not control for any formal education in Tanzania due to lack of variation in this indicator (97.8% of our panel sample had ever been in school). We further controlled for the PMT score in the Ghana LEAP 1000 models, given the quasi-experimental study design. Finally, in the Tanzania sample we performed a sensitivity analysis to estimate treatment impacts with an analysis of covariance (ANCOVA) model, which, in addition to the covariates indicated in Equation (1), further controls for the baseline value of the outcome.

3. Results

3.1. Balance and attrition

Table 1 (Panel A–C) displays the balance between the treatment and comparison groups of the three samples (Ghana, Malawi and Tanzania) at baseline. The results show few differences in characteristics observed at the baseline in treatment and control groups, indicating successful randomization in the cases of Malawi and Tanzania. In Ghana, there was a statistically significant difference between treatment and comparison households with respect to gender of the household head, whereby treatment households were more likely to have a female head of household. In the Tanzania sample, there was a statistically significant difference in the ELDI well-being sub-scale between the treatment and control group. Thus, any impacts on this outcome in Tanzania should be

Table 1
Baseline balance - Ghana LEAP 1000.

Panel A: Baseline Characteristics (Ghana)

	Pooled N = 2005	Comparison N = 1005	Treatment N = 1050	P-value for difference
Age	29.8 (6.5)	28.8 (6.5)	30.73 (6.5)	0.59
Household size	6.7 (2.6)	6.4 (2.5)	7.05 (2.7)	0.09
Female-headed household	101 (5.0%)	41 (4.1%)	74 (7.0%)	0.03
Any Education	381 (19.0%)	201 (20.0%)	189 (18.0%)	0.66

Panel B: Baseline balance (Malawi)

	Pooled N = 3251	Control N = 1711	Treatment N = 1540	P-value for difference
Age	56.7 (19.5)	55.7 (19.3)	57.8 (19.7)	0.33
Female	2708 (83.3%)	1437 (84.0%)	1271 (82.5%)	0.38
Household size	4.7 (2.3)	4.7 (2.2)	4.6 (2.3)	0.72
Female household head	2708 (83.3%)	1437 (84.0%)	1271 (82.5%)	0.38
Any Education	1079 (33.2%)	561 (32.8%)	517 (33.6%)	0.60
Salima	1652 (50.8%)	909 (53.1%)	742 (48.2%)	0.80

Panel C: Baseline characteristics by treatment status, Tanzania Cash Plus

	Pooled N = 2191	Control N = 1128	Treatment N = 1063	P-value for difference
Age	16.1 (1.6)	16.1 (1.6)	16.1 (1.6)	0.36
Female	1001 (45.7%)	528 (46.8%)	473 (44.5%)	0.28
Household size	5.0 (2.0)	4.9 (2.0)	5.0 (2.0)	0.40
Female-headed household	1441 (65.8%)	755 (66.9%)	686 (64.5%)	0.24
ELDI	3.5 (4.6)	3.7 (4.7)	3.3 (4.5)	0.080
Well-being (0-15)	2.6 (3.2)	2.8 (3.3)	2.4 (3.0)	0.015
Risk (0–9)	0.3 (1.0)	0.3 (1.0)	0.3 (0.9)	0.93
Relations (0-12)	0.3 (1.1)	0.3 (1.1)	0.3 (1.2)	0.81

Note: Data are presented as mean (SD) or n(%). P-values are computed regressing each variable listed in the table on treatment, controlling for PMT score with standard errors clustered at the community level.
Note: Data are presented as mean (SD) or n(%). P-values are computed regressing each variable listed in the table on treatment with standard errors clustered at the community level.
Note: Data are presented as mean (SD) or n(%). P-values are computed regressing each variable listed in the table on treatment with standard errors clustered at the community level.

interpreted with caution.

We did not find evidence of selective attrition (Appendix 3), with one exception – household head gender in Ghana, and only 5–6% of households in our sample were female-headed.

3.2. Description of sample and outcomes

Table 1 (Panel A–B) also indicates that in the Ghana sample, the respondents were approximately 30 years old. In the Malawi SCT sample, respondents were, 55–60 years old, while respondents in the Tanzania Cash Plus were 16 years old. The average household size in Ghana was 7 members, 5 in Malawi, and 5 in Tanzania. On average, less than half of respondents in Ghana (19%) and Malawi (33%) had some level of education. About 5% of sampled households in Ghana, 83% in Malawi and 66% in Tanzania were female-headed, and on average, 33% of household head in Malawi were married. In Tanzania sample, the average score of ELDI was 3.5, the ELDI sub-scale associated with economic and health well-being had a score of 2.6, while ELDI sub-scale related to risk/security and relationships was 0.3.

We found that the internal reliability of the LDI and ELDI scales was close to the minimum acceptable level (0.7). In the Tanzania Cash Plus and Ghana LEAP 1000 studies, respectively, the Cronbach's α was 0.6942 and 0.771 for the economic and health-related well-being sub-scale, 0.6499 and 0.706 for risk/security sub-scale, and 0.6649 and 0.769 for the relationship sub-scale. In Malawi, Cronbach's α for the full scale was 0.74.

3.3. Program impacts

We found the Malawi SCT significantly reduced self-perceived stress as measured by the LDI (Table 2). The cash transfer reduced the overall LDI on average by 3.33 points and impacts on sub-scales were as follows: $\widehat{\beta}$ = -0.743 for social distress sub-scale, $\widehat{\beta}$ = -1.97 for the life distress sub-scale and $\widehat{\beta}$ = -0.62 for the financial distress sub-scale. We found no significant impacts of the Ghana LEAP 1000 or Tanzania Adolescent Cash Plus Programme on self-perceived stress as measured by the ELDI.

Sensitivity analyses (Appendix 4) using ANCOVA models in the Tanzania sample also did not find any significant treatment impacts on self-perceiced stress.

4. Discussion

This study analyzed three national cash transfer programs in Africa to examine the effects of cash transfers or cash plus programs on self-perceived stress. We found that cash transfers reduced self-perceived stress in Malawi but cash plus programming did not reduce self-perceived stress in Ghana or Tanzania.

The findings from the Malawi program are in line with similar studies on cash transfers in Malawi, Kenya, and Mexico (Baird et al., 2011; Haushofer & Shapiro, 2018; Ozer et al., 2011). A randomized control trial of the Give Directly program in Kenya found that, overall, cash transfers reduced a measure of self-perceived stress (Cohen PSS) but had no impacts on a stress-related biomarker, cortisol (Haushofer & Shapiro, 2016). However, among the sub-sample of female recipients in that study, the opposite was true: the cash transfers reduced cortisol levels but had no impact on self-perceived stress (ibid). Similarly, the *Oportunidades* program in Mexico resulted in reduced depressive symptoms among mothers (Ozer et al., 2011). Another study of the Oportunitidades program found that it lowered salivary cortisol measures in children (Fernald & Gunnar, 2009). In contrast, another study from Malawi found that cash transfers had heterogeneous impacts on adolescent girls, whereby conditional cash transfers had no impacts among a group of girls out of school at baseline; however, among girls in school at baseline, both conditional and unconditional cash transfers reduced their psychological distress (Baird et al., 2013). However, the target group in that study (adolescent girls) was very different from those interviewed in our study in Malawi, where the average age was over 50 years, as was the intervention (the Zomba study included conditional cash transfers to some of the participants, whereas the Malawi SCT was an unconditional transfer).

Results from the Ghana and Tanzania programs are similar to those from Kenya, Zambia, and Ecuador, which did not find cash transfers impact on perceived stress (Haushofer et al., 2020; Hjelm et al., 2017; Paxson & Schady, 2010). A randomized trial in Kenya compared the effect of a free health insurance and of an unconditional cash transfer, and found no effects on self-perceived stress or cortisol of the cash transfer, but found that free health insurance program lowered self-perceived stress (as measured by Cohen PSS) and improved cortisol levels (Haushofer et al., 2020). Similarly, cash transfers were not found to affect perceived stress in Zambia, despite improving economic outcomes (Hjelm et al., 2017). Finally, cash transfers in Ecuador were not found to improve maternal stress (Paxson & Schady, 2010).

Differences in the current study's population contexts may have contributed to the different impacts observed. First, the Malawi sample is notably older than the Ghana or Tanzania sample (approximate average age of 57 years versus 30 years and 16 years old, respectively), due to the SCTP eligibility criteria, which resulted in many elderly

Table 2
Program impacts on self-perceived stress (LDI and ELDI).

Panel A. Impacts of Ghana LEAP 1000 on ELDI sub-scales, Linear regressions

	Well-being (0-15) N = 2055	Risk (0–9) N = 2055	Relations (0-12) N = 2055
Impact	0.545(0.376)	0.109(0.217)	0.325(0.321)
Control Mean (SD)	10.50 (4.16)	1.63 (2.43)	4.36 (3.63)
Treatment Mean (SD)	10.76 (4.06)	1.74 (2.53)	4.64 (3.75)

Panel B. Impacts of Malawi SCT on LDI sub-scales, Linear regressions

	LDI (10–50) N = 3251	Social distress (3-15) N = 3251	Life distress (6-30) N = 3251	Financial distress (1–5) N = 3251
Impact	−3.329*** (0.810)	−0.743*** (0.192)	−1.966*** (0.574)	−0.621*** (0.134)
Control Mean (SD)	26.68 (0.16)	5.55 (0.07)	16.84 (0.11)	4.29 (0.03)
Treatment Mean (SD)	23.25 (0.17)	4.79 (0.06)	14.80 (0.12)	3.66 (0.03)

Panel C. Tanzania Cash Plus Impact on ELDI sub-scales, Linear regressions

	Well-being (0-15) N = 2191	Risk (0–9) N = 2191	Relations (0-12) N = 2191
Impact	−0.141 (0.151)	−0.0256 (0.0574)	0.000575 (0.0706)
Control mean (SD)	2.82 (3.27)	0.38 (1.2)	0.42 (1.3)
Treatment mean (SD)	2.66 (3.24)	0.35 (1.2)	0.41 (1.28)

Note: Standard errors in parentheses are clustered at the community level. All regressions include the following covariates at baseline: women's age; household size; dummy if the household head is female; dummy for having any formal education; PMT total score.
*p < 0.10, **p < 0.05, ***p < 0.01.
Note: Standard errors in parenthesis are clustered at the community level. All regressions include the following covariates at baseline: respondent's age; ever attended school; household size; main respondent is married; main respondent is female.
*p < 0.10, **p < 0.05, ***p < 0.01.
Note: Standard errors in parentheses are clustered at the community level. All regressions include the following covariates at baseline: age; household size; adjusted for sex, female-headed household, and stratification indicators.
*p < 0.10, **p < 0.05, ***p < 0.01.

households caring for orphaned children (Malawi SCT Evaluation Team, 2014). Stress varies across the lifespan, with some evidence indicating that middle-to old-age (i.e., ages 45–65) may be a high-stress period (Stone et al., 2010). Further, response and reactivity to stressors declines with age, making old-age a particularly vulnerable period that could result in worse health (Mañas-Ojeda et al., 2020; Zannas, 2019). Second, the Malawi sample is over 80% female and the Ghana sample is almost all female but is considerably younger as they are in their childbearing ages, whereas the Tanzanian sample is balanced between males and females. Research conducted in a variety of settings has found females have higher stress levels compared to males (Haushofer & Shapiro, 2016; Lee, 2012; Palermo et al., 2020; Stone et al., 2010). Given the importance of age and gender in the mosaic of stress and health consequences, our findings that cash transfers reduce stress levels in an older and majority-female population is crucial, with significant public health implications. This finding is particularly salient given the calls to further identify whether or not treatment effects are differential according to demographic group (J. McGuire et al., 2022). That our findings are mixed with regard to geographical context is consistent with work in the medical geography field, which emphasizes differences in study results across regions can be due to dynamics of place and space rather than a failing of the study (Andrews et al., 2012; Simandan, 2020, 2021). The results showing the theory linking cash transfers, poverty, and stress materialize differently according to country and demographic group provides important nuance and context-specific considerations that should be taken into account in future research. Finally, impacts of cash transfers on stress and other outcomes may depend on the transfer size (Haushofer et al., 2020).

Recent literature has noted the importance of complementary programming with cash transfers in achieving impacts on second-order outcomes beyond food security and consumption (Ismayilova et al., 2018; Roelen et al., 2017; Zaneva et al., 2022). Surprisingly, we did not find the programs with additional linkages or complementary programming (Ghana LEAP 1000 and Tanzania Cash Plus) had a significant impact on stress, contrary to our hypothesis. While unexpected, the circumstances of the complementary program or the population may be important factors. For instance, the Ghana LEAP 1000 program provided health insurance fee waivers to participants, but access to health insurance may not always have direct impacts on self-perceived stress. Indeed, other studies examining this LEAP 1000 population found that fewer than half of those receiving the waivers actually enrolled in health insurance (Palermo et al., 2019), and that the quality of surrounding health services moderated take-up of the health insurance component (Otieno et al., 2022). Thus, benefits of complementary programming may be context-specific and other factors may need to be in place before they can have large impacts on alleviating stress. This finding is in contrast to that of Haushofer et al. (2020), which did find that health insurance reduced self-perceived stress and cortisol levels. However, the latter study provided health insurance directly, whereas Ghana LEAP 1000 provided only a premium fee waiver, which households still had to act upon to enroll. Moreover, cash-plus programs have been found to improve social support (de Milliano et al., 2021), which may in itself alleviate stress (Ozbay et al., 2007). Alternatively, impacts on stress and broader mental health may also depend on pre-existing characteristics of the intervention population. For example, the Tanzania Cash Plus program provided was previously found to be protective against another mental health outcome, depressive symptoms, but only among the upper distribution (i.e., those with worse mental health) (Prencipe et al., 2022). Similarly, the *Oportunidades* program impacts on children's cortisol levels in Mexico was moderated by mothers' depressive symptoms; the program reduced cortisol levels among children of mothers with high depressive symptoms but not those with mothers with low depressive symptoms (Fernald & Gunnar, 2009).

Despite mixed results in our study and in the broader work evaluating the effects of cash transfers on stress, such findings are of critical importance for elucidating the causal relationship between poverty and mental health. A recent meta-analysis found increases in income were significantly associated with mental health improvements, particularly when the income increases result in poverty transitions (Thomson et al., 2022). A similar meta-analysis found unconditional cash transfers had the strongest impacts on mental health endpoints (Romero et al., 2021). Further, meta-analyses that did not find significant effects from cash transfers have noted the importance of additional social care support and supplementary programming (Zaneva et al., 2022; Zimmerman et al., 2021). This constellation of evidence bolsters the social causation theory – that poverty has a causal impact on mental health – and gives critical empirical support to calls for increased welfare and social safety net policies.

There are several limitations to this study. In Ghana and Malawi, outcomes of interest were collected only at follow-up. Therefore, it was not possible to test for baseline balance of these measures, nor was it possible to implement models such as ANCOVA or difference-in-differences to estimate program impacts. Another limitation relates to the external validity of results. Because our respondents come from extremely poor households in rural African settings, findings may not be generalizable to individuals of higher socioeconomic status, those in urban settings, or those outside of Africa. Moreover, while we used an innovative measure of self-perceived stress (ELDI) that was specifically adapted for a global setting (Palermo et al., 2020) in the Ghana and Tanzania samples, it is possible there are limitations to this measure and further refinement may be needed. Results from a validation study of psychiatric screeners in Sub-Saharan Africa reveal limitations to measures of perceived stress, including the existence of linguistic differences across countries and regions that could alter the interpretation of words like "depression", and that distress is often expressed physically or behaviorally rather than cognitively (Sweetland et al., 2014). Additionally, stress was assessed via the LDI in the Malawi sample, which was the only sample to show significant program effects. Thus, it is possible results may alter according to scale.

5. Conclusion

We found cash transfers resulted significant reductions in stress in a Malawi sample but did not have a significant effect in samples from Ghana or Tanzania. Our mixed findings, combined with recent reviews on cash transfers and mental health, suggest cash transfers may play a role in improving mental health. However, cash alone may not be sufficient to overcome many challenges related to poverty, and complementary programming may also be needed to improve mental health. Such programming may include facilitating access to existing health services or other community-based mental health interventions. Additionally, our findings may suggest that the measures currently used to measure self-perceived health may not be optimal in rural African settings, and more research to adapt and refine measures are possibly needed.

Author contributions

JM: Formal analysis, Writing – Original Draft and Review & Editing; CR: Formal analysis, Writing – Original Draft and Review & Editing; GA: Formal analysis, Writing – Review & Editing; LP: Formal analysis, Writing – Review & Editing; MdM: Formal analysis, Writing – Review & Editing; SML: Writing – Review & Editing; TP: Conceptualization, Methodology, Formal analysis, Writing – Original Draft and Review & Editing; Supervision. Members of the evaluation teams further contributed to study design and data collection.

Declaration of competing interest

None.

Data availability

Data from Ghana LEAP 1000 are publicly available from https://data.cpc.unc.edu/projects/13/view#res_226. Datasets from Malawi and Tanzania expected to be available 2024 pending governmental approval.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ssmph.2023.101403.

Appendix 3. Selective Attrition Analysis

Panel A: Ghana LEAP 1000 Baseline balance of demographic indicators, by panel and attritor status

	Attrited			Panel		
	Control (n = 174)	Treatment (n = 154)	p-value	Control (n = 1061)	Treatment (n = 1108)	P-value
	(1)	(2)	(3)	(4)	(5)	(6)
Age	25.24	24.73	0.72	28.95	30.51	0.96
Household size	5.63	5.77	0.61	6.41	7.07	0.09
Female household head	0.29	0.40	0.03	0.05	0.06	0.03
Any education	0.35	0.43	0.15	0.21	0.19	0.16

Panel B: Malawi SCT, Baseline balance of demographic indicators, by panel and attritor status

	Attrited			Panel		
	Control(n = 142)	Treatment(n = 138)	P-value	Control(n = 1711)	Treatment(n = 1540)	P-value
	(1)	(2)	(3)	(4)	(5)	(6)
Age	64.12	65.96	0.56	56.33	58.63	0.32
Any Education	0.21	0.25	0.23	0.30	0.30	0.87
Household size	3.16	3.44	0.33	4.57	4.48	0.82
Female	0.76	0.81	0.38	0.84	0.82	0.26
Female household head	0.76	0.81	0.38	0.84	0.82	0.26
Salima	0.34	0.30	0.42	0.42	0.36	0.35

Panel C: Tanzania Adolescent Cash Plus, Baseline balance of demographic indicators, by panel and attritor status

	Attrited			Panel		
	Control (n = 144)	Treatment (n = 123)	p-value	Control (n = 1128)	Treatment (n = 1063)	P-value
	(1)	(2)	(3)	(4)	(5)	(6)
Age	16.15	16.41	0.21	16.12	16.06	0.32
Female	0.56	0.45	0.07	0.47	0.44	0.33
Household size	4.96	5.07	0.75	4.92	4.99	0.54
Head female	0.69	0.63	0.36	0.67	0.65	0.30

Notes: Mean values represent unadjusted statistics, while p-values in columns 3 and 6 are from the coefficient on 'treatment' from a regression controlling for PMT score in Ghana and district and district size in Tanzania, predicting each characteristic listed in the table among the group of attritors, while column 6 is the same among the panel sample. Standard errors are clustered at the community level. For the Ghana sample, this attrition analysis includes n = 2169 individuals in the panel sample, while the sub-sample for analysis reported in the main impacts analysis was further reduced to n = 2055 when those with missing values for key variables (e.g., stress outcomes) were removed.

Appendix 4. Impacts of Tanzania Cash Plus on Stress Indicators, ANCOVA model

	ELDI	Well-being (0-15)	Risk (0–9)	Relations (0-12)
Treatment effect	−0.206(0.255)	−0.0874(0.149)	−0.0257(0.0574)	−0.000261(0.07)
Control mean (SD)	4.1 (5.11)	2.82 (3.27)	0.38 (1.20)	0.42 (1.30)
Treatment mean (SD)	3.82 (5.15)	2.66 (3.24)	0.35 (1.20)	0.41 (1.28)
N	2191	2191	2191	2191

Note: Standard errors in parentheses are clustered at the community level. All regressions include the following covariates at baseline; age; household size; dummy if the individual is female; dummy if the household head is female; district*size fixed effects.
*p < 0.10, **p < 0.05, ***p < 0.01.

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