Association of Participation in the Supplemental Nutrition Assistance Program and Psychological Distress

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Objectives. We assessed whether households' participation in the Supplemental Nutrition Assistance Program (SNAP) was associated with improvements in well-being, as indicated by lower rates of psychological distress.

Methods. We used longitudinal data for 3146 households in 30 states, collected between October 2011 and September 2012 for the SNAP Food Security survey, the largest longitudinal national survey of SNAP participants to date. Analyses compared households within days of program entry to the same households approximately 6 months later. We measured psychological distress in the past 30 days on a 6-item Kessler screening scale and used multivariable regression to estimate associations between SNAP participation and psychological distress.

Results. A smaller percentage of household heads exhibited psychological distress after 6 months of participation in SNAP than at baseline (15.3% vs 23.2%; difference = −7.9%). In adjusted models, SNAP participation was associated with a decrease in psychological distress (adjusted relative risk = 0.72; 95% confidence interval = 0.66, 0.78).

Conclusions. Continuing support for federal nutrition programs, such as SNAP, may reduce the public health burden of mental illness, thus improving well-being among vulnerable populations. (*Am J Public Health.* 2015;105: e30–e35. doi:10.2105/AJPH.2014.302480)

In 2012, 15% of all households in the United States were food insecure: their access to food was limited by a lack of income.[1] Among households in poverty, the prevalence was more than twice that of the general US population; an estimated 41% were food insecure. Persistently high rates of household food insecurity in the United States pose a significant problem, potentially affecting both physical and psychological well-being.[2,3]

As the largest program in America's nutrition assistance safety net, the Supplemental Nutrition Assistance Program (SNAP) provides nutrition assistance benefits to low-income individuals and families in an effort to reduce hunger and improve health and well-being. Several studies have documented an association between SNAP and improved food security,[4–7] including the most recent national-level study.[8,9] Although these studies have examined the program's effectiveness in meeting one of its primary objectives—reducing hunger—its effectiveness in improving health and well-being has not been adequately assessed.

The effects of SNAP on psychological well-being warrant considerable attention because estimates from the Behavioral Risk Factor Surveillance System, a survey of the US adult population, suggest that approximately 40% of persons in 35 states exhibit psychological distress (defined as a score of ≥ 10 on the 6-item Kessler screening scale [K6]).[10–12] In particular, women and people in lower socioeconomic positions have higher rates of psychological distress than does the general US population.[10] However, evidence suggests that the higher prevalence of mental illness observed among vulnerable populations may be a result of stressors associated with their common experiences rather than of demographic characteristics, such as race/ethnicity, education, or income.[13–15] In particular, growing evidence indicates that food insufficiency (a measure related to food insecurity) is strongly associated with adverse mental health outcomes.[3,16–21] Liu et al. reported that in a nationally representative sample, the prevalence of frequent mental distress was significantly greater among those reporting food insecurity (23.5%) than among their food-secure counterparts (7.7%).[21] Similarly, Heflin et al. explored food insufficiency among welfare recipients and found that the relationship between household food insufficiency and major depression remained highly significant, even after adjustment for factors known to increase the risk of depression.[3] Carter et al. also reported a strong relationship between food insecurity and psychological distress.[20]

Increased social support is one way to mitigate the association between food insecurity and mental illness.[22,23] Although research is limited, participation in food assistance programs may be particularly effective in modifying the relationship between food insecurity and mental illness.[24,25] Certain nutrients,[26–28] overall diet quality,[29] and patterns of dietary intake[30,31] may be important in reducing the prevalence of adverse mental health outcomes. By reducing households' exposure to food insufficiency, federal nutrition programs, such as SNAP, may improve well-being by reducing the public health burden of mental illness among vulnerable populations.

We hypothesized that SNAP participation would result in decreased psychological distress, measured by the K6, among almost 3200 newly certified households that participated in the SNAP Food Security (SNAPFS) survey, which was conducted by Mathematica Policy Research for the US Department of Agriculture Food and Nutrition Service from October 2011 to September 2012. SNAPFS is the largest longitudinal food security survey of SNAP participant households to date.

METHODS

Using household survey data to estimate the effect of SNAP on program outcomes has been challenging because of selection bias. Eligible households that choose to participate in SNAP may differ in systematic ways from households that do not, making it difficult to identify whether differences in an outcome measure

(such as psychological distress) between participants and nonparticipants reflect true program effects or differences in observable or unobservable characteristics of the 2 groups.[7,32–34]

We sought to minimize selection bias by comparing households that had been certified for SNAP in the 5 days prior to the sample date (new-entrant households) to those same households after they participated in SNAP for approximately 6 months (6-month households). Thus, we avoided a considerable source of selection bias in previous studies, a result of comparing program participants to nonparticipants—many of whom do not ever enter SNAP—by interviewing new-entrant households and obtaining information from the month prior to entering SNAP. This design minimized the bias associated with self-selection that occurs in comparisons of different households at a point in time (as in a cross-sectional design), but it may have introduced biases arising from changes in external factors over time. We attempted to minimize this bias by controlling for changes over time in characteristics and circumstances associated with both psychological distress and SNAP participation, such as changes in income, household size, and housing status.

Although its main objective was to collect information about SNAP households' food security, the SNAPFS survey included the K6[11,12] for the household head. The scale assessed whether the head of household exhibited psychological distress during the past 30 days. We defined household as "the people who live with the respondent and share food with the respondent, including babies, small children, and people who are not related to the respondent," and household head as the interview respondent who reported (1) being the person who did most of the planning or preparing of meals in the family or (2) being the adult in the household who did most of the shopping for food for the family. We also collected information on a rich set of demographic, economic, and household characteristics.

Sample

We collected data for the SNAPFS study from October 2011 to September 2012 through computer-assisted telephone interviewing. The sample comprised 3250 households from 30 states that were interviewed from October 2011 through February 2012 and were still participating in the program at follow-up, approximately 6 months later. We chose to analyze data from households that had participated for approximately 6 months, rather than other lengths of time, to allow for enough time after program enrollment for households to adjust their food-purchasing behavior, while avoiding sample loss from program attrition. The field period was about 2 weeks for a new-entrant household at the baseline interview and approximately 8 weeks at the follow-up interview.

We used a 2-stage process to draw our sample of SNAP participants. First, we chose 30 states through probability-proportional-to-size sampling.[8] We selected states from the 48 contiguous states and the District of Columbia, with the number of SNAP households in each state as the measure of size. We sampled with certainty each of the 14 states with at least 1/30th of the national caseload. We sampled the noncertainty states (all the rest) with probabilities proportional to size. In the second step of the sampling process, we drew samples of participant households from caseload files provided by participating states. For each certainty state, we set the sample size proportional to the size of the state's caseload. For the states not chosen with certainty, we took equal-sized samples, reflecting the fact that the states had already been selected with probabilities proportional to size.

We used sampling weights for all analyses to account for the complex survey design and to adjust for the potential effects of differential nonresponse. We constructed weights separately for the samples of new-entrant and 6-month households. The weights were the products of several factors: (1) state-level selection and replacement of noncooperating states, (2) adjustments for selection probabilities within sampled states, and (3) nonresponse adjustments at the household level, to adjust for nonresponse and differences in response rates for different groups of households. Our findings from these weighted data were nationally representative of new-entrant SNAP households at the time of the baseline interviews.

Measuring Psychological Distress

Dimensional measures of psychological distress, such as the K6, play an important role in distinguishing community cases by severity rather than purely by diagnosis. The K6 was developed with modern psychometric methods to select questions with the maximum precision at the clinical threshold of the scale.[11] The K6 module consists of 6 questions that ask respondents to rate how often they felt nervous, hopeless, restless or fidgety, so depressed that nothing could cheer them up, that everything was an effort, and worthless over the past 30 days. The response options and their numerical scores are all of the time (4), most of the time (3), some of the time (2), a little of the time (1), and none of the time (zero). The component scores are summed to produce a total scale score ranging from zero to 24.

As in most applications,[11] we classified household heads as exhibiting psychological distress in the past 30 days if their total score ranged from 13 to 24 in our primary analysis. Thus, the main outcome measure was a binary variable that equaled 1 for household heads who exhibited psychological distress and zero for those who did not. Although the K6 is highly concordant with diagnoses in general population samples of the United States,[12,35] the SNAP population exhibited different demographic characteristics than the general population. SNAP participants typically have incomes less than 130% of poverty, have lower educational attainment, are more likely to be female, and are less likely to be non-Hispanic White.[36] Because evidence from Kubiak et al.[37] and Baggaley et al.[38] suggests that adjusting scale cutpoints may be appropriate for vulnerable populations, we evaluated psychological distress as a dichotomous response in our analyses with alternative cutpoints, corresponding to quartiles of the total score distribution.

Analyses

We conducted multivariable regression analysis to estimate the association between SNAP and psychological distress, while accounting for differences across households in demographic, economic, and household characteristics. We set a binary variable indicating SNAP participation to equal 1 if the household had been participating in SNAP for approximately 6 months and to equal zero if the household had just entered SNAP. We estimated a linear probability model with

TABLE 1—Descriptive Characteristics of Sample Households: Supplemental Nutrition Assistance Program Food Security Survey, United States, 2011–2012

Characteristic	Baseline, % or Mean (SD)	6-Month Follow-up, % or Mean (SD)	*P*
Female household head	64.0	63.6	.75
Race/ethnicity of household head			.99
Non-Hispanic White	47.8	47.8	
Non-Hispanic Black	26.3	26.3	
Non-Hispanic other	7.2	7.2	
Hispanic	22.7	22.7	
Age of household head, y			.12
18–24	20.1	20.5	
25–49	52.2	53.7	
50–64	21.1	19.6	
≥ 65	6.6	6.1	
Educational attainment			.74
< high school	22.4	22.8	
High school	32.6	32.4	
Some college	36.1	36.3	
≥ college	8.9	8.5	
Employment status of household head			< .001
Not employed	78.1	72.4	
Employed full time	12.5	17.9	
Employed part time	9.5	9.7	
Interview conducted in English language	90.5	90.6	.97
Monthly income as a percentage of the federal poverty level	61.6 (68.6)	71.6 (72.0)	.97
Household size, no.	2.3 (1.5)	2.3 (1.4)	.94
Household contains children	40.9	42.6	.34
Household contains elderly person(s)	11.8	11.0	.45
Household contains disabled person	32.2	27.1	.002
Participated in SNAP before current spell	49.6	49.6	.94
Trigger events in past 6 months			
Change in household size	21.1	16.6	.003
Eviction	4.7	3.4	.03
Change in employment, pay, or hours worked	39.6	20.5	< .001
Region of residence			.89
Northeast	12.8	12.8	
Mid-Atlantic	7.6	7.6	
Midwest	12.6	12.6	
Southeast	25.2	25.2	
Southwest	12.3	12.3	
Mountain Plains	5.7	5.7	
West	23.6	23.6	
State 25th percentile wage	10.75 (0.90)	10.75 (0.90)	.99
State unemployment rate	8.8 (1.6)	8.8 (1.6)	.99
State offers BBCE[a]	88.8	88.8	.99
State SNAP certification period[b]	12.2 (0.90)	12.2 (0.90)	.99

Note. BBCE = broad-based categorical eligibility; SNAP = Supplemental Nutrition Assistance Program. Estimates compared 3146 new-entrant SNAP households at baseline and at follow-up 6 months later.
[a]BBCE is noncash benefits or services funded by Temporary Assistance for Needy Families or state maintenance of effort that confer categorical eligibility to virtually all households applying for SNAP.
[b]SNAP participants are required to periodically be recertified to continue to receive benefits. The certification period varies with the likelihood of a change in a SNAP household's financial circumstances. In fiscal year 2011, SNAP households were certified for benefits for an average of 12 months.

household fixed effects and used replicate weights to estimate standard errors. For each sample, we constructed 24 sets of replicate weights with balanced repeated replication. The replicate weights accounted for the clustered, multistage sampling design and nonresponse adjustments. Statistical analyses used Stata version 13.1 (StataCorp LP, College Station, TX). All statistical tests were 2 sided.

The regression model incorporated the following set of explanatory variables measuring household characteristics and circumstances: highest grade completed and employment status of the household head; household income-to-poverty ratio, size, and composition; changes in household size, housing status, employment, pay, or hours worked; and state 25th percentile wage and state (nonseasonally adjusted) unemployment rate. The analytic sample consisted of 3146 households out of the 3250 households in the original baseline and follow-up samples. The remaining 104 households, or 3.2% of the sample, had missing information on either the outcome measure or at least 1 of the explanatory variables and were excluded from the sample. Households with complete data had higher income than households with incomplete data and were more likely to be employed part time or full time, to have completed high school, and to be aged 18 to 24 years.

To test the sensitivity of the findings to the functional form of the model and the inclusion of fixed effects, we also estimated a logistic regression and linear probability model without fixed effects. In addition, because the prevalence of the outcome measure at baseline exceeded 20% and logistic regression models can produce inflated estimates of relative risks in the context of a common occurrence, we estimated a modified Poisson regression with robust error variance.[39,40]

RESULTS

A smaller percentage of household heads who had participated in SNAP for 6 months than who had just entered the program exhibited psychological distress (15.3% vs 23.2%; difference = −7.9%).

Table 1 details basic demographic, household, and economic characteristics for new-entrant household heads exhibiting

TABLE 2—Association of Psychological Distress With Food Assistance Participation for 6 Months: Supplemental Nutrition Assistance Program Food Security Survey, United States, 2011–2012

Model	ARR (95% CI)
Main specification: linear probability model with household fixed effects	0.72* (0.66, 0.78)
Alternative specifications	
Generalized linear model (modified Poisson)	0.73* (0.66, 0.80)
Logistic regression	0.71* (0.60, 0.82)
Linear probability model (without household fixed effects)	0.73* (0.65, 0.81)

Note. ARR = adjusted relative risk; CI = confidence interval; SNAP = Supplemental Nutrition Assistance Program. Estimates compared 3146 new-entrant SNAP households at baseline and at follow-up 6 months later. Relative risks were adjusted for highest grade completed and employment status of the household head; household income-to-poverty ratio, size, and composition; and changes in household size, housing status, employment, pay, or hours worked.
*$P < .001$.

psychological distress and those same households 6 months later. Largely, characteristics remained unchanged between entry into SNAP and follow-up. After 6 months in SNAP, household heads were more likely to be employed. In addition, households were less likely to contain a disabled person; to have been evicted from their house or apartment in the past 6 months; to have experienced a change in employment, pay, or hours worked in the past 6 months; and to have experienced a change in household size in the past 6 months.

In the adjusted model, SNAP was associated with a significant decrease in psychological distress (adjusted relative risk [ARR] = 0.72; 95% confidence interval [CI] = 0.66, 0.78; Table 2). Heads of households participating in SNAP for 6 months had 0.7 times the risk of exhibiting psychological distress, after adjustment for other possible confounders.

Our findings were robust to alternative classifications of psychological distress, corresponding to quartiles of the total score distribution, whereby the 25th percentile (ARR = 0.91; 95% CI = 0.87, 0.94), 50th percentile (ARR = 0.85; 95% CI = 0.80, 0.91), and 75th percentile (ARR = 0.74; 95% CI = 0.67, 0.82) cutoffs remained highly statistically significant ($P < .001$). In addition, the magnitude and statistical significance of the association between SNAP participation and psychological distress were robust to alternative modeling specifications. In the modified Poisson regression with robust error variance, SNAP was associated with a significant decrease in psychological distress (ARR = 0.73; 95% CI = 0.66, 0.80; Table 2). The same was true in the logistic regression model (ARR = 0.71; 95% CI = 0.60, 0.82) and in the linear probability model without fixed effects (ARR = 0.73; 95% CI = 0.65, 0.81; Table 2). In each model, heads of households participating in SNAP for 6 months had 0.7 times the risk of exhibiting psychological distress, after adjustment for other possible confounders.

DISCUSSION

To our knowledge, ours is the first study to present multivariable regression analyses of the association between SNAP participation and psychological distress, in nationally representative data. The findings suggest that SNAP is associated with a 38% reduction in psychological distress among participating households.

Our findings are consistent with previous results that participation in a food assistance program may result in improved mental health outcomes among adults.[22,24,25] The literature suggests 2 possible mechanisms that support the observed association. First, a growing body of evidence shows that SNAP is associated with reductions in food insecurity by 4% to 30%.[4–8] Research also indicates that food-insecure households are more likely than food-secure households to exhibit symptoms of adverse mental health outcomes.[3,16–21,41] Second, SNAP may improve overall security. Shaefer and Gutierrez explored the effects of SNAP participation on measures of nonfood material hardship and found that SNAP has a sizeable effect not just on the food security of households, but also on their nonfood material well-being.[41] SNAP participation may reduce nonfood material hardships by allowing recipients to reallocate resources originally directed toward the purchase of food to other essential expenses, such as housing, utilities, and medical costs.[41] SNAP participation may affect economic well-being in several dimensions: improving overall socioeconomic position and reducing financial strain, hardship, and stressful events.[13,18,42–44]

SNAP provides nutrition assistance benefits to low-income individuals and families with the aim of reducing hunger and improving health and well-being. Our results suggest that receiving SNAP benefits may reduce psychological distress by improving food security and nonfood material hardship, thus improving well-being among participants. This result is consistent with the notion that psychological distress is negatively associated with well–being.[45] Although our analyses did not explore these mechanisms, they are plausible explanations for the observed association between SNAP participation and psychological distress.

Limitations

Although the K6 properties are stable in minority subsamples, and the 13-plus cutpoint will generally result in a fairly accurate estimate of the prevalence of psychological distress, this cutpoint is optimal in a population representative of the total US population. Our sample was predominantly English and Spanish speaking; thus, our findings have limited generalizability beyond English- and Spanish-proficient subpopulations.

The SNAPFS survey did not collect data on previous history of psychiatric illness among household heads; however, we considered the possible influence of seasonal affective disorder. Approximately 5% of the US population experiences this condition, and depressive symptoms may persist for about 40% of the year.[46] Review of the literature yields mixed results regarding the postulated link between latitude and seasonal affective disorder,[47] but

latitude has been reported to be a determinant of the winter type of the condition.[48] Because baseline interviews were initially conducted between October 2011 and February 2012 (during fall and winter months), with follow-up occurring approximately 6 months later (during spring and summer months), we considered seasonal affective disorder as a confounder. To the extent possible, we addressed this limitation in the multivariable models by staggering the start date for each state's field period to reflect state-level effects. Our findings were robust to the inclusion of region of residence.

As in many longitudinal designs, it was possible that bias arose from changes in external factors over time. To minimize this potential bias, we included many of the variables that likely affect both the decision to continue participating in SNAP and the likelihood of exhibiting psychological distress, such as changes in income (including earnings), household size, and housing status. Finally, by using a carefully developed nonrandom design, we sought to control for observable differences between SNAP new entrants and ongoing participants. However, some risk remained that observed associations of variables were attributable to differences across households that were not observable.

Conclusions

Examining the association between SNAP participation and psychological distress is a critical step in understanding SNAP's effectiveness in improving health and well-being among participants. With its nationally representative, carefully structured quasi-experimental research design, our study overcame many barriers of previous SNAP surveys. We found strong evidence of an association between SNAP and psychological distress and of improvement in well-being among SNAP participants.

Recent work suggests that allotment size of benefits differentially affects improvement in well-being among program participants.[49] In light of the sizable variation in the monthly allotment of SNAP benefits across households, future studies should explore the role of benefit size on improving the well-being of program participants. In addition, a better understanding of the most effective pathways through which SNAP affects mental health and thus well-being in subpopulations of interest, including households with children or elderly persons, is warranted to inform future policy and intervention strategies. ■

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This article was accepted November 18, 2014.

Contributors

Both authors conducted the analysis, interpreted the data, and conceptualized and wrote the article. J. Mabli and the Food and Nutrition Service, USDA, conceptualized and designed the study.

Acknowledgments

This article uses data from the SNAP Food Security (SNAPFS) study. The SNAPFS study was designed by the Food and Nutrition Service (FNS), US Department of Agriculture (USDA), and was conducted by Mathematica Policy Research under Contract number GS-10F-0050L with FNS. The Harry D. Kruse Publication Award in Human Nutrition is gratefully acknowledged.

Note. The views expressed in this article are those of the authors and do not necessarily represent the views of the USDA, Mathematica Policy Research, or Johns Hopkins Bloomberg School of Public Health.

Human Participant Protection

This study received approval by the Office of Management in Budget. Informed consent was obtained from all respondents.

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