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Gender Differences in Street Economy and Social Network Correlates of Arrest Among Heroin Injectors in Baltimore, Maryland

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ABSTRACT *In a sample of 761 heroin injectors in Baltimore, Maryland, correlates of arrest for drug-related and non-drug-related criminal offenses, by gender, were examined. This investigation examined gender differences in involvement in the drug economy and correlates of arrest. Correlates included roles in the street drug economy, social network attributes, and economic and demographic variables. Gender differences were found. Selling drugs was strongly associated with drug-related arrests for males. Steering (i.e., publicizing drug brands) was highly associated with drug-related arrests for females. Level of heroin addiction was associated with drug-related arrests for males, but not for females. The associations of social network variables with arrests also differed by gender. For females but not males, a higher number of females in one's network was associated with a lower frequency of arrests. For males, having at least one heroin injector in the personal network was associated with a decreased frequency of arrest, while for females the direction of the association was reversed. These findings suggest the importance of modeling drug behaviors by gender.*

KEYWORDS *Arrest, Drug economy, Gender, Injection drug use, Social networks.*

INTRODUCTION

The concomitant epidemics of injection drug use and human immunodeficiency virus (HIV) continue to afflict many urban areas in the United States. Baltimore, Maryland, has been frequently identified as one of the most heroin-plagued cities.[1] The high volume of heroin and other illicit drugs flowing through urban areas is often distributed through street-level drug markets. Those who use heroin and other drugs often occupy front-line roles in the drug economy. For many, especially those who use drugs, the street-level drug economy offers employment in the absence of licit employment opportunities.[2,3]

Sherman and Latkin[3] described a range of characteristics associated with involvement in the street-level drug economy among a sample of current and former drug users enrolled in a network-oriented HIV prevention study in Baltimore. These authors found that persons who use drugs, compared to persons who formerly used drugs, were less likely to be legally employed, more likely to have been arrested in the previous year, and had more extensive ties to the street-level drug economy.

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Those involved in the drug economy spent more time on the street, had more frequent contact with persons who used drugs, and had a higher percentage of persons who used drugs in their social networks.

Being arrested often has negative consequences. Many studies have found that persons convicted of crimes experience more difficulty in securing stable legal employment.[4,5] It is questionable that arrest will serve as a deterrent for continued drug use for persons addicted to heroin, especially in the absence of opportunities for immediate drug treatment. Weatherburn and Lind[6] found that, when length of time as a heroin addict and age were included in a model predicting entry into methadone maintenance, prior arrests did not predict entry into drug treatment. Schutz and colleagues[7] found that a history of arrest did not predict entry into methadone maintenance and was only marginally associated with entry into detoxification (odds ratio [OR] 1.10–3.10). A history of treatment for substance abuse, a recent overdose, and frequency of use were the strongest predictors of entry into detoxification.

There are several reasons for further investigating the ecology of street-level drug markets and their impacts on drug users. Much of the research on drug users is based on treatment populations, and several studies suggest that these samples are not representative,[8–10] whereas the present study used a sample of injection heroin users who were not incarcerated or currently in treatment. More important, few studies have examined gender differences in arrests or correlates of arrests among women drug users. We do not know if the same factors that are associated with arrests among male drug users can be generalized to females. Given the dramatic increase in the number of women incarcerated for drug-related offenses from 1990 to 1998, it may be important to examine gender differences in correlates of drug-related and non-drug-related arrests in a population of heroin users.[11,12]

The present study sought to extend the work of Sherman and colleagues by examining characteristics of heroin injectors (those in the study who reported injecting heroin in the past 6 months, but who also used a variety of other street drugs) associated with frequency of arrest for both drug-related and non-drug-related offenses. We sought to compare correlates of arrest by gender to examine differences. Based on past studies of crime and substance use, we hypothesized that a higher level of heroin addiction would be associated with a greater frequency of arrests.[13–15] We also hypothesized that social network factors would protect users against arrest by means of social control or provision of material or emotional support. We anticipated that participation in the street-level drug economy would be associated with an increased frequency of arrest for drug-related crimes, but not for other types of crimes. Finally, we expected to uncover gender differences in rates and correlates of drug-related and non-drug-related arrests.

METHODS

The data used in this analysis were collected as a part of the SHIELD (Self-Help in Eliminating Life Threatening Diseases) project, a network-oriented experimental pre- and posttest intervention. Targeted outreach in high drug areas was used to recruit participants. Areas of high drug activity were assessed using focus groups, geocoding of drug-related arrests over a 3-year period, and ethnographic observations. A description of the study and a telephone number to call was provided to potential participants.

Those who contacted our research staff were given a brief screening to assess eligibility. Individuals who were eligible and agreed to participate were administered consent information and forms, followed by a face-to-face interview on their background, HIV-related behaviors, and their social networks. SHIELD study inclusion criteria consisted of (1) age at least 18 years, (2) daily or weekly contact with drug users, (3) willingness to conduct acquired immunodeficiency syndrome (AIDS) outreach education, (4) ability to bring in two network members for a baseline interview, and (5) not being enrolled in other HIV prevention or network studies. Index participants were asked to bring two high-risk members of their networks to the clinic for assessment after the initial interview.

The Johns Hopkins School of Public Health Committee on Human Research approved the study in March 1997. The data presented here were collected at baseline interviews administered between August 1997 and March 1999. The current analysis was limited to SHIELD participants who had injected heroin within the 6 months prior to data collection (N = 761). This did not eliminate participants who had used other drugs in addition to injecting heroin. Due to missing data limitations, arrest and drug economy role data were only available for 690 of these participants. Excluded participants, due to missing data, did not differ from the 690 included in the analysis with regard to mean age, proportion male, or level of education.

Participants were asked if they had performed at least one of the following five roles in the 6 months prior to the interview: (1) sold drugs; (2) steered customers to or touted (publicized) drugs; (3) held drugs or money for drugs; (4) provided street security for drug sellers, which included being a "lookout" for police; or (5) cut, packaged, or cooked drugs. To assess arrests, participants were asked how many times in the previous year they were arrested. Participants were also asked if they were arrested for a variety of specific crimes (yes or no) including drug possession, loitering, theft, shoplifting, assault, violation of probation, sale of drugs, and trespassing. To categorize arrests into drug-related versus non-drug-related crimes, we asked how many times the participant had been arrested in the past year, then later in the interview asked the participants how many times they had been arrested for drug use, including possession, selling, buying, or anything else related to drug use.

Data analysis proceeded in four steps. First, descriptive statistics and exploratory plots for all variables were examined. Bivariate associations for each covariate with the number of arrests (total arrests, drug-related arrests, non-drug-related arrests) were obtained.

Second, as the number of arrests was a count variable, a log-linear regression model was fit for each covariate. We used a quasi-likelihood method of estimation with a scale parameter equal to the square root of the mean Pearson chi-square statistic for the models to account for overdispersion of the arrest variables.

Third, a log-linear regression model examining the direct effect of all covariates was estimated. Statistically insignificant covariates were eliminated (P value for chi-square test > .05) using backward and forward selection procedures.

Finally, a log-linear model was fit with all analysis variables and two-way interactions. Due to the large number of covariates, higher order interactions were not considered in this analysis. Statistically insignificant interaction terms and covariates were eliminated using backward and forward selection procedures. All significant interactions involved gender; therefore, for ease of interpretation, we chose to run separate models for males and females for all analyses.

RESULTS

This sample of heroin injectors had a mean age of 40 years, with a standard deviation of 7 years (see Table 1). Most were not employed (83%) either part or full-time, were male (66%), and did not have a high school diploma (52%). About half of the participants injected heroin on a daily basis (49%). Many had at least one heroin injector in their social network (40%), and many (43%) had participated in the drug economy within the 6 months prior to the interview.

Participants reported spending an average of 7 hours per day "on the street." About 29% reported selling drugs in the previous 6 months; 23% reported steering or touting; 28% reported holding drugs; 15% reported packaging, cooking or cut-

TABLE 1. Descriptive characteristics, current heroin injectors in SHIELD study*

	Mean	SD	Minimum	Maximum
Times arrested past year	0.99	1.67	0	25
Times arrested, drug related, past year	0.54	1.41	0	25
Times arrested, non-drug related, past year	0.48	0.94	0	10
Age	40.01	6.78	21	63
Hours per day spent on street	7.38	5.13	0	24
Number of roles in drug economy	1.15	1.57	0	5
Number of females in network	4.61	2.50	0	16
Total number in network	9.07	3.67	2	20
Number of nuclear family in network	3.56	2.13	0	13

	Percentage
Male	65.80
Employed	17.39
At least high school education	48.11
Daily heroin injector	49.13
At least one heroin injector in network	39.86
At least one role in drug economy	42.60
Sold drugs past 6 months	28.55
Steer/tout past 6 months	23.19
Hold drugs past 6 months	28.11
Package, cut, cook drugs past 6 months	15.36
Provide street security past 6 months	20.00

Arrested at least once for	Percentage	N
Drug possession	16.19	636
Other violations	12.38	630
Loitering	8.41	630
Other theft	6.26	623
Shoplifting	6.06	627
Assault	5.24	630
Probation violation	4.16	625
Drug sales	2.88	625
Trespassing	1.77	622

SHIELD, Self-Help in Eliminating Life Threatening Diseases.
*Injected heroin within 6 months prior to interview date; N = 690 unless indicated otherwise.

ting drugs; and 20% reported providing street security. There were 16% who reported an arrest for drug possession at least once in the previous year; 8% reported arrest for loitering, and 6% reported arrest for shoplifting. Only 3% reported arrest for selling drugs in the previous year.

Table 2 presents descriptive characteristics for males and females separately as well as results of two-sided *t* tests for means and *Z* tests for proportions (normal

TABLE 2. Descriptive characteristics, *t* and *Z* tests for differences, males and females, current heroin injectors in SHIELD study*

	Males (454)		Females (236)		
	Mean	SD	Mean	SD	*t* statistic
Times arrested past year	1.10	1.53	0.76	1.90	2.37†
Times arrested, drug related, past year	0.60	1.22	0.42	1.73	1.41
Times arrested, non-drug related, past year	0.54	1.02	0.38	0.77	2.28†
Age	41.09	6.69	38.17	6.56	5.51‡
Hours per day spent on street	8.42	5.13	5.40	4.54	7.91‡
Number of roles in drug economy	1.32	1.62	0.82	1.42	4.20‡
Number of females in network	4.11	2.03	5.57	3.00	−6.72‡
Total number in network	8.87	3.49	9.47	3.96	−1.99†
Number of nuclear family in network	3.34	2.04	3.97	2.22	−3.64‡

	Males, %	Females, %	*Z* statistic
Employed	18.94	14.41	1.49
At least high school education	47.14	50.00	−0.71
Daily heroin injector	46.26	54.66	−2.10†
At least one heroin injector in network	39.21	41.10	−0.48
At least one role in drug economy	48.46	31.36	4.31‡
Sold drugs past 6 months	33.26	19.49	3.80‡
Steer/tout past 6 months	26.87	16.10	3.18§
Hold drugs past 6 months	31.28	22.03	2.56†
Package, cut, cook drugs past 6 months	18.28	9.75	2.95§
Provide street security past 6 months	22.69	14.83	2.45†

	Males		Females		
Arrested at least once for	%	N	%	N	*Z* statistic
Drug possession	17.79	416	13.18	220	1.50
Other violations	13.41	410	10.45	220	1.08
Loitering	9.56	408	6.30	222	1.40
Other theft	8.15	405	2.75	218	2.65§
Shoplifting	6.60	409	5.04	218	0.78
Assault	5.12	410	5.45	220	−0.18
Probation violation	3.95	405	4.54	220	−0.36
Drug sales	2.96	406	2.74	219	0.15
Trespassing	2.22	404	0.92	218	1.18

SHIELD, Self-Help in Eliminating Life Threatening Diseases.
*Injected heroin within 6 months prior to interview date.
†$P < .05$.
‡$P < .001$.
§$P < .01$.

approximation to binomial distribution) to test for differences between males and females. For all categories of arrests, males were arrested at a higher overall rate than females, although two-sided t tests revealed significant differences ($P < .05$) only for total arrests and non-drug-related arrests. Males spent considerably more time on the street than females (8 hours per day for males to 5 hours per day for females), reported holding more roles in the drug economy (average number 1.32 vs. 0.82), and were more likely to have at least one role in the drug economy (48% vs. 31%). Females reported having significantly larger social networks, more females in their networks, and more nuclear family in their networks. Males reported significantly more involvement in the street drug economy than females for all drug economy roles.

The multivariate models presented in Tables 3 and 4 were derived as follows: All covariates, with the exception of number of roles in the drug economy, were initially included; next, a backward selection procedure was applied, retaining covariates that were significant below $P = .05$. Next, a forward selection procedure was applied to confirm the results obtained by the backward procedure. Finally, a plot of standardized residuals and a plot of observed versus fitted values was examined to check model fit and identify exceptional values.

Table 3 combines single-variable log-linear models for each covariate with multivariate models for total arrests, drug-related arrests, and non-drug-related arrests for males. Although most covariates in these models were significant in bivariate models, only a few retained significance in the multivariate models. Number of roles in the drug economy was not entered into any multivariate model due to its strong relationship with each of the individual drug economy role variables. We substituted the number of roles in the drug economy variable for selling drugs in the male multivariate models and for steering/touting drugs in the female multivariate models and found that it did not "explain" more variance. In the multivariate model for total arrests, having a high school education; having at least one injector in the personal network; reporting packaging, cutting, or cooking drugs; and older age were associated with a lower rate of total arrests.

Selling drugs and spending more time on the street were associated with a higher frequency of total arrests. Report of selling drugs versus not selling drugs in this model was associated with a .71 increase in the log of the expected number of arrests or an increase of approximately two arrests, holding the effect of the other covariates constant. An increase of spending 2 hours on the street was associated with an increase of approximately one arrest, holding the effect of the other covariates constant.

For drug-related arrests, only two covariates were significant in the final model: injecting heroin daily and selling drugs. Compared to nondaily heroin injectors, those who reported daily heroin injection reported 1.5 more drug-related arrests. For non-drug-related arrests, having a high school education, having at least one injector in the personal network, and older age were associated with a lower frequency of arrests, while hours per day spent on the street continued to be associated with a higher frequency of arrests.

The multivariate models for females (Table 4) followed the same format as in the models in Table 3. One observation (number of arrests = 25) that was unduly influential was dropped from the model on examination of the Pearson residuals, even though its exclusion reduced the overall fit of the models. Covariate associations with frequency of arrest were markedly different for females compared to males. In the multivariate total arrests model, having another injector in the per-

TABLE 3. Single predictor and multivariate log linear regression models for total, drug-related, and non-drug-related arrests (males)

	Bivariate total arrests	Multivariate total arrests	Bivariate drug-related arrests	Multivariate drug-related arrests	Bivariate non-drug arrests	Multivariate non-drug arrests
Intercept (multivariate models only)		0.73		–1.25*		0.85
Employed	–0.13	—	–0.14	—	–0.08	—
At least high school education	–0.30†	–0.36‡	–0.14	—	–0.40†	–0.43†
Daily heroin injector	0.28†	—	0.50†	0.41†	0.01	—
At least one heroin injector in network	–0.34†	–0.36‡	–0.25	—	–0.35	–0.38†
Sold drugs past 6 months	0.73*	0.71*	1.14*	1.10*	0.27	—
Steer/tout past 6 months	0.55*	—	0.70*	—	0.31	—
Hold drugs past 6 months	0.54*	—	0.82*	—	0.29	—
Package, cut, cook drugs past 6 months	0.14	–0.32†	0.25	—	0.10	—
Provide street security past 6 months	0.36†	—	0.69*	—	0.07	—
Number of roles in drug economy	0.18*		0.27*		0.08	
Age	–0.03*	–0.02†	–0.02	—	–0.05*	–0.04*
Hours per day spent on street	0.05*	0.04‡	0.05‡	—	0.06*	0.05*
Number of females in network	–0.01	—	0.05	—	–0.04	—
Total number in network	–0.01	—	0.01	—	–0.03	—
Number of nuclear family in network	0.00	—	–0.01	—	0.02	—
N	454	454	454	454	454	454
Model deviance		132.21		97.70		61.27
Error deviance		688.14		635.79		558.78
Total		820.35		733.50		620.05

Dash indicates variable was found insignificant in backward and forward elimination scheme and removed.
*$P < .001$ for chi-square statistic.
†$P < .05$ for chi-square statistic.
‡$P < .01$ for chi-square statistic.

TABLE 4. Single predictor and multivariate log linear regression models for total, drug-related, and non-drug-related arrests (females)

	Bivariate total arrests	Multivariate total arrests	Bivariate drug-related arrests	Multivariate drug-related arrests	Bivariate non-drug arrests	Multivariate non-drug arrests
Intercept (multivariate models only)		–0.41		–1.55*		–1.00†
Employed	–0.32	—	0.12	—	–0.68	—
At least high school education	0.07	—	–0.18	—	0.26	—
Daily heroin injector	0.23	—	0.28	—	0.30	—
At least one heroin injector in network	0.49‡	0.66*	0.00	—	0.69†	0.79†
Sold drugs past 6 months	0.29	—	0.95*	—	–0.18	—
Steer/tout past 6 months	0.99*	1.09*	1.44*	1.44*	0.56	0.69‡
Hold drugs past 6 months	0.57†	—	0.99*	—	0.34	—
Package, cut, cook drugs past 6 months	0.31	—	0.46	—	0.04	—
Provide street security past 6 months	0.72†	—	1.08*	—	0.04	—
Number of roles in drug economy	0.20*		0.34*		0.09	
Age	–0.03	—	–0.01	—	–0.02	—
Hours per day spent on street	0.06†	—	0.08†	—	0.04	—
Number of females in network	–0.11†	–0.11†	–0.10‡	—	–0.09	–0.10‡
Total number in network	–0.06‡	—	–0.06	—	–0.05	—
Number of nuclear family in network	–0.04	—	–0.03	—	–0.04	—
N	235	235	235	235	235	235
Model deviance		58.67		33.51		23.73
Error deviance		264.53		194.67		238.56
Total		323.20		228.18		262.29

Dash indicates variable was found insignificant in backward and forward elimination scheme and removed.
*$P < .001$ for chi-square statistic.
†$P < .01$ for chi-square statistic.
‡$P < .05$ for chi-square statistic.

sonal network and reporting steering/touting in the past 6 months were associated with an increased frequency of arrests; having a higher number of females in the personal network was associated with a decreased frequency of arrests. For drug-related arrests, only steering/touting remained statistically significant, starting from the model with all covariates. The model for non-drug-related arrests was similar to the model for total arrests for females.

As a post hoc analysis, we tested additional models by separately substituting four variables for the "at least 1 heroin injector in network" in the two total arrest models. We asked participants if they had a "running buddy" or someone with whom they regularly obtained drugs. The variables were as follows: (1) having at least one male heroin injector in network, (2) having at least one female heroin injector in network, (3) having at least one male running buddy, and (4) having at least one female running buddy.

For males, having a female heroin injector in network was protective against arrests ($P = .06$ in the total arrests model), but having male injectors or running buddies in the network was statistically unrelated to total arrests. For females, having a male heroin injector or a male running buddy was associated with more arrests ($P < .01$ for each variable), while having a female heroin injector or a female running buddy was statistically not associated with arrests.

DISCUSSION

We found multiple gender differences in correlates of arrest. Not unexpectedly, involvement in the drug economy was associated with drug-related arrests. In the multivariate model for total and drug-related arrests for males, selling drugs showed the strongest association of all covariates. Interestingly, males who reported packaging, cutting, or cooking drugs had a lower frequency of arrest in the total arrests model. Males may exchange these services for drugs and therefore do not need to engage in other riskier street-level activities to acquire funds for drugs. For females, steering/touting showed the strongest association for total and drug-related arrests. Selling drugs is a role local police may associate with males, while steering/touting is a role associated with females; therefore, the pattern of association observed stems not from differences in roles between males and females, but rather from arresting patterns of police.

Severity of heroin addiction, as measured by daily versus nondaily use of heroin, was associated with drug-related arrests for males, but not for females. Individuals who use more frequently are likely to have more severe withdrawal symptoms; to stave off withdrawal, they may engage in drug-related criminal activities that have a higher probability of arrest. Alternatively, they may be known by the police as users and hence targeted for arrest, or they may have had more involvement in the street drug economy to acquire greater funds to support their drug use. Perhaps police are not as likely to target females for drug-related arrest, or females may acquire heroin in a less-visible manner than males. The direction and magnitude of the associations of frequency of heroin use and number of arrests were similar for males and females; however, our sample size may have given insufficient power to detect an association for females.

For females, a higher number of females in the personal network was associated with a lower frequency of arrests in each multivariate model. A higher proportion of females in the personal network may have indicated higher levels of access to material resources, which allowed individuals to engage in behaviors not likely to

lead to arrest. Alternatively, a higher proportion of females in the personal network indicated higher levels of social control, again protecting against behaviors likely to lead to arrest. For males, having at least one injector in the personal network was associated with a decreased frequency of arrest in the total and non-drug-related multivariate models. For females, having at least one injector in the personal network was associated with an increased frequency of arrest in the total and non-drug-related multivariate models.

Why should having other heroin users in the personal social network be protective against arrest for males, but lead to a greater chance of arrest for females? The answer may lie in the role of other heroin-using associates for males versus females and in power dynamics between male and female heroin users. Male heroin users often associate with a female user to obtain money for buying heroin. The female is often expected to assume the risk of obtaining the money; this may expose her to a greater chance of being arrested. The male, in this relationship, may possess the knowledge or network to purchase the drugs.

Further specification of the gender of the network members should then show specific relationships to arrests: For males, having female injectors or running buddies in the network should show a negative relationship to arrests (protective), but having male injectors or running buddies should not show any relationship to arrests. Conversely, for females, having male injectors or running buddies in the network should show a positive relationship to arrests (harmful), but having female injectors or running buddies should not show any relationship to arrests. We found support for these hypotheses in our post hoc analysis, which indicated that having female heroin injectors was protective against arrests for males, while having male heroin injectors or running buddies was associated with more arrests for females.

Participants in this study were unlikely to be employed, spent a considerable amount of time on the street, and were likely to be involved in the drug economy. Interestingly, licit employment (either full or part time) was not protective against probability of arrest. In this population, the type of employment among employed participants may not provide adequate resources to escape involvement in the drug economy or support daily heroin use. The arrest and conviction records of this population could be a barrier to obtaining more than minimal employment. As the proportion of employed individuals was low, we may not have had the statistical power to detect a protective effect of employment.

For both males and females, spending more time on the street was associated with an increased frequency of arrest. Spending time on the street may indicate a higher level of involvement in the drug economy or lead to greater police awareness of their activities.

There are several limitations concerning the design and assumptions of this study. First, although this investigation was based on self-reported data, for many behaviors, self-report information obtained from drug users, including criminal records, has been shown to be valid and reliable.[16] Second, we would ideally like to know about the processes underlying how level of addiction, involvement in the drug economy, and social network characteristics lead to arrests. However, our analysis of running buddies within the network does help explain how social network characteristics lead to differences in arrest rates for women compared to men. Although information on the frequency and duration of participation in the drug economy was not collected, this investigation represents a first step in quantifying gender differences in correlates of arrest in this population.

Finally, arrests are a social and political phenomenon that also should be exam-

ined above the level of the individual. Police may target specific neighborhoods in response to concerns of the community, as a reaction to crimes committed in the neighborhood, or at the direction of political leaders attempting to "clean up" a neighborhood. Injection drug users may be arrested (for loitering, for example) due to police targeting their neighborhood. Future studies should examine the place of residence, where injection drug users purchase drugs, and where the users spend their time to improve our understanding of the contribution of geographic location on arrests.

In summary, greater involvement in the drug economy was associated with an increased frequency of drug-related arrests, with marked gender differences. For males, selling drugs was associated with an increased frequency of arrest, while packaging, cutting, or cooking drugs was associated with a decreased frequency of arrest. For females, steering/touting drugs showed the strongest association to frequency of arrest. There was specificity in the relationship between network characteristics and arrests. Having at least one injector in the personal network was associated with fewer arrests for males, but more arrests for females. This finding may be explained by role and power differences between male and female heroin users.

Several important implications arise from the study's findings. First, generalizing female drug use and associated patterns of arrest from studies involving primarily males is likely to be misleading. In examining correlates of arrest among injection heroin users, gender differences should be considered. High levels of involvement in the street drug economy suggest that structural interventions, such as job creation and training programs, are necessary. Given the apparent failures of legal sanctions against drug users and those involved in the street drug economy, this may be the only means to curb the pervasive influence of drugs and drug markets in Baltimore.

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