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Food Insecurity and Unmet Needs Among Youth and Young Adults Living With HIV in the San Francisco Bay Area

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A B S T R A C T

Purpose: Little is known about food insecurity and unmet subsistence needs and their association with antiretroviral therapy adherence among youth and young adults living with HIV (YLWH).
Methods: We conducted a cross-sectional survey to examine this association in 101 YLWH (aged 18–29 years). Poisson regression models with robust standard errors were used to estimate adjusted risk ratios (RRs) and 95% confidence intervals (CIs).
Results: Approximately 51.7% of participants experienced at least one unmet subsistence need (difficulty finding enough to eat [36.6%], clothing [22.8%], place to sleep [21.8%], place to wash [17.8%], and bathroom [15.8%]), and 64.2% reported being food insecure. For every additional unmet need, the risk of very good/excellent adherence was reduced by 15% (RR = .85; 95% CI = .72–.99; p value = .04). The risk of very good/excellent adherence was lowered by 39% (RR = .61; 95% CI = .43–.87; p value = .005) among food insecure youth, compared with those who were food secure.
Conclusions: These data highlight the need for more research and structural interventions targeting food assistance strategies among YLWH.

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IMPLICATIONS AND CONTRIBUTION

Among youth and young adults living with HIV, food insecurity and unmet subsistence needs are negatively associated with antiretroviral therapy adherence. Structural interventions to address food security and subsistence needs are needed to improve health outcomes such as linkage to and engagement in HIV care, mental health, and antiretroviral therapy adherence among this population.

Food insecurity, defined by the U.S. Department of Agriculture as a "lack of consistent access to enough food for an active, healthy life," is estimated to impact 41 million people in the U.S. [1]. In a study of people living with HIV in San Francisco, 56% of the participants were food insecure at study enrollment [2]. In another study conducted in San Francisco, 25% of participants reported unmet subsistence needs, defined as "difficulty gaining access to a bathroom, place to wash, clothing, food, or a place to sleep [3]." Based on "Maslow's hierarchy of needs," physiological needs such as water, food, shelter, and sleep are the primary driving forces behind human motivation and are prioritized over other health needs, such as care engagement or medication

adherence [3,4]. Thus, examining and intervening on food insecurity and unmet subsistence needs are critical because when physiological needs are not met, health needs are not prioritized.

Food insecurity and unmet subsistence needs have been identified as substantial barriers to antiretroviral therapy (ART) adherence and serve as predictors of poor health outcomes for people living with HIV [5—8]. Food insecurity is associated with lower ART adherence and therefore decreases the likelihood of viral suppression, which in turn can result in viral resistance, increased transmission of HIV, and progression to AIDS. Food insecurity and unmet subsistence needs have also been associated with increased stress [9], depression [10], substance use [11], and increased healthcare costs [12]. Thus, HIV, food insecurity, and unmet subsistence needs are in a compounded detrimental relationship where each worsens in the presence of the other [13].

In 2014 in the U.S., individuals aged 13—29 years comprised 23% of the population, yet accounted for 40% of new HIV diagnoses. A recent review estimated that <6% of youth (aged 13—29 years) living with HIV were virally suppressed [14]. Youth and young adults living with HIV (YLWH) are less likely than older adults to be aware of their HIV diagnosis, linked to care, retained in care, and to adhere to ART [14,15]. The consequence of unaddressed health disparities, suboptimal ART adherence, and lack of virologic suppression among YLWH is a future generation of adults with increased risk of poor health outcomes who are more susceptible to developing AIDS and drug resistance.

Due to unique challenges within the youth population, such as autonomy, psychological development, and handling of personal healthcare and finances [16], food insecurity and unmet subsistence needs may impact YLWH differently and in varying degrees compared with adults living with HIV. Food insecurity and unmet subsistence needs have been examined in HIV studies in populations that experience homelessness [17], pediatric patients [18], and individuals who are substance users [9]; however, there are no data on the relationship between food insecurity and unmet subsistence needs and ART adherence among YLWH. We hypothesized that YLWH have a high level of food insecurity and unmet subsistence needs, which are associated with clinically low ART adherence.

Methods

We conducted a cross-sectional online survey from March through November 2017 to examine the amount of food insecurity and unmet subsistence needs and the association between these two variables and ART adherence in YLWH (herein defined as individuals aged 18—29 years) in the San Francisco Bay Area. We received approval from the University of California, San Francisco Institutional Review Board to conduct this study and obtained electronic informed consent from all participants.

Eligibility criteria included having an HIV seropositive status, being aged 18—29 years, and speaking English. Participants were recruited through outreach to community-based organizations and clinics serving YLWH, referrals from enrolled participants, as well as through social media including Grindr, Facebook, and Craigslist. When a potential participant contacted the study, the study staff screened the individuals over the telephone and determined their age eligibility via a text-messaged photograph of the individual's date of birth from an official identification card (e.g., driver's license) and their HIV serostatus eligibility based on a text-messaged photograph of an antiretroviral medication bottle bearing their name, a laboratory slip showing their HIV viral load result, or a letter of diagnosis from their healthcare provider. All text message communications were sent to a password-protected and encrypted study telephone.

We administered the online survey using Qualtrics (version 2017; Provo, UT), a data collection software program used to conduct online surveys. The survey was completed remotely on the participants' mobile telephone or computer with Internet access. The duration of the survey was approximately 30 minutes, and participants were paid $40 upon completion using an electronic Amazon gift certificate or cash (if the participant opted to come to the university research offices in person).

Participants responded to questions pertaining to demographics, ART adherence rating in past 30 days [19], unmet subsistence needs in the past 6 months [20], and food security in the past 12 months [21]. The ART adherence rating question read as such: "Thinking back over the past 30 days, rate your ability to take all your medications as prescribed: excellent, very good, good, fair, poor, or very poor" [19]. Household food security was assessed using a six-item version of the Household Food Security Survey Module [21], and unmet subsistence needs were assessed using five yes/no questions examining difficulties gaining access to housing, bathroom, place to wash, clothing, or food [20]. We chose "very good" as the cut-off for ART adherence and dichotomized ART adherence as 1 = "very good" or "excellent" and 0 = less than "very good." The decision to dichotomize was due to skewed data and based on our hypothesis of examining clinically meaningful differences in adherence. Food security was dichotomized as 1 = high to marginally high food security (i.e., food secure) and 0 = low to very low food security (i.e., food insecure), consistent with scoring guidelines. The unmet subsistence needs variable was treated as a continuous variable (0—5) to capture a dose—response relationship between unmet subsistence needs and adherence.

Descriptive analyses including totals, percentages, means, and standard deviations were conducted to characterize the population. Inferential analyses used Poisson regression with robust standard errors [22] to estimate adjusted risk ratios (RRs) and 95% confidence intervals (CIs) for the association between ART adherence (outcome variable) and each of two explanatory variables: (1) food insecurity and (2) unmet subsistence needs. Each of these two models adjusted for age (years), sex at birth (female or male), race/ethnicity (Latino, non-Latino African American, non-Latino white, or non-Latino other race), and sexual identity (heterosexual, gay, or bisexual). We used Stata (version 15.1, StataCorp LLC; College Station, TX) to perform descriptive analyses and M*plus* (version 8.2, Muthén & Muthén; Los Angeles, CA) to perform inferential analyses. M*plus* was used for the latter analyses because it can incorporate cases with partial data into the analysis via direct maximum likelihood estimation.

Results

In our study of 101 YLWH with a mean age of 25.0 years, 84.1% self-identified as non-white, 78.2% as male gender, and 85.1% as gay or bisexual at the time of the survey (Table 1). In evaluating education level, 46.5% had a college degree or an education level higher than high school diploma or General Education Diploma, 44.6% had a high school diploma or General Education Diploma, whereas 8.9% reported having less than a high school education. Over half of the participants (50.6%) reported living situations other than living in their own house or apartment or their

Table 1
Summary of participant characteristics

Characteristics	Subcategories	N = 101[a]
Age, mean years (SD, range)		25.0 (2.9, 18–29)
Race/ethnicity, n (%)	Latino	36 (35.6)
	African American non-Latino	30 (29.7)
	White non-Latino	14 (13.9)
	Other non-Latino (American Indian, Asian, multiracial, other)	19 (18.8)
Male sex at birth, n (%)		90 (89.1)
Gender identity, n (%)	Male	79 (78.2)
	Female	10 (9.9)
	Other	12 (11.9)
Sexual identity, n (%)	Gay	69 (68.3)
	Bisexual	17 (16.8)
	Heterosexual	12 (11.9)
Perceived financial situation, n (%)	Live comfortably	17 (16.8)
	Can barely get by	56 (55.4)
	Cannot get by	21 (20.8)
Education, n (%)	Less than high school	9 (8.9)
	High school degree or GED	45 (44.6)
	More than high school or any college degree	47 (46.5)
In school, n (%)		29 (28.7)
Working, n (%)		62 (61.4)
Living situation, n (%)	Own or parent's home	50 (49.5)
	Someone else's place	24 (23.8)
	Rooming, boarding, half-way house, group home, or shelter	11 (10.9)
	Drug or other treatment facility	8 (7.9)
	Welfare hotel or month-to-month hotel	4 (4.0)
	Other	4 (4.0)
Ever homeless or lived in a shelter, n (%)		53 (52.5)
Ever jail or prison, n (%)		24 (23.8)
ART adherence rating, n (%)	Excellent	25 (24.8)
	Very good	33 (32.7)
	Good	21 (20.8)
	Fair	12 (11.9)
	Poor	4 (4.0)
	Very poor	5 (5.0)
Unmet subsistence needs, n (%)	Difficulty finding enough to eat	37 (36.6)
	Difficulty finding clothing	23 (22.8)
	Difficulty finding place to sleep	22 (21.8)
	Difficulty finding place to wash	18 (17.8)
	Difficulty finding a bathroom	16 (15.8)
Number of unmet subsistence needs, (%)	0	45 (48.4)
	1	18 (19.4)
	2	15 (16.1)
	3	5 (5.4)
	4	4 (4.3)
	5	6 (6.5)
Food security, n (%)	Food secure	34 (35.8)
	Food insecure	61 (64.2)

ART = antiretroviral therapy; GED = General Equivalency Diploma; SD = standard deviation.

[a] Numbers do not add up to 100% due to small amounts of missing data, including "do not know" or "decline to answer" responses.

Table 2
Association between number of unmet subsistence needs, food security, and ART adherence (N = 101)

Explanatory variable	Risk ratio (95% CI)	*p* value
Number of unmet subsistence needs	.85 (.72–.99)	.04
Food security categories		
Food secure	Reference	-
Food insecure	.61 (.43–.87)	.005

Adjusted risk ratios were estimated using M*plus* version 8.2 via maximum likelihood assuming a Poisson distribution with robust standard errors adjusting for the following covariates: age (y), sex at birth (male or female), race/ethnicity (Latino, non-Latino African America, non-Latino white, or non-Latino other race), and sexual identity (heterosexual, gay, or bisexual).

Sixty-one participants (64.2%) reported having low to very low food security.

Both unmet subsistence needs and food insecurity were significantly associated with ART adherence (Table 2). Our data suggest that for every additional unmet need, the risk of very good/excellent adherence was reduced by 15% (RR = .85, *p* value = .04). As participants moved from food security to food insecurity, the risk of very good/excellent adherence was lowered by 39% (RR = .61, *p* value = .005).

Discussion

In this study, we were able to show a negative association between ART adherence and food insecurity and unmet subsistence needs in a demographically diverse group of U.S. YLWH. Most participants noted at least one unmet subsistence need in the past 6 months, and about two third of the participants reported high to marginally high food insecurity in the past 12 months. Previous studies have shown an association between food insecurity, unmet subsistence needs, and lower likelihood of ART adherence [23]; however, to our knowledge, this is the first study examining these associations among YLWH.

Several studies have indicated the association between food insecurity and the development of chronic comorbidities such as diabetes, high blood pressure, or heart disease, which in turn are exacerbated in the presence of HIV [24–26]. Additionally, researchers have demonstrated that indicators of poverty, such as food insecurity and unmet subsistence needs, serve as a determinant of risk behaviors, such as sex work and drug use [27], which in turn can reduce ART adherence. Other studies show that high-risk behaviors are used in populations that are food insecure as a means "to gain access to food resources [10]" and that food insecurity can impact public health by contributing to transactional and unprotected sex [28]. Therefore, food insecurity, unmet subsistence needs, and their related indicators critically impact public health through their influence on the risk of HIV infection and transmission. Our findings thus have significant implications to the lives of YLWH whom we have shown to experience high levels of food insecurity and unmet subsistence needs, and therefore may be at increased risk for other comorbidities, sex work, and drug use.

The lived experiences of individuals with food insecurity or unmet subsistence needs can exist in an interlocking experience with other socioeconomic indicators such as the lack of education and history of incarceration. These psychosocial indicators are inextricable from racism, sexism, stigma, and other forms of oppression that may further decrease the likelihood of HIV viral suppression in YLWH [29]. Our study highlights the importance

parent's house or apartment, and 52.5% had experienced homelessness or living in a shelter.

When surveying ART adherence rating, 57.5% reported very good/excellent adherence, whereas 41.7% had good to very poor adherence. Approximately 51.7% experienced at least one unmet subsistence need—the least reported was difficulty finding a bathroom (15.8%), and the most common was difficulty finding enough to eat (36.6%), followed by difficulty finding clothing (22.8%), a place to sleep (21.8%), and a place to wash (17.8%).

of structural interventions to address the physiological needs of YLWH. Despite the existence of several interventions to address food insecurity among adults living with HIV [30,31], to our knowledge, currently, none exist for YLWH. Therefore, future research should examine the implications of food insecurity and unmet subsistence needs on health outcomes of YLWH to create tailored interventions to address these disparities. In addition, from a clinical standpoint, when creating a treatment plan, healthcare providers should examine the patient's level of food insecurity and unmet subsistence needs in conjunction with the aptness of their medication regimen [32]. Provider awareness of the existence of patient's food insecurity and/or unmet subsistence needs can allow for referrals to nutritionists, food assistance programs, and other services addressing food, shelter, and clothing.

Our study has several notable limitations. Our participants were mainly male, gay-identified, English-speaking, and with a high school degree or higher, and they were all residents of the San Francisco Bay Area. Additionally, all participants were able to complete the research methods remotely using a smartphone or computer. Therefore, our results may not be generalizable to individuals with varying demographics and education, those living in other regions, or those who may be less technologically savvy. Our data were all based on participants' self-report and therefore may be subject to recall or social desirability biases. As such, given that HIV viral load measures were not obtained in this study, subjective self-reports of very good/excellent adherence may not equate viral suppression. Finally, our study was an observational, cross-sectional survey in which participants retrospectively recalled food insecurity, adherence, and unmet subsistence needs over different timeframes. Consequently, we cannot establish causality. Nonetheless, as a first examination of the associations between food insecurity and unmet subsistence needs with ART adherence in U.S. YLWH, we believe our findings will serve as a catalyst to stimulate future prospective studies with more extensive measures.

Food insecurity and unmet subsistence needs are negatively associated with ART adherence and, therefore, with other health outcomes [13]. Food insecurity has also been associated with stress, depression, increased drug use, and obesity [33,34]. These comorbidities increase an individual's healthcare cost and have personal and public health implications. Future research should examine the impact of interventions designed to assist YLWH with food security and subsistence needs on linkage to care, engagement in care, mental health, and ART adherence.

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Funding Sources

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