Human Recognition among HIV-Infected Adults: Evidence from a Randomized Controlled Trial in Kenya

Tony Castleman, Ph.D.
Country Representative
Catholic Relief Services
140 Shopping Complex, Zamrudpur
Greater Kailash I, New Delhi, India
Telephone: +91-9810880281
Email: tonyc@gwu.edu

Abstract

The paper evaluates the impacts that food supplementation and medical treatment have on human recognition among malnourished, HIV-infected adults in Kenya. Human recognition is defined as the extent to which an individual is acknowledged by others to be of inherent value by virtue of being a fellow human being. Questions in a randomized controlled trial were specially designed to measure human recognition, the first time human recognition has been empirically measured. Determinants of human recognition and the role recognition plays in nutritional status and subjective well-being are also examined. Six months of food supplementation is found to have a significant positive impact on recognition levels, and this effect is robust to controlling for changes in health and nutrition caused by the food. Improvements in human recognition are greater in rural and peri-urban areas than in urban areas. Women receive lower levels of human recognition than men and also have worse mental health status; the relationship among gender, mental health, and human recognition merits further investigation. There is some evidence of an association between human recognition and nutritional status and some evidence of human recognition's contribution to well-being, but further study of these relationships is needed.

Keywords: respect; dehumanization; human recognition; HIV; Africa; Kenya

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1. Introduction

In recent years, the study and practice of economic development have expanded to focus on intangible underlying factors of development, such as freedom (Sen, 1999), empowerment (World Bank, 2005), and social capital (Isham et al., 2002). This paper builds on this work but focuses on a concept distinct from those cited above; the paper measures the extent to which individuals are viewed, valued, and treated as fellow human beings – the concept of 'human recognition' – and evaluates the impact of specific health and nutrition programme interventions on human recognition.

Human recognition is defined as the extent to which an individual is acknowledged by others to be of inherent value by virtue of being a fellow human being. Human recognition can be positive or negative. Provision of positive human recognition refers to actively acknowledging an individual to be of value by virtue of being a human being who possesses basic qualities in common with oneself and other human beings. Provision of negative human recognition refers to viewing an individual as lacking inherent value as a human being or not acknowledging this value. An individual can value another individual for various reasons, including his/her skills, capabilities, and behavior. Human recognition refers to valuing someone simply because s/he is a fellow human being, not for other attributes. Therefore, it is possible for an individual to be valued and respected for one's labour, while being devalued as a human being. For a more detailed description of the concept of human recognition, see Castleman (2013). Human recognition transactions occur in multiple domains of individuals' lives, and measurement of human recognition focuses on the three primary domains of household, community, and institutions.

Human recognition plays multiple roles in development. As modeled in this paper and more extensively in Castleman (2013), human recognition is hypothesized to affect development outcomes such as health and consumption through impacts on individuals' behaviors, choices, and access to opportunities and services. Development programmes themselves can influence human recognition transactions. This paper studies two specific programme interventions: supplementary food and antiretroviral therapy for HIV. Data from a randomized controlled trial are used to examine the impact these interventions have on the human recognition levels of malnourished, HIV-infected adults in Kenya. Different pathways by which these interventions affect recognition are tested. Determinants of human recognition and the extent to which human recognition is a determinant of nutritional status and well-being are also examined.

Sub-Saharan Africa is home to approximately 25 million people living with HIV/AIDS (UNAIDS, 2013). HIV-infected individuals are often subject to stigma from their families, communities, and institutions (Brown et al., 2003). HIV-related stigma refers to 'all unfavorable attitudes, beliefs, and policies directed toward people perceived to have HIV/AIDS' (Brimlow et al., 2003). Negative human recognition underlies stigma and stigmatising behaviors; failure to recognise an HIV-infected individual to be of inherent value as a fellow human being facilitates 'unfavorable attitudes, beliefs, and policies' and related behaviors. Therefore, several stigma-related behaviors such as domestic violence or barring infected individuals from participating in household or community activities manifest negative human recognition. Based on this relationship between human recognition and stigma and given the prevalence of HIV-related stigma in Kenya (see Hamra, Ross, Orrs, & D'Agostino, 2006 for quantification of HIV-related stigma in Kenya), it is expected that some HIV-infected individuals in Kenya receive low levels of human recognition.

Studies of food supplementation among HIV-infected adults have examined outcomes such as malnutrition, treatment adherence, disease progression and other clinical outcomes (Ndekha et al., 2009; Ndekha et al., 2009; Cantrell et al., 2008; Koethe & Heimburger, 2010; Mahlungulu et al., 2007). Receiving food supplementation may also influence human recognition among malnourished HIV-infected clients through various pathways, but studies have not examined such outcomes. To address gaps in the evidence base about the impact of food supplementation on malnourished, HIV-infected adults, the U.S. Agency for International Development (USAID) funded the Food and Nutrition Technical Assistance (FANTA) Project and the Kenya Medical Research Institute (KEMRI) to carry out a randomized controlled trial of the impacts of supplementary food in 2006-2008. USAID reviewed the study design; USAID did not play a role in the collection, analysis, or interpretation of data, nor did it play a role in writing the report or the decision to submit this article for publication.

Questions were included in the trial to measure human recognition levels among study subjects. This randomized trial is the first time that human recognition has been empirically measured and, in addition to providing empirical evidence about specific research questions, demonstrates how human recognition can be measured in the context of health services or a research study.

The next section presents a model of human recognition in development programmes. Section 3 describes the study design, Section 4 describes the variables, and Section 5 presents the empirical strategy. Section 6 reports results, and the final section discusses implications and limitations of the findings.

2. Model of Human Recognition's Role in Utility

A simplification of the full model of human recognition in Castleman (2013) focuses on the hypotheses tested in this study. An individual's utility function is given by $\mathrm{U} = \mathrm{U}(\mathrm{h}, \mathrm{c}, \mathrm{R})$, where h, c, and R are health, consumption, and the total level of recognition received by an individual, respectively. Utility obtained by providing human recognition to others is not part of the empirical study and is not included in the function. The utility function is expanded to include sub-utility functions for health and consumption:

$$\begin{aligned} \mathrm{U} &= u_h[h(\mathrm{H},\mathrm{R})] + u_c[c(\mathrm{C},\mathrm{R}] + \phi\mathrm{R} = \eta h(\mathrm{H},\mathrm{R}) + \kappa c(\mathrm{C},\mathrm{R}) + \phi\mathrm{R} \\ &= \eta(\mathrm{H} + \frac{\mathrm{HR}}{\lambda} + \sigma\mathrm{R}) + \kappa(\mathrm{C} + \frac{\mathrm{CR}}{\gamma} + \delta R) + \phi\mathrm{R} \end{aligned} \qquad (1)$$

where H, C, and R $\geq$ 0; σ, $\delta > 0$; $\phi > 0$; and λ, $\gamma > \max(\mathrm{R})$.

ϕ is a parameter reflecting the psychic utility that one's human recognition level confers (or more broadly, the utility conferred by human recognition through all pathways other than health and consumption). η and κ are parameters reflecting the utility conferred by health and consumption. σ and δ are parameters reflecting recognition's direct effect on health and consumption respectively. H and C are the factors and inputs other than human recognition that determine health status and consumption respectively, for example, availability of health services, income, age, and proximity to health facilities. In this model, H, C, and R are non-negative with zero signifying the worst status.

The $\frac{HR}{\lambda}$ and $\frac{CR}{\gamma}$ terms represent the effects that one's human recognition level has on the 'productivity' of other factors in producing health and consumption respectively. The restriction on the parameters λ and γ that they are greater than the maximum level of R means that the effect of these interactions will always be smaller in magnitude than the direct effect that non-recognition factors H and C have on health and consumption.

A number of predictions emerge from the model that are empirically tested using the study data.

1) $\frac{\partial U}{\partial R} = \eta(\frac{H}{\lambda} + \sigma) + \kappa(\frac{C}{\gamma} + \delta) + \phi > 0$. The hypothesis is that higher levels of human recognition have a net positive effect on an individual's total utility.

2) $\phi > 0$. The hypothesis is that higher levels of human recognition have a positive psychic effect on an individual's utility in addition to recognition's effect on utility through changes in material outcomes.

3) $\frac{\partial h}{\partial R} = \frac{H}{\lambda} + \sigma \geq 0$. The hypothesis is that an individual's recognition level is a determinant of health and that the relationship between the two is positive.

4) $\frac{\partial R}{\partial H} \geq 0$. The hypothesis is that factors contributing to health – food and medical treatment in the context of this study – have positive impacts on recognition levels[1]. This is the primary hypothesis tested by the study.

5) $\frac{\partial R}{\partial h} \geq 0$. Because the relationship between health and human recognition is hypothesized to be simultaneous, this partial derivative captures the reverse effect of 3) above, that is, that health status is a determinant of recognition levels and that the relationship is positive.

3. Study Design

At six HIV treatment sites in Kenya[2] eligible subjects were randomized to receive, along with their other treatment services, either a) 12 months of nutrition counseling or b) 12 months of nutrition counseling and 6 months of food supplementation consisting of 300 grams/day of precooked micronutrient-fortified blended flour composed of corn, soy, vegetable oil, sugar, whey protein, and micronutrient premix. This supplement provides approximately 50 per cent of estimated daily energy needs for malnourished, HIV-infected adults. One arm of the study consisted of malnourished, HIV-infected adults who began antiretroviral therapy (ART) within a month of recruitment. The other arm consisted of malnourished or nutritionally vulnerable HIV-infected adults who were not yet eligible for ART because their disease was at an earlier stage but who were prescribed antibiotics (cotrimoxazole) per the standard of care to prevent opportunistic infections. Subjects in both arms were randomized between food and non-food groups. Figure 1 diagrams the study design[3].

Eligibility for the study was determined by nutritional status using body mass index (BMI) cutoffs established by the World Health Organization (WHO) (1999). ART subjects had BMIs between 14-18.5 kg/m^2 at the time of enrollment. Pre-ART subjects had BMIs between 14-18.5 kg/m^2, or 18.5-20 kg/m^2 with weight loss during the past month[4]. Women who reported being pregnant or lactating were excluded from analysis. For ethical reasons, all patients with BMI < 14 kg/m^2 were provided food. Their data were excluded from analysis. At the time of the study the standard of care for malnourished HIV-infected individuals in Kenya did not include food supplementation. Programmes were providing food supplementation at some facilities, but the study was conducted only at sites where food was not already being provided. Therefore, the study did not prevent any clients from receiving food supplementation who would otherwise have received it. The study protocol was approved by institutional review boards in the U.S. and in Kenya.

A total of 1,146 subjects were enrolled. Complete data are available for fewer subjects due to high attrition rates and missing data. Attrition among ART clients was a significant problem in Kenya, and post-election violence that occurred in Kenya during January and February 2008 caused missed appointments and staff shortages, leading to missing data. Two sources of attrition, unreported mortality and inability to return to the clinic due to illness or poverty, are more likely among those who enter the study with poorer health. This is likely why baseline CD4 count is significantly higher among subjects for whom there are data at 9 or 12 months than it is for all subjects (211 vs. 186, $p < .05$). Therefore, results from these periods reflect a sample that was somewhat healthier at baseline than the full set of subjects.

For some clients recruited late in the study period, data were collected for less than 12 months. Recruitment took longer than expected due to decentralization of HIV treatment services in Kenya and other factors. Funding for the study required that data collection end in June 2008, and data from clients who had not reached 12 months by then are used in analyses at earlier months but not in the 12-month analysis. The only factor determining this exclusion was the date of recruitment, and this does not appear to bias the 12-month data, though it does reduce the sample size for the 12-month analysis.

4. Variables

Human Recognition Variables

Seven questions in the trial were specially designed to measure the level of human recognition received by subjects. These variables are listed in Table 1. Self-reported responses use a 4-point scale. Although self-reported receipt of human recognition is being measured directly, data on respect and how one’s problems are viewed by others are also collected because the concept of human recognition was new to both subjects and data collectors in this study, and questions about related, familiar concepts such as respect capture aspects of human recognition that subjects might not consider in responding to the human recognition question. Whether subjects eat meals with other household members serves as an objective measure of the human recognition that family members provide to subjects. In Kenya and elsewhere, studies indicate that some people believe HIV can be spread by sharing food, and cases have been reported of family members refusing to eat meals with HIV-infected individuals, denying them participation in a basic and communal part of household life (Kako & Dubrosky, 2013; Mishra et al., 2009).

Human recognition is measured in the domains of household, the community and institutions. Because data were collected by health care providers at health facilities, which are a primary institutional source of human recognition for HIV-infected adults, the questions combined the community and institution domains to avoid biases from respondents or data collectors. For each month factor analyses were run using responses to the questions for each domain to generate household recognition and community/institution recognition scores. The Appendix provides details of the factor analyses. To generate an overall measure of an individual's human recognition level, scores for each domain are weighted and summed to form an index:

$$R_i = \omega_{ho} r_i^{ho} + \omega_{c/in} r_i^{c/in} \qquad (2)$$

The subscripts and superscripts signify the domains of household, community, and institutions. The ωs are weights reflecting the relative impact the domains have on one's overall level of recognition.

Based on the number and type of indicators in order to balance household-level and external human recognition, equal weights of 0.5 are assigned to the household domain and to the combined community and institutions domains. As a robustness check, when other weights are used, such as 0.6 and 0.4, results do not differ significantly. Empirical models are also estimated using a composite variable of only the self-reported levels of recognition received (not respect or views of problems), equally weighted between household and community/institutions, in place of the full factor score. Results using this 'direct' measure are similar to those that use the factor scores. Models were also estimated using a measure of 'minimum recognition', the lowest level of recognition reported from the six self-reported questions, with similar results.

<u>Other Variables</u>

Table 2 presents baseline statistics. The high female-to-male ratio among clients is consistent with HIV treatment patterns in Kenya at the time: HIV prevalence was higher among women than men, 8.7 per cent and 4.6 per cent respectively (Central Bureau of Statistics Kenya, 2004), and women were also more likely to seek treatment (Voeten et al., 2004). Medical treatment is measured with a value of 2 assigned to those taking ART, 1 to those taking cotrimoxazole but not ART, and 0 at baseline before medication began. At the time of the study, WHO recommended beginning ART when CD4 counts drop below 200 cells/μl[5]. The physical and mental health variables use self-reported responses to standard questions developed by the U.S. Centers for Disease Control and Prevention (CDC) to measure quality of life. The physical health variable sums the numbers of poor physical health days and days in pain over the past month, so values can range from 0 to 60. The mental health variable uses factor analysis to combine information about numbers of days experiencing stress, depression, sadness, emotional problems, worry, tension, and anxiety. Both physical and mental health variables are coded so higher values represent better health. Subjective well-being is measured by responses to the question, 'Overall, how satisfied are you with your life these days?'

5. Empirical Strategy

<u>Empirical Specifications</u>

To test the predictions generated from the theoretical model, three sets of empirical models are estimated. The first set uses human recognition as the dependent variable to test whether provision of supplementary food or medical treatment for HIV improves the levels of recognition ($\frac{\partial R}{\partial H} \geq 0$). These models also examine the determinants of human recognition, including the extent to which health status is an independent predictor of human recognition ($\frac{\partial R}{\partial h} \geq 0$). The second set of models uses nutritional status as the dependent variable to test the extent to which receipt of human recognition is a determinant of nutritional status ($\frac{\partial h}{\partial R} \geq 0$). The third set uses subjective well-being as the dependent variable to test human recognition's association with utility ($\frac{\partial U}{\partial R} > 0$) and whether recognition's contribution to utility occurs through psychic utility ($\phi > 0$), independent of changes in physical and mental health.

Three different types of empirical specifications are estimated: baseline models, semi-differenced models, and panel models. *Baseline models* examine variations in baseline status among study subjects. *Semi-differenced models* estimate the differences between the status at a given point of time (3, 6, 9, or 12 months) and the status at baseline. Not all variables are differenced so time invariant variables such as food supplementation, age, sex, and education can be included. *Panel models* exploit all the data points and are estimated as full panels with fixed effects. Because these models use the difference between a variable's value in a given month and its mean for each subject, time invariant variables cannot be included. T tests for comparisons of means are also used to examine differences in human recognition between treatment groups, between men and women, and between subjects at urban and non-urban sites.

Human Recognition Models

The model for determinants of human recognition at baseline is:

$$R_{i0} = \alpha + \beta \boldsymbol{d_i} + \gamma \boldsymbol{h_{i0}} + e_i \qquad (3)$$

where $\boldsymbol{d_i}$ is a vector of time-invariant characteristics, and $\boldsymbol{h_{i0}}$ is a vector of time-variant characteristics at baseline.

The model used to test the effects of food and medical treatment on human recognition is:

$$\Delta R_{i6,0} = \alpha + \delta \text{food}_i + \beta \boldsymbol{d_i} + \gamma \Delta \boldsymbol{h_{i6,0}} + e_i \qquad (4)$$

where the difference between 6 months and baseline levels are measured for the **h** variables. These models are also run at 3, 9, and 12 months. In order to isolate any direct effects food and medical treatment have on human recognition, health and nutritional status are controlled for in some models.

The human recognition model using full panel data to examine determinants of changes in human recognition is:

$$R_{it} = \alpha + \beta \boldsymbol{h_{it}} + e_{it}. \qquad (5)$$

Nutritional Status Model

The nutritional status model uses full panel data:

$$N_{it} = \alpha + \varphi R_{it} + \beta \boldsymbol{h_{it}} + e_{it} \qquad (6)$$

Variations and robustness checks use direct measurement of recognition in place of factor scores and change some of the control variables. Unlike the recognition panel, Hausman specification tests do not reject random effects, meaning the individual-specific variables not included in the model are not correlated with the explanatory variables. Random effects estimation is used in addition to fixed effects.

Subjective Well-Being Models

The baseline model for subjective well-being is:

$$SWB_{i0} = \alpha + \varphi R_{i0} + \beta \boldsymbol{d_i} + \gamma \boldsymbol{h_{i0}} + e_i \qquad (7)$$

Specifications that do not include baseline health status in $\boldsymbol{h}_{i0}$ capture the full relationship between recognition and subjective well-being in φ. When health and nutritional status are included, φ measures human recognition's direct psychic effects on well-being. The use of ordered probit to estimate models in which subjective well-being is the dependent variable follows Frey and Stutzer (2005) and Kingdon and Knight (2007).

The semi-differenced subjective well-being model is:

$$\Delta SWB_{i6,0} = \alpha + \varphi R_{i6,0} + \delta food_i + \beta \boldsymbol{d}_i + \gamma \Delta \boldsymbol{h}_{i6,0} + e_i \qquad (8)$$

The full panel data model is:

$$SWB_{it} = \alpha + \varphi R_{it} + \beta \boldsymbol{h}_{it} + e_{it} \qquad (9)$$

Probit cannot be used with fixed effect panel data[6], and Stata does not support ordered logit estimation with fixed effects for panel data. Therefore, the panel is estimated as a linear model.

<u>Identification</u>

Initially OLS is used for continuous variables, ordered probit for discrete variables, and generalized least squares for the random effects models. Since the food intervention is randomized, that variable is exogenous in all models, and OLS results can be used for the primary hypothesis about the impact of food on human recognition. However, tests indicate that some other explanatory variables are endogenous in the human recognition and subjective well-being models, including *recognition, physical health, mental health, nutritional status*[7]. In the semi-differenced models the effects of individual-specific, omitted variables that influence the dependent and independent variable levels are subtracted out by the differencing. However, if there are omitted variables that affect changes in the levels of both dependent and independent variables over the period of measurement, then endogeneity could bias the OLS estimators. For example, in the human recognition models, omitted characteristics of the subject's family, social networks, or social capital may influence the extent to which improvements in human recognition occur as well as influencing changes in mental health and possibly physical health. There could also be simultaneity between changes in the independent variables and the dependent variables. In the panel models, individual-specific omitted variables are subtracted out in the fixed effects, and the primary possible source of endogeneity would be simultaneity between deviations from the means of the dependent and independent variables.

Where endogeneity is indicated, leading values of variables are used as instrumental variables[8]. Lagged values are not used, except in the 12-month specification, so baseline values can be included to capture changes during the initial months of interventions. Leading values are correlated with the endogenous variables, (for example, $mental\_health_{i6}$ is correlated with $mental\_health_{i0}$), but leading values are not expected to be correlated with the error term in the original model. There is not simultaneity across different time periods because, for example, mental health in a future month will not influence human recognition in an earlier month. To the extent that leading values of mental health status are correlated with earlier values of recognition, it is through the correlation between mental health status at baseline and month 6, and this is the correlation the instrument is designed to use. Evidence supporting validity of the instruments is found in the Hansen J test statistics that indicate exogeneity of the instruments and the Anderson canonical correlation likelihood ratio statistics that indicate the instruments are correlated with the endogenous variables. One challenge posed by using leading values as instruments is it reduces the number of observations because some subjects are missing some data.

6. Results

<u>Baseline Equivalence</u>

Table 3 demonstrates baseline equivalence between the food and no-food groups in the three outcome variables.

Impacts of Food and Medical Treatment on Human Recognition and the Determinants of Human Recognition

Comparison of means

Table 4 reports the results of t-tests comparing the mean values of variables between intervention groups. The equivalence in human recognition levels at baseline between the food and no-food groups is expected because the food intervention was randomized. After 6 months of interventions, the increase in recognition is higher (p =.07) among those receiving food by approximately one third of a standard deviation. At 12 months, after an additional 6 months of no food interventions to either group, the difference between the two groups is no longer significant. Food supplementation appears to improve human recognition during the period of supplementation but the effect does not persist following completion of supplementation.

A t-test finds that at baseline the group beginning ART had significantly lower mean human recognition levels than the group that was not yet eligible for ART (p=.02). Unlike food, ART was not randomized; per WHO guidelines, the subjects starting ART were those whose disease was more progressed. Clients with more advanced disease may receive lower levels of recognition because the effects of the disease are more visible, HIV status is more likely known by others, they are less productive in performing tasks, and they require greater care. Starting ART itself may also entail disclosure of HIV status for the first time, leading to stigma and negative human recognition. During the period of the study, changes in recognition are not significantly different between those taking ART and those not taking ART.

Women received significantly lower levels of recognition at baseline than men (Table 5). Women also experienced greater improvements in human recognition during and after the interventions; this difference was not statistically significant at completion of the food intervention (p=.21) but was marginally significant at 12 months (p=.056). Men had lower CD4 counts than women at baseline, which is likely because men often seek treatment for HIV later in the disease progression than women do (Voeten et al., 2004).

Impacts of food and treatment on changes in human recognition

Since the food intervention is randomized, the comparison of means demonstrates food's impact on human recognition. However, multivariate regressions (Table 6) are also carried out as a robustness check and to examine other determinants of changes in human recognition. The coefficient on *food* is positive and significant in all three semi-differenced models, indicating that subjects who received food supplementation had significantly greater improvements in human recognition than those who did not receive it, controlling for various demographic, socio-economic and health variables. With factor scores, interpreting magnitudes is challenging, but in model (4), addition of food supplementation increases the improvement in an individual's human recognition over 6 months by an average of about one third of a standard deviation of the change in recognition and 40 per cent of a standard deviation of baseline recognition, compared to those not receiving supplementation. The coefficient on *food* in (4) captures all the effects that food supplementation has on changes in human recognition levels, including both through improved health and nutritional status and through being valued more[9] by other household members because one brings home significant quantities of food[10].

The coefficient on *medical treatment* is not significant, suggesting that treatment with ART for those requiring it does not confer significantly greater or lesser human recognition benefits than treatment with cotrimoxazole prophylaxis for those not yet requiring ART.

The *site* variable is coded such that higher values signify the three sites located in urban slums in Nairobi and lower values signify the three sites in rural or peri-urban areas. The coefficient on *site* is negative and significant in all three semi-differenced models: subjects at the non-urban sites accrued greater human recognition gains than those in the urban clinics. Given that site was not a significant determinant of human recognition in the baseline model and that there was baseline equivalence in human recognition across sites, this result suggests there were systematic differences across sites or in factors that facilitate the interventions' impact on human recognition. This could occur through counseling methods, staff's interpersonal approaches, and facility systems, or through other factors in the environment outside the health facilities.

When a *siteXfood* interaction term is added, its coefficient is not significant (results not shown)[11], suggesting that the result is not explained by greater food insecurity in rural areas generating greater recognition from bringing home food. The baseline equivalence and the robustness of the result to coding *site* as a binary, urban-rural variable or as different values for each site indicated that differences in data collection across sites do not seem to explain this result either.

Model (4) is run at 9 and 12 months to examine whether the results persist after completion of the food interventions (not shown). At 9 months the coefficient on *site* is still significant and negative, and the coefficient on food is still positive but no longer significant (p=.16). By 12 months *site* is still significant and negative, and *food* is not significant.

Models (5) and (6) control for changes in nutrition and physical and mental health so the coefficient on *food* captures the effects that food has on recognition through enhanced status within the household or other factors unrelated to changes in health or nutritional status[12]. The coefficient on *food* is still positive and significant in these models, suggesting that part of how food supplementation impacts human recognition is through channels other than one's health and nutrition status. In the IV model receipt of food increases human recognition levels by 0.56 units, which is 59 per cent of a standard deviation of the change in human recognition, and 72 per cent of a standard deviation of the baseline level of human recognition. When change in CD4 count is included, the coefficients on *food* remain significant in both the OLS and IV model, but the overall IV model is no longer significant (results not shown), partly due to loss of power due to missing data.

Determinants of human recognition

The first two baseline models use OLS and ordered probit for human recognition factor scores and direct measures respectively, with very similar results. Sex is a significant determinant of human recognition at baseline, with women more likely to receive low levels of recognition than men. Physical and mental health are also both significant determinants of human recognition levels with less healthy subjects more likely to receive lower levels of recognition. Subjects with higher incomes are more likely to receive higher levels of recognition.

In the IV estimation results, the number of observations declines from 485 to 212 because of missing data for leading variables. The coefficient on *mental health* has a large positive magnitude and is highly significant: those with better mental health receive higher levels of recognition. The *nutritional status* coefficient becomes marginally significant, indicating that subjects with worse nutritional status also receive lower levels of recognition. The coefficient on *physical health* is now negative, indicating those with worse physical health in the past 30 days receive higher levels of recognition. This is a surprising result but could be due to the additional care provided to ill subjects.

Interestingly, the coefficient on *sex* is no longer significant. This suggests that when physical and mental health and nutritional status are fully controlled for and endogeneity addressed, being female does not significantly affect the level of human recognition received. When only *nutritional status* and *physical health* are treated as endogenous and instruments are used, but not *mental health*, *sex* remains significant and positive (results not shown). But when *mental health* is treated as endogenous and instrumented, even when both *physical health* and *nutritional status* are treated as exogenous, the coefficient on *sex* is insignificant. In the linear regression the t-statistic for the *sex* coefficient drops from over 2 to 0.07 by instrumenting for mental health. This suggests that while women in the study receive significantly lower levels of human recognition, women and men with the same mental health status do not differ in recognition. A comparison of means shows that women have worse mental health status than men at baseline (p=.09), and in a linear regression *sex* is a significant independent predictor of mental health status (p=.05). The apparent relationship among gender, mental health, and human recognition is intriguing.

OLS estimation of the full panel with fixed effects finds that increases in BMI, reductions in physically unhealthy days, and reductions in mentally unhealthy days are all significant predictors of increases in human recognition received. Using two-stage least squares, the coefficient on *nutritional status* remains significant and positive and the coefficient on *treatment* is negative and significant, but the coefficients on the two health variables are not significant. The significant negative coefficient on treatment means that when clients reached the stage of requiring ART, they were receiving lower levels of recognition than when clients were at the stage of only requiring cotrimoxazole. This is consistent with the earlier finding of lower mean values of human recognition among ART clients than pre-ART clients.

<u>Role of Human Recognition in Nutritional Status</u>

Table 7 reports results from the nutrition panel models. Results of the fixed effects and random effects estimations are quite similar. In models (1) and (2), fewer days of poor physical health, improvements in human recognition, and taking ART are all significant independent predictors of improved nutritional status. When income and CD4 counts are included in the model, the number of observations decreases because these data are collected less frequently and data are missing for some observations. In these models the coefficients on human recognition remain positive and increase in magnitude but are no longer statistically significant. This may be because CD4 and income are controlled for or may be due to the reduction in sample size. Coefficients on physical health and treatment remain significant. Larger increases in income or in CD4 counts are also predictors of larger increases in BMI.

Role of Human Recognition in Well-Being

Table 8 reports results from the subjective well-being models. In the ordered probit baseline model (1), the coefficient on *human recognition* is positive and significant, indicating that subjects with higher levels of human recognition at baseline are more likely to have higher levels of subjective well-being at baseline. The coefficient on *recognition* captures associations between human recognition and subjective well-being through both direct psychic effects and health, nutrition and other material outcomes. Controlling for health and nutrition status in model (3), the coefficient on human recognition remains positive and significant at the 0.1 level, though the magnitude and statistical significance decrease. This can be interpreted to mean that one way human recognition affects subjective well-being is through health and nutritional status, so when this pathway is no longer included in the *recognition* coefficient, the magnitude and significance decrease. However, the fact that the coefficient is still positive and significant suggests that human recognition makes other, direct contributions to well-being. The coefficient on *site* is negative and significant; subjects at the sites outside of Nairobi have higher subjective well-being at baseline than those in the Nairobi slum sites.

However, when endogeneity is addressed using instrumental variables[13], the sample size drops, the coefficient on *human recognition* is no longer significant, and *site* is the only significant independent predictor of subjective well-being status at baseline.

The semi-differenced models (5), (6), and (7) follow a similar pattern as the baseline models. Ordered probit estimates yield significant positive coefficients on Δ*recognition* at 3 months both with and without health and nutrition controls. At 6 months these coefficients are no longer statistically significant at the .1 level (results not shown). Hausman specification tests do not reject exogeneity in model (5) but indicate endogeneity in model (6) when health and nutrition controls are included. When leading variables are used as instruments, the coefficient on Δ*recognition* is no longer significant. Δ*mentalhealth* is the only significant variable, and the model does not have significant explanatory power. In the panel model *recognition* is not significant.

7. Discussion

This study is the first time human recognition has been empirically measured, demonstrating how the concept can be measured in a research study or health services programme. Food supplementation improves receipt of human recognition among malnourished, HIV-infected adults in Kenya. This effect is significant at completion of 6 months of food supplementation, but does not persist 6 months after completion of the food intervention. The finding from the comparison of means is robust to multivariate analysis using various combinations of control variables. The food intervention is randomized, and this result is the most robust finding from the study.

The effect food supplementation has on human recognition may occur through changes in health and nutrition, or through other changes that affect how subjects are valued by others.

These latter effects are measured by controlling for physical and mental health, income, and nutritional status. With these controls, the food intervention's positive effect on changes in human recognition remains significant, even though the sample size becomes small for these models. This suggests that food supplementation's effect on human recognition occurs at least in part through pathways other than changes in material outcomes.

While food supplementation significantly improves human recognition levels, introduction of ART does not. In addition to the different nature of the two interventions, ART was provided based on stage of disease while food was randomized. Comparison of means tests finds that clients eligible for ART began the study with significantly lower human recognition levels, and the panel data analysis finds that treatment with ART is a significant predictor of lower levels of recognition. These results suggest that subjects with more advanced disease receive lower levels of recognition, perhaps due to more visible illness, lower productivity, disclosure of HIV status, and the need for greater care. This interpretation is supported by the analyses of determinants of human recognition levels. Better physical and mental health and better nutritional status are significant independent predictors of receiving higher levels of human recognition at baseline. The link between mental health and human recognition appears particularly strong. Endogeneity of the *mental health* variables in these models suggests that the same factors are at work influencing both mental health and recognition, and that human recognition and mental health may reinforce each other. Indeed, many of the factors that Patel and Kleinman (2003) identify as influencing mental health in developing countries are rooted in human recognition transactions.

There is evidence of a gender divide in human recognition as well. Women receive significantly lower levels of human recognition at baseline than men, though when mental health status is controlled for and endogeneity addressed, the effect of sex is no longer significant. This relationship among being female, mental health, and receipt of lower levels of human recognition merits further study.

Improvements in human recognition are greater at district and provincial hospitals than at urban slum clinics in Nairobi, even after controlling for various demographic, socioeconomic, and health variables. Possible explanations include differences in how interventions are implemented at the two types of sites and differences in household and community support.

Within individual subjects, deviation from one's mean human recognition level over time is a significant predictor in some specifications of deviation in BMI, suggesting human recognition's contribution to health and nutrition. While human recognition is a significant independent predictor of subjective well-being status at baseline in the initial models, once endogeneity is addressed, the human recognition variable is no longer significant. Similarly, in the models of changes in subjective well-being, change in human recognition is not significant once endogeneity is addressed, though smaller sample sizes may account for part of the loss of significance. The programme interventions did not include components designed specifically to influence human recognition, and the relationship between changes in recognition and changes in well-being may differ in programme settings where recognition is deliberately addressed.

Limitations to the study offer lessons for future research on this topic. Human recognition was measured primarily through self-reporting. While this allowed human recognition to be directly identified, what was being measured were subjects' perceptions of the recognition they received. This perception may differ from the recognition others are actually providing, and it was not possible to collect data from other household members about recognition provided. However, for the purposes of assessing impacts on those receiving recognition, an individual's perception of recognition received may be most relevant.

Missing data due to attrition, missed appointments, and incomplete data collection posed a challenge to analysis, reducing the power of results, especially when differenced models were used and when leading values were used as instruments. While the study applied a number of mechanisms to improve follow-up, the high rates of attrition and missed appointments reflect the situation among HIV treatment clients in Kenya at the time.

Notwithstanding these limitations, the study points to the impact programmes can have on human recognition, the relevance of human recognition to other outcomes of interest, and the feasibility of measuring human recognition. Researchers and programme implementers may consider explicitly incorporating human recognition interventions and measures into studies and into programme design and evaluation in order to strengthen programme impacts and improve understanding of human recognition's role in development.

Appendix: Factor Analysis Results

All factor analyses generate one strong factor with low uniquenesses (except for the *eat_together* variable discussed below) and factor loadings that are consistent with interpreting the factor to be receipt of human recognition in the specified domains. Results are quite similar at each month – though the number of observations varies – and baseline results are shown illustratively.

The factor analysis for human recognition received in the household at baseline is based on the following model:

$$self\text{-}reported\_recognition\_hh_i = \lambda_{1srh} hhrecognition_i + \lambda_{2srh} eat\_together_i + \delta_{isrh}$$
$$respect\_hh_i = \lambda_{1rh} hhrecognition_i + \lambda_{2rh} eat\_together_i + \delta_{irh}$$
$$view\_problems\_hh_i = \lambda_{1vph} hhrecognition_i + \lambda_{2vph} eat\_together_i + \delta_{ivph}$$
$$eat\_together_i = \lambda_{1et} hhrecognition_i + \lambda_{2et} eat\_together_i + \delta_{iet}$$
$$i = 1, 2\ldots..763$$

$Hhrecognition_i$ is the latent variable of human recognition that i receives in the household; λs are factor loadings; and δ_{ix} are unique factors (error terms). The letter subscripts (srh…et) refer to the four measured variables. Two factors are included in the model because two factors achieve Eiegenvalues $\geq$ 1.

Results (Table A1) indicate that variations in the three self-reported responses are closely correlated, but variation in *eat_together* is not correlated with the other variables. In fact, when only Factor 1 is retained, the uniqueness for the *eat_together* measure leaps to 0.9995 (results not shown). Factor 2 appears to be whether or not subjects eat with other members of the family, and there is not a common factor underlying this variable and the others. Consistent with the spirit of exploratory factor analysis, this variable is dropped from the factor analysis.

When the factor analysis is run with only the three self-reported responses (Table A2), more data points can be used because the self-reported data were collected monthly, and the eating together data were collected at baseline, 6 months, and 12 months. The model becomes:

$$\textit{self-reported\_recognition\_hh}_i = \lambda_{1srh}\textit{hhrecognition}_i + \delta_{isrh}$$
$$\textit{respect\_hh}_i = \lambda_{1rh}\textit{hhrecognition}_i + \delta_{irh}$$
$$\textit{view\_problems\_hh}_i = \lambda_{1vph}\textit{hhrecognition}_i + \delta_{ivph}$$
$$i = 1, 2\ldots..857$$

Now all the factor loadings are quite high and the uniquenesses are low. The factor score has a mean of 1.05e-8 and a standard deviation of 1.

The factor analysis for human recognition received in the community and institutions at baseline is based on the following model:

$$\textit{self-reported\_recognition\_oth}_i = \lambda_{1sro}\textit{othrecognition}_i + \delta_{isro}$$
$$\textit{respect\_oth}_i = \lambda_{1ro}\textit{othrecognition}_i + \delta_{iro}$$
$$\textit{view\_problems\_oth}_i = \lambda_{1vph}\textit{othrecognition}_i + \delta_{ivpho}$$
$$i = 1, 2\ldots..714$$

Only one significant factor emerges from the factor analysis. The resulting factor loadings (Table A3) are consistent with the factor being recognition received from non-household members, and the uniquenesses are low. The mean factor score is -2.9e-10 and the standard deviation is 1.

Factor analysis results from months 1 to 12 yield results similar to the baseline.

Endnotes

[1] Because the theoretical model presented here does not include determinants of recognition receipt, this hypothesis – unlike the first three – is not an explicit prediction of the model.

[2] The six sites were: Maragwa District Hospital, Mathere North Hospital, Mbagathi District Hospital, Naivasha District Hospital, Nyeri Provincial Hospital, and Riruta City Council Hospital.

[3] The main reason the number of clients receiving food is higher than the number not receiving food is that some clients chose to drop out of the study after learning which group they were randomized to, and more of those assigned to receive no food dropped out than those assigned to receive food.

[4] Pre-ART clients may be more vulnerable since their HIV is not being treated yet, and there may be benefits of supporting such clients who have declining nutritional status before they cross the threshold into malnutrition.

[5] In 2009, WHO revised its guidelines, recommending initiation of ART when CD4 counts drop below 350 cells/μl (WHO, 2009); and in 2013 it revised them again to recommend initiating ART when CD4 counts are below 500 cells/μl (WHO, 2013).

[6] Fixed effects cannot be conditioned out of the likelihood function for a probit, and unconditional fixed effects probit models are biased (Stata, 2007).

[7] Hausman specification tests do not reject exogeneity for any of the nutrition panel models.

[8] Stata does not have commands for using instrumental variables with ordered probits. Therefore, for ordered probit specifications where endogeneity of independent variables is indicated, two stage least squares is performed manually, following Bartilow (2008).

[9] Valuing someone for the material goods s/he brings home is distinct from valuing someone for his/her inherent worth as a human being, but increases in the former may enhance or help actualize the latter.

[10] The food was for the subjects themselves but qualitative assessments indicated it was sometimes shared with others, and food consumed by the subjects still served as an income transfer to the household.

[11] Here and throughout the paper, results that are not shown are available with the author.

[12] Since the variables used to measure changes in health and nutritional status may omit aspects of health or nutrition (for example, micronutrient status), the coefficient on *food* in these models could also reflect food's effect on recognition through changes in unmeasured aspects of health and nutrition.

[13] While Hansen J test statistics cannot be generated using ordered probit, the instruments are tested by estimating the model as a linear model and checking the test statistics. The Hansen J test statistic is insignificant (χ^2 p=.6136), providing evidence that the instruments are exogenous. The Anderson canonical correlation likelihood ratio statistic is significant (χ^2 p=.0002) indicating that the instruments are correlated with the endogenous variables.

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Tables

Table 1: Variables Measuring Human Recognition Receipt

Domains	Variables
Household	Self-reported assessment of how much one is recognized and valued as a human being by one's family members
	Self-reported level of respect received from family members
	Self-reported assessment of how family members view the individual's problems and needs
	Whether eat together with other family members at least once per day
Community and Organizations & Institutions	Self-reported assessment of how much one is recognized and valued as a human being by employer, neighbors, and other non-family members
	Self-reported level of respect received from employer, neighbors, and other non-family members
	Self-reported assessment of how employer, neighbors, and other non-family members view the individual's problems and needs

Table 2: Baseline Statistics

Variable	Baseline Status
Age	35.3 years (mean)
Sex	57% female 43% male
Body mass index	17.6 kg/m^2 (mean)
CD4 counts	186 cells/µl (mean) 126 cells/µl (ART clients' mean) 285 cells/µl (pre-ART clients' mean)
Income (monthly)	24% < 1,000 Ksh 22% 1,000 – 2,999 Ksh 19% 3,000 – 4,999 Ksh 23% 5,000 – 9,999 Ksh 9% 10,000 – 19,999 Ksh 2% 20,000 – 49,999 Ksh 0.1% ≥ 50,000 Ksh
Distance to health facilities	43% < 5 km 14% 5-10 km 9% 10-15 km 6% 15 – 20 km 28% > 20 km
Education	5% no education 8% 1-4 years 52% 5-8 years 7% 9-12 years 26% 13-14 years 3% > 14 years
Physical health (days of poor health last month + days of pain last month)	19 days (mean)
Mental health	2.09e-9 (mean, from factor analysis)
Human recognition	-.001 (mean, from factor analysis)
Subjective well-being	5% very unsatisfied 33% unsatisfied 57% satisfied 5% very satisfied

Table 3: Baseline Equivalence in Outcome Variables

Variable	***Mean among food group***	***Mean among no-food group***	***p-value***
Human recognition at baseline	-0.022	0.025	.43
BMI at baseline	17.67	17.64	.68
Subjective well-being at baseline	1.65	1.60	.256

Table 4: Comparison of Means t-Tests by Intervention

Intervention	***Variable***	***Mean with intervention***	***Mean without intervention***	***p-value***
Food	CD4 count at baseline	184.9	187.7	.40
	Human recognition at baseline	-0.022	0.025	.43
	Change in human recognition at 6 months	***0.057***	***-0.186***	***.07***
	Change in human recognition at 12 months	-0.012	0.129	.35
ART	CD4 count at baseline	**126.4**	**284.8**	**< .001**
	Human recognition at baseline	**-0.053**	**0.072**	**.02**
	Change in human recognition at 6 months	0.020	-0.084	.22
	Change in human recognition at 12 months	0.021	0.073	.37

In all tables, bold values indicate significance at the .05 level. Bold italics values indicate significance at the .1 level.

Table 5: Comparison of Means t-Tests by Sex

Variable	***Mean among Women***	***Mean among Men***	***p-value***
CD4 count at baseline	**196.2**	**173.0**	**.02**
Human recognition at baseline	**-0.118**	**0.151**	**<.001**
Change in human recognition at 6 months	0.012	-0.096	.21
Change in human recognition at 12 months	***0.145***	***-0.094***	***.056***

Table 6: Results from Human Recognition Models

	Baseline Models			Semi-Differenced Models			Panel Models	
	(1)	(2)	(3)	(4)	(5)	(5)	(7)	(8)
Dependent variable	Human recognition (HR)	HR (direct)	HR (direct)	ΔHR to 6 months	ΔHR to 6 months	ΔHR to 6 months	HR	HR
Estimation method	OLS	Ordered Probit	Ordered Probit with IV	OLS	OLS	2SLS	Fixed Effects w/OLS	Fixed Effects w/2SLS
Constant	-0.297 (0.520)	--	--	0.769 (0.559)	***1.24*** ***(0.647)***	1.94 (1.56)	**-0.596** **(0.208)**	**-2.37** **(1.00)**
Age	0.002 (0.004)	-0.002 (0.008)	-0.016 (0.013)	-0.001 (0.008)	-0.008 (0.009)	-0.016 (0.018)	--	--
Sex	**-0.233** **(0.058)**	**-0.462** **(0.137)**	0.034 (0.267)	0.152 (0.138)	0.105 (0.151)	0.283 (0.239)	--	--
Education	-0.003 (0.029)	-0.016 (0.059)	0.005 (0.096)	-0.065 (0.068)	-0.107 (0.074)	***-0.239*** ***(0.135)***	--	--
Distance to facility	-0.004 (0.022)	-0.005 (0.041)	-0.019 (0.065)	-3e-4 (0.045)	0.016 (0.047)	0.020 (0.098)	--	--
Site	0.006 (0.024)	-0.053 (0.042)	0.144 (0.118)	**-0.243** **(0.055)**	**-0.245** **(0.062)**	***-0.246*** ***(0.148)***	--	--
Income	***0.045*** ***(0.028)***	0.084 (0. 056)	0.066 (0.104)	-.012* (0.045)	-0.009* (0.052)	0.026* (0.123)	--	--
CD4	-7e-5 (2e-4)	4e-4 (4e-4)	-3e-4 (8e-4)	--	--	--	--	--
Physical health	**0.004** **(0.002)**	**0.0074** **(0.0035)**	**-0.073** **(0.037)**	--	-0.002* (0.003)	-0.011* (0.033)	***0.0024*** ***(0.0012)***	0.001 (0.004)
Mental health	***0.082*** ***(0.045)***	***0.117*** ***(0.067)***	**2.53** **(0.929)**	--	-0.011* (0.060)	0.235* (0.237)	**0.036** **(0.018)**	-0.174 (0.174)
BMI	0.009 (0.027)	0.061 (0.050)	***0.219*** ***(0.121)***	--	-0.042* (0.033)	-0.031* (0.115)	**0.030** **(0.012)**	**0.133** **(0.059)**
Medical Treatment	--	--	--	-0.002 (0.140)	0.027 (0.157)	-0.113 (0.291)	-0.0363 (0.026)	**-0.115** **(0.054)**
Food	--	--	--	**0.305** **(0.137)**	***0.264*** ***(0.163)***	**0.557** **(0.263)**	--	--
n	485	485	212	141	113	54	2,688	981
Prob>F, χ^2	.004	.0001	.01	.0002	.0025	.02	.0004	.016
Instruments	--	--	Physical, mental health, nutrition (1)	--	--	Physical, mental health (12), nutrition (7)	--	Leading mental health, leading nutrition

Heteroskedasticity-robust standard errors are given in parentheses.
* change in variable from baseline to 6 months.

Table 7: Results from Nutrition Models

Panel Models				
	(5)	(6)	(7)	(8)
Dependent variable	BMI	BMI	BMI	BMI
Estimation method	Fixed Effects w/OLS	Random effects w/GLS	Fixed Effects w/OLS	Random effects w/GLS
Constant	**17.01** **(0.1335)**	**16.93** **(0.1104)**	**14.45** **(1.115)**	**15.48** **(0.565)**
Income	**--**	**--**	**0.236** **(0.095)**	**0.164** **(0.0417)**
CD4	**--**	**--**	***0.0015*** ***(0.0009)***	**0.0019** **(0.0003)**
Physical health	**0.0178** **(0.0028)**	**0.0196** **(0.0021)**	**0.0192** **(0.0073)**	**0.0126** **(0.0035)**
Mental health	0.0341 (0.0338)	0.0330 (0.0330)	0.070 (0.148)	-0.0285 (0.0637)
Human recognition	**0.123** **(0.0452)**	**0.136** **(0.0428)**	0.380 (0.267)	0.225 (0.146)
Medical Treatment	**0.7947** **(0.0517)**	**0.7300** **(0.0427)**	**1.175** **(0.126)**	**1.177** **(0.078)**
n	2,688	2,688	831	831
Prob>F, χ^2	<.0001	<.0001	<.0001	<.0001

Table 8: Results from Subjective Well-Being Models

	Baseline Models				Semi-Differenced Models			Panel
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	SWB	SWB	SWB	SWB	ΔSWB to 3 months	ΔSWB to 3 months	ΔSWB to 3 months	SWB
Estimation method	Ordered Probit	Ordered Probit with IV	Ordered Probit	Ordered Probit with IV	Ordered Probit	Ordered Probit	Ordered Probit with IV	Fixed Effects w/OLS
Constant	--	--	--	--	--	**--**	**--**	**1.87**
								(0.397)
Age	0.0037	-0.009	***0.011***	-0.014	***-0.016***	**-0.032**	0.005	--
	(0.006)	(0.009)	***(0.006)***	(0.011)	***(0.009)***	**(0.012)**	(0.053)	
Sex	**0.267**	0.065	***0.232***	0.466	-0.254	**-0.528**	0.234	--
	(0.112)	(0.174)	***(0.121)***	(0.382)	(0.170)	**(0.215)**	(0.590)	
Education	-0.0237	0.020	-0.006	-0.002	0.030	0.024	0.598	--
	(0.0435)	(0.060)	(0.045)	(0.088)	(0.065)	(0.087)	(0.511)	
Distance facility	-0.046	0.029	-0.027	-0.064	-0.011	-0.065	0.142	--
	(0.030)	(0.047)	(0.032)	(0.108)	(0.049)	(0.060)	(0.211)	
Site	**-0.210**	**-0.183**	**-0.205**	**-0.189**	**0.109**	0.106	0.009	--
	(0.034)	**(0.049)**	**(0.035)**	**(0.060)**	**(0.055)**	(0.071)	(0.106)	
Income	0.044	-0.025	0.008	-0.009	**	**	**	**0.071**
	(0.037)	(0.490)	(0.039)	(0.056)				**(0.029)**
CD4	--	--	***0.0006***	-0.0003	**--**	***0.001****	6.3e-6*	-0.0001
			(0.0003)	(0.0006)		***(0.0005)***	(0.001)	(0.0003)
Physical health	--	--	0.002	-0.049	--	-0.005*	0.008*	0.003
			(0.003)	(0.054)		(0.005)	(0.213)	(0.002)
Mental health	--	--	**0.260**	1.972	--	0.067*	***2.826****	0.067
			(0.060)	(1.329)		(0.092)	***(2.180)***	(0.043)
BMI		--	**0.120**	0.229	--	0.093*	-0.120*	0.031
			(0.042)	(0.181)		(0.066)	(0.132)	(0.023)
Human recog.	**0.1977**	0.040	***0.118***	-0.692	**0.202***	**0.234***	0.892*	-0.060
	(0.074)	(0.191)	***(0.071)***	(0.431)	**(0.086)**	**(0.116)**	(2.490)	(0.061)
Medical Treat.	--	--	--	--	***0.273***	***0.338***	-0.531	***0.091***
					(0.147)	***(0.194)***	(1.132)	***(0.051)***
Food	--	--	--	--	0.059	0.057	0.065	--
					(0.154)	(0.209)	(1.343)	
n	500	261	480	209	205	122	82	821
Prob>F, χ^2	<.0001	.003	<.0001	.0007	.0006	.0016	.64	<.003
Instruments	--	Human recognit ion (1)	--	Human recog., mental, physical health, BMI (1)	--	--	Human recog., mental, physical health, BMI (6)	--

* change in variable from baseline to 6 months.

** Income was only collected at 0, 6, and 12 months.

Table A1: Factor Analysis Results for Human Recognition Received in the Household at Baseline by Study Subjects (including eating together)

Measure	Factor 1 Loadings	Factor 2 Loadings	Uniqueness
Self-reported level of respect received from household members	0.909	-0.012	0.174
How household members view subject's problems and needs	0.868	0.007	0.247
Self-reported recognition and value received from household members	0.922	-0.027	0.150
Whether eat together with other hhold members at least once a day	0.029	0.9995	0.0002
Eigenvalue	*2.43*	*1.0*	

Table A2: Factor Analysis Results for Human Recognition Received in the Household at Baseline by Study Subjects (not including eating together)

Measure	Factor 1 Loadings	Uniqueness
Self-reported level of respect received from household members	0.908	0.175
How household members view subject's problems and needs	0.870	0.244
Self-reported recognition and value received from household members	0.920	0.153
Eigenvalue	*2.43*	

Table A3: Factor Analysis Results for Human Recognition Received from the Community and Institutions at Baseline by Study Subjects

Measure	Factor 1 Loadings	Uniqueness
Self-reported level of respect received from employers, neighbors, and other non-family members	0.916	0.161
How employers, neighbors, and other non-family members view subject's problems and needs	0.812	0.341
Self-reported recognition and value received from employers, neighbors, and other non-family members	0.932	0.131
Eigenvalue	*2.37*	

Figures

Figure 1: Design of Randomized Controlled Trial