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Prevalence of suicide ideation, planning and attempts among Supplemental Nutrition Assistance Program participants in the United States

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Abstract

Background.—Suicide represents a substantial public health problem in the U.S. Programs like the Supplemental Nutrition Assistance Program (SNAP)—which provides services for U.S. adults who are food insecure—could be an appropriate venue for suicide prevention strategies targeting high-risk individuals.

Methods.—This cross-sectional study used multiple logistic regression to determine odds ratios (*OR*s) and 95% confidence intervals (*CI*s) for suicide ideation, planning and attempt among those who participated in SNAP vs. nonparticipants. The National Survey of Drug Use and Health provided a representative sample of U.S. adults for 2012-2018 (n=288,730).

Results.—SNAP participants were more likely than nonparticipants to have serious suicidal thoughts (crude *OR*=1.89; 95% *CI*=1.79-1.99), to have a plan for suicide (crude *OR*=2.35; 95% *CI*=2.16-2.56) or to attempt suicide (crude *OR*=2.89; 95% *CI*=2.54-3.29). Associations remained for those aged <50 in age-stratified analyses that accounted for survey year, demographics, socioeconomic status, self-rated health and mental health service use.

Limitations.—SNAP was assessed at the household level; thus, those who reported suicidal thoughts and/or behaviors may not personally interact with SNAP.

Conclusion.—Using a large, nationally-representative sample of U.S. adults, this study documented greater prevalence of suicide-related outcomes among those who participate in SNAP. Suicide prevention among SNAP participants may provide a unique means to reach individuals who are often hard to engage in other health services.

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AUTHOR CONTRIBUTIONS

RSB conceived of the study. RSB and MAI designed the study. MJ analyzed the data. RSB, MJ and MAI interpreted findings. RSB wrote the initial draft. All authors reviewed and commented on subsequent drafts of the manuscript.

CONFLICT OF INTEREST STATEMENT

Authors declare that they have no conflicts of interest.

Keywords

suicide; food assistance; food insecurity; epidemiology; community psychiatry

INTRODUCTION

Suicide represents a substantial public health problem in the United States, where mortality due to suicide is on the rise across all age groups (Curtin, Warner, & Hedegaard, 2016). Risk of fatal and non-fatal suicide attempts is particularly high among those with low socioeconomic status (Kim, et al., 2016). Poverty is associated with limited or uncertain ability to acquire food of sufficient quantity or quality, referred to as food insecurity, and recent evidence within adolescents suggests that food insecurity is a determinant of suicide-related behavior, above and beyond low income (Alaimo et al., 2002). Therefore, food assistance programs in the United States—which serve low-income households with a high prevalence of food insecurity—may encounter a large number of individuals at risk for suicide.

In the U.S., the Supplemental Nutrition Assistance Program (SNAP, i.e. food stamps) is one of the largest food assistance programs available to Americans and supported over 42 million people in 2017 (United States Department of Agriculture Food and Nutrition Service (FNS), 2016b). SNAP provides monthly food vouchers to low income households; state income-to-poverty ratio cutoffs for SNAP participation range from 1.30 to 2.00) (United States Department of Agriculture Food and Nutrition Service (FNS), 2016a). Participation in SNAP is voluntary and influenced by household need. Thus those who self-select to participate in SNAP are categorically different from those who do not receive SNAP benefits (Nord, 2010). Indeed, the prevalence of food insecurity tends to be higher among SNAP participants than non-participants, even when accounting for income eligibility. For example, in a representative sample of U.S. adults with a household income at or below 150% of the poverty threshold, 36% of SNAP participants are food insecure compared to only 20% among nonparticipants (Ratcliffe, McKernan, & Zhang, 2011).

Similarly, those with severe mental illness have a greater need for social services like SNAP (McGinty et al., 2018; Somers, Rezansoff, Moniruzzaman, & Zabarauckas, 2015); however the burden of suicide-related behavior among those who participate in SNAP is not well established. This study aimed to determine whether SNAP may provide a novel setting for suicide intervention. We utilized multiple years of nationally-representative data from the U.S. to examine whether suicide ideation, planning and attempts are more common among SNAP participants than non-participants, and whether there were variations across age groups.

METHODS

Sample

The National Survey on Drug Use and Health (NSDUH) provided cross-sectional data for years 2012 to 2018, representative of non-institutionalized civilians aged 12 years or older in

the contiguous U.S. NSDUH is considered a leading reference for U.S. patterns of substance abuse and mental health symptoms. NSDUH also collects information on study subject demographics, socioeconomic status, general health and suicidal thoughts, plans and behaviors. The overall methods for NSDUH were approved by the RTI International Institutional Review Board. Informed consent was obtained prior to survey administration (RTI International, 2015). Sensitive questions were completed using audio computer-assisted self-interview. Logical editing and statistical imputation are used to handle missing data prior to NSDUH public data releases (Center for Behavioral Health Statistics and Quality, 2017).

The analysis sample was limited to adults, aged 18 years or older who participated in NSDUH from 2012 to 2018 (n=288,730). Data were analyzed in 2018 to 2020.

Measures

SNAP Participation—A binary measure for SNAP participation (yes vs no) was created based on whether a NSDUH respondent received SNAP benefits in the previous year or a family member in a respondent's household received SNAP benefits the previous year.

Suicide-related outcomes—Three binary measures of suicidality were used as the outcomes of interest. Those who responded '*yes*' to '*At any time in the past 12 months … did you seriously think about trying to kill yourself?*' were considered to have suicide ideation. Those who responded '*yes*' to '*During the past 12 months, did you make any plans to kill yourself?*' were considered to have made plans to attempt suicide. Those who responded '*yes*' to '*During the past 12 months, did you try to kill yourself?*' were considered to have attempted suicide.

Covariates—In addition to survey year, a number of covariates were included in study analyses. Demographic covariates included gender (male, female), race/ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic, other), marital status (married, not married) and age group. NSDUH aggregates study participants within certain age ranges, providing the following age groups: 18-25, 26-34, 35-49, 50-64 and >64. Socioeconomic covariates included household size category (1 person, 2 persons, 3 persons, ≥4 persons), employment status (employed full or part time, not employed), educational attainment (< high school degree, ≥high school degree) and household income category (<$30,000, $30,000 to < $75,000, ≥$75,000).

Lastly, we accounted for health status and mental health service use. There is growing awareness concerning the influence of social factors, like food insecurity, on physical and mental health (Allen, Marmot, World Health Organization, & Fundação Calouste Gulbenkian, 2014; World Health Organization & Clouste Gulbenkian Foundation, 2014). Poor self-rated health is associated with completed suicide (Stenholm et al., 2016), as well as medical morbidity (Latham & Peek, 2013)—which increases health care utilization and potentially the need for social assistance programs like SNAP (Schoenberg, Kim, Edwards, & Fleming, 2007). Furthermore, health care providers are encouraged and incentivized to systematically incorporate social service referral in primary care settings and during hospital discharge (Alley, Asomugha, Conway, & Sanghavi, 2016; American Diabetes Association,

2018; Waring et al., 2014). SNAP participants with poor health and/or greater mental health service use may be more likely to receive treatment referral for suicidal thoughts and behaviors. Self-rated health was categorized as fair or poor, good, very good or excellent. Outpatient mental health service use was defined as those who received any outpatient mental health treatment in the previous 12 months, but were not hospitalized due to mental illness (yes vs. no). Inpatient mental health service use was defined as those who were hospitalized due to mental illness, regardless of outpatient service use (yes vs. no).

Approach

All analyses were conducted using SAS Software version 9.4 (SAS Institute Inc., 2013) and included cluster size, sample weights, and strata to account for NSDUH's complex sampling design. Descriptive statistics provided sample distributions by suicide-related ideation and behavior. Next, separate logistic regressions were used to test odds of suicide ideation, suicide planning and suicide attempt among those who participate in SNAP vs. non-participants. Adjusted models accounted for survey year, demographic factors, socioeconomic status, health status and mental health service use. Lastly, adjusted models were stratified by age group.

RESULTS

Table 1 provides distribution of characteristics for the total sample and by SNAP participation. SNAP participants were more likely to be aged 18-34 years, not be married, live in a household with 4 persons or more, be unemployed, have less than a high school degree and have a household income <$30,000 than nonparticipants. Additionally, the proportion of females as well as those Hispanic or Non-Hispanic Black was greater among SNAP participants than nonparticipants. When considering suicidality in the total sample, 4.1% experienced suicide ideation, 1.2% had made suicide-related plan and 0.5% had attempted suicide in the past year. Suicidal thoughts and behaviors were twice as common among SNAP participants than nonparticipants for ideation (6.7 vs 3.6%), planning (2.2 vs. 1.0%) and attempt (1.2 vs. 0.4%). Additionally, mental health treatment was more common among SNAP participants than nonparticipants for both outpatient (8.3 vs. 6.6%) and inpatient (7.0 vs. 4.0%) services.

Table 2 presents odds ratios (*OR*s) and 95% confidence intervals (*CI*s) for the prevalence of suicide-related outcomes among those who participate in SNAP vs. non-participants. In crude associations for the total analysis sample, SNAP participants were 1.89 (95% *CI*=1.79-1.99) times more likely to have suicide ideation, 2.35 (95% *CI*=2.16-2.56) times more likely to have suicide plans and 2.89 (95% *CI*=2.54-3.29) times more likely to attempt suicide. When accounting for survey year, demographics, socioeconomic status, health status and mental health service use, these associations remained for ideation (*OR*=1.14; 95% *CI*=1.07-1.23) and were marginally significant for planning (*OR*= 1.13; 95% *CI*=0.99-1.28) and attempt (*OR*=1.12; 95% *CI*=0.94-1.34).

Table 2 also presents findings stratified by age group. In adjusted models, suicide attempt was more common among SNAP participants than non-participants for those aged 18-25 (*OR*=1.26; 95% *CI*=1.03-1.34) and 30-34 (*OR*=1.12; 95% *CI*=0.94-1.34). For those aged

35-49, SNAP participants were more likely to report suicide ideation (*OR*=1.22; 95% *CI*=1.04-1.44) and suicide planning (*OR*=1.34; 95% *CI*=1.04-1.73) than non-participants. Associations did not meet statistical significance (α=0.05) for other age groups.

DISCUSSION

Using a large, nationally-representative sample of U.S. adults, this study described the prevalence of past year suicide ideation, planning and attempt among those who participate in SNAP. SNAP participants were more likely than non-participants to seriously consider killing themselves, to make plans for suicide or attempt suicide. These associations remained for those aged <50 in age-stratified analyses that accounted for survey year, demographics, socioeconomic status, self-rated health and mental health service use. Suicide prevention among SNAP participants may provide a unique means to reach individuals who are often hard to engage in other health services.

The high prevalence of food insecurity among SNAP participants (Ratcliffe et al., 2011) may play an instrumental role in the corresponding high frequency of suicide-related behaviors. To cope with food insecurity, individuals may reduce the size of meals, skip meals or neglect other financial needs (e.g. utilities, medical expenses) (Bengle et al., 2010; Seligman, Bolger, Guzman, López, & Bibbins-Domingo, 2014). Constant decision-making in poverty is emotionally burdensome (Spears, 2011), and psychological stress has a dose-response relationship with suicide risk (Bell, Russ, Kivimäki, Stamatakis, & Batty, 2015). In extreme cases, food insecurity can lead to hunger (Coleman-Jensen, Rabbitt, Gregory, & Singh, 2018, p.), which is associated with suicidal thoughts and behaviors across the life course (Fuller- Thomson & Shaked, 2009; McIntyre, Williams, Lavorato, & Patten, 2013; Stickley, Koyanagi, Inoue, & Leinsalu, 2018). Additionally, food insecurity contributes to poor diet quality (Bergmans et al., 2018)—healthier foods tend to be more expensive than less nutritious options. Both poor diet and nutritional deficiencies can increase risk of death due to suicide (Hibbeln & Gow, 2014)—possibly due to the influence of diet on biological pathways of systemic inflammation (Bergmans, Kelly, & Mezuk, 2019).

These findings have important public health and policy implications. SNAP has an educational component, called SNAP-Ed, which is designed to help participants stretch their benefits further while making healthy dietary choices (Molitor et al., 2015). SNAP-Ed has been associated with greater consumption of fruits and vegetables, and could be leveraged to provide public health interventions for suicide.

Limitations

NSDUH assessed SNAP participation at the household level. Therefore, those who reported suicidal thoughts and/or behaviors may not individually interact with SNAP enrollment, benefit receipt or educational opportunities.

Conclusions

Using a large, nationally-representative sample of U.S. adults from 2012 to 2018, this study documented a greater prevalence of suicide-related outcomes among SNAP participants than non-participants. Age-stratified analyses that accounted for social and economic factors,

health status and mental health service use indicate that SNAP could provide a novel setting to reach adults aged <50 with a higher risk of suicide. Interventions that seek to improve diet quality and nutritional status among SNAP participants should consider targeting mental health. Future research is needed to assess acceptability and appropriateness of incorporating suicide-prevention strategies in programs like SNAP-Ed.

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HIGHLIGHTS

- Suicidality in Supplemental Nutrition Assistance Program (SNAP) participants is not known.
- SNAP could provide a novel setting for reaching those with high prevalence of suicidality.
- Suicidality was more common among SNAP participants than nonparticipants.
- In fully adjusted age-stratified models, associations remained for those aged <50.
- SNAP recipients may benefit from interventions targeting mental health.

Table 1.

Population characteristics by suicidality among U.S. adults, NSDUH[a] 2012 to 2018[b]

	Total sample	Household received SNAP benefits in previous year	
		Yes	No
Characteristics	**(*n*=288,730)**	**(*n*=53,350)**	**(*n*=235,380)**
Study year			
2012	37,869	8,046 (14.7%)	29,823 (13,7%)
2013	37,424	8,046 (15.1%)	29,378 (13.8%)
2014	41,671	7,792 (14.8%)	33,879 (14.1%)
2015	43,561	8,315 (14.9%)	35,246 (14.2%)
2016	42,625	7,550 (14.2%)	35,075 (14.4%)
2017	42,554	6,892 (13.3%)	35,662 (14.8%)
2018	43,026	6,709 (13.0%)	36,317 (15.0%)
Age group (n, %)			
18-25	105,516 (14.3%)	22,385 (18.5%)	83,131 (13.5%)
26-34	54,743 (15.8%)	12,249 (21.8%)	42,494 (14.8%)
35-49	71,569 (25.1%)	11,879 (26.4%)	59,690 (24.8%)
50-64	33,553 (25.5%)	4,785 (22.3%)	28,768 (26.1%)
65 and older	23,349 (19.3%)	2052 (11.1%)	21,297 (20.7%)
Male (n,%)	134,217 (48.2%)	20,116 (39.8%)	114,101 (49.6%)
Race/ethnicity (n, %)			
Non-Hispanic White	176,034 (64.8%)	22,710 (45.7%)	153,324 (68.1%)
Non-Hispanic Black	36,203 (7.9%)	13,221 (24.8%)	22,982 (9.5%)
Hispanic	48,392 (15.6%)	12,215 (23.3%)	36,177 (14.2%)
Other	28,101 (7.9%)	5,204 (6.3%)	22,897 (8.2%)
Marital status (n, %)			
Married	114,869 (52.1%)	12,414 (29.0%)	102,447 (56.1%)
Not married	173,869 (47.9%)	40,936 (71.0%)	132,933 (43.9%)
Household size (n, %)			
1 person	26,095 (10.8%)	3,371 (9.6%)	22,724 (11.0%)
2 persons	69,618 (28.6%)	7,588 (15.5%)	62,030 (30.8%)
3 persons	93,391 (30.9%)	17,952 (31.4%)	75,439 (30.8%)
≥4 persons	99,626 (29.8%)	24,439 (43.6%)	75,187 (43.6%)
Employment status (n,%)			
Employed (full or part time)	195,6774 (63.3%)	26,275 (44.8%)	169,402 (66.5%)
Not employed	93,053 (36.7%)	27,075 (55.2%)	65,998 (33.5%)
Educational attainment (n, %)			
< High school	28,105 (9.4%)	10,865 (21.0%)	17,240 (7.3%)
High school degree or above	260,625 (90.6%)	42,485 (79.0%)	218,140 (92.7%)

	Total sample	Household received SNAP benefits in previous year	
		Yes	No
Characteristics	**(*n*=288,730)**	**(*n*=53,350)**	**(*n*=235,380)**
Household income, (n, %)			
<$30,000	96,509 (27.7%)	38,031 (69.3%)	58,478 (20.5%)
$30,000 to <$75,000	105,280 (36.7%)	13,011 (25.2%)	92,269 (38.6%)
≥$75,000	86,941 (35.6%)	2,308 (5.4%)	84,633 (40.9%)
Overall health status (n,%)			
Excellent or Very Good	177,701 (57.4%)	24,639 (39.2%)	153,062 (60.5%)
Good	79,163 (28.8%)	17,778 (33.5%)	61,385 (28.0%)
Fair or Poor	31,807 (13.8%)	10,921 (27.2%)	20,886 (11.5%)
Suicidal thoughts and behaviors (n,%)[c]			
Ideation	16,447 (4.1%)	4,178 (6.7%)	12,269 (3.6%)
Planning	5,192 (1.2%)	1,515 (2.3%)	3,677 (1.0%)
Attempt	2,588 (0.5%)	869 (1.2%)	1,719 (0.4%)
Mental Health Service Use (n,%)			
Outpatient (only)[d]	13,066 (6.9%)	3,017 (8.3%)	10,049 (6.6%)
Inpatient (any)[e]	10,835 (4.5%)	3,007 (7.0%)	7,828 (4.0%)

[a] NSDUH, National Survey on Drug Use and Health

[b] Percentages are weighted to provide nationally-representative estimates

[c] Suicide-related behavior is not mutually exclusive

[d] Includes persons who received outpatient mental health treatment but were not hospitalized due to mental health in the past year

[e] Includes persons who were hospitalized for mental health treatment in the previous year, regardless of outpatient mental health treatment status

Table 2.

Odds ratios and 95% confidence intervals of suicidality among U.S. adults who participate in the Supplemental Nutrition Assistance Program (SNAP), NSDUH[a] 2012 to 2018[b,c]

	Suicidal Thoughts and Behaviors[d]		
	Ideation	**Planning**	**Attempt**
SNAP participation[e]	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**
ALL AGES			
Crude	1.89 (1.79, 1.99) ***	2.35 (2.16, 2.56) ***	2.89 (2.54, 3.29) ***
Adjusted[f]	1.14 (1.07, 1.23) ***	1.13 (0.99, 1.28)	1.12 (0.94, 1.34)
AGES 18-25			
Crude	1.10 (1.03, 1.18) ***	1.29 (1.15, 1.45) ***	1.68 (1.45, 1.94) ***
Adjusted[g]	1.04 (0.96, 1.13)	1.09 (0.94, 1.26)	1.26 (1.03, 1.52) *
AGES 26-29			
Crude	1.43 (1.23, 1.66) ***	1.70 (1.31,2.21) ***	2.84 (1.98, 4.08) ***
Adjusted[g]	1.12 (0.91, 1.38)	1.08 (0.73, 1.60)	1.33 (0.78, 2.27)
AGES 30-34			
Crude	1.64 (1.39, 1.93) ***	2.51 (1.87, 3.36) ***	3.85 (2.46, 6.02) ***
Adjusted[g]	1.12 (0.88, 1.42)	1.32 (0.87, 1.99)	1.86 (1.01,3.43) *
AGES 35-49			
Crude	2.35 (2.11,2.61) ***	3.38 (2.83, 4.05) ***	3.77 (2.94, 4.84) ***
Adjusted[g]	1.22 (1.04, 1.44) *	1.34 (1.04, 1.73) *	0.98 (0.65, 1.48)
AGES 50-64			
Crude	2.19 (1.87, 2.57) ***	2.56 (1.93, 3.41) ***	3.15 (1.81,5.46) ***
Adjusted[g]	1.10 (0.90, 1.35)	0.88 (0.61, 1.26)	0.79 (0.43, 1.47)
AGES > 64			
Crude	1.90 (1.36, 2.65) ***	1.05 (0.52, 2.11)	1.22 (0.41,3.63)
Adjusted[g]	1.39 (0.92, 2.08)	0.60 (0.26, 1.39)	0.67 (0.20, 2.32)

[a] NSDUH, National Survey on Drug Use and Health

[b] Multivariate logistic regression, analyses are weighted to provide nationally-representation estimates

[c] n=288,730

[d] Suicidal thoughts and behaviors assessed over prior 12 months, binary measures are mutually exclusive (reference group=no)

[e] Household participated in SNAP within prior 12 months (reference group=no)

[f] Adjusts for survey year, age group, gender, race/ethnicity and marital status, household size, employment status, educational attainment and household income, self-rated health, and use of mental health services

[g]Adjusts for survey year, gender, race/ethnicity and marital status, household size, employment status, educational attainment and household income, self-rated health, and use of mental health services

*p≤0.05

**p≤ 0.01

***p≤ 0.005