

The Use of Location Monitoring at the Post-Conviction Stage of Supervision

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THE LOCATION MONITORING program within the U.S. probation and pretrial services system has played a significant role in the supervision process for several decades. In 1986, the federal system launched the home confinement program, using a special curfew of approximately 60 days (Gowen, 2000). In 1989, the program was expanded when the Federal Judicial Conference authorized the use of electronic monitoring for federal supervisees in 12 districts, and a couple of years later the program was expanded nationally (Cornish & Whetzel, 2014). The agency next began to explore the possible implementation of various technologies as a tool for the home confinement program. Monitoring technology by that time offered equipment that would allow officers an increasing ability to remotely monitor the location of supervisees. Today, the three location monitoring technologies that are used in pretrial and post-conviction supervision are radio frequency (RF), global positioning system (GPS), and voice recognition. Location monitoring is imposed as a condition of supervision for a variety of reasons, including as an alternative to pretrial detention or custodial sentences or as a means of addressing high-risk behaviors/violative behavior or noncompliance during supervision (Gowen, 2001).

An ancillary advantage is cost savings. The Administrative Office of the U.S. Courts reported in 2020 that the daily cost of

incarceration per person was \$108.00, while the daily cost of GPS location monitoring was \$4.15.¹ Since GPS is the most expensive form of location monitoring, it is apparent that location monitoring results in substantial savings as an alternative to incarceration.

In this study we sought to develop a better understanding of location monitoring as a major component within the federal system. More specifically, we first provide an overview of location monitoring in the federal supervision system and then explore several topics, including the characteristics of those who receive the condition, the application of the risk principle to location monitoring (hereafter referred to as LM), and the relationship between LM and recidivism outcomes.

History of Location Monitoring in the Federal System

In the late 1990s, U.S. probation and pretrial service officers began to assess the types of technologies for the LM programs. The first awarded contract for LM services was in 1993, and the initial program solely used RF and voice recognition technology (Cornish

& Whetzel, 2014). New technology paved the way for advancements in monitoring equipment that would use GPS. This level of monitoring offers degrees of intensity (for example, real-time monitoring) to pinpoint exact locations that are instrumental in the surveillance of higher risk cases and participants with third-party risk factors, such as a victim or co-defendant. Noting the evolution of the “home confinement program,” the *Guide to Judiciary Policy* (Vol. 8, § 160(a)) notes the evolution of the “home confinement program,” including the renaming of program as the “location monitoring program.” The new name provided a better description of all the monitoring capabilities of the program, emphasizing that it was more than just monitoring at a residence.

The court has the authority to impose a period of LM under 18 U.S.C. § 3563(b)(19) for probation cases and 18 U.S.C. § 3583(d) for supervised release cases as an alternative to incarceration. LM is a multifaceted condition that can be imposed for a variety of reasons. When LM is imposed at the time of sentencing, for example, it tends to be used in place of a custodial sentence. As will be shown, the imposition of LM at the time of sentencing tends to be associated with individuals at low risk of re-offending. When an individual is deemed low risk, the LM sentence is not intended to promote behavior change or risk reduction; in such cases LM is satisfying a

¹ Costs for incarceration are calculated based on information received by the Administrative Office of the U.S. Courts (AO) and the Bureau of Prisons (BOP). Location monitoring costs are based on information received from the AO's Budget Division for fiscal year 2020.

period of a custodial sentence (Cornish, 2010). Conversely, LM conditions can be imposed during supervision; when this occurs, its imposition tends to be based on risk, when an individual on post-conviction supervision demonstrates noncompliant behavior and receives a modification of supervision conditions from the court. For some, the modification includes a period of LM to address offending behavior or for punitive purposes (Cornish, 2010; Belur et al., 2020).

In addition, LM can be used for post-conviction cases during prerelease at a residential reentry center. Although the supervisee in this scenario is under the authority of the Federal Bureau of Prisons, the individual is supervised by a post-conviction officer to increase the likelihood of successful community reintegration. Finally, the imposition of LM occurs in instances of compassionate release, based on a criterion set forth in the *Guide to Judiciary Policy* for elderly and terminally ill offenders under 34 U.S.C. § 60541(g).

While LM has been subjected to extensive empirical investigations (see Bonta et al., 2000; Downing, 2006; Erez & Ibarra, 2004; Finn & Muirhead-Steves, 2002; Wolff et al., 2017; Yeh, 2010), there is relatively little empirical data on the imposition of LM on persons placed on federal post-conviction supervision. Moreover, the few federal studies that exist often examine LM imposed during the pretrial stage of the judicial process or fail to distinguish between LM conditions imposed at sentencing or during supervision when exploring whether LM is associated with a reduction in recidivism outcomes (Wolff et al., 2017; Gowen, 2000; Cadigan, 1991). The failure to disentangle when an LM condition is imposed—that is at the start of or during supervision—has the potential to skew results when examining the association between LM and recidivism, because this condition is often imposed during supervision to address noncompliant and violative behavior. This study sought to address this methodological issue by examining the imposition of LM within the federal system at either the time of sentencing or during a supervisee's post-conviction supervision term. Other key issues this research explored include who on post-conviction supervision receives LM, the characteristics of persons on LM, the different types of LM imposed, and the relationship between LM and recidivism outcomes. We did not examine the imposition of LM at the pretrial stage.

Three Primary Types of Location Monitoring in the Federal System

Location monitoring within the federal system is primarily accomplished using RF, GPS, or voice recognition technology. RF technology uses a receiver that is placed in the center of the participant's residence. This receiver can either be connected to a landline telephone or cellular-based, working off nearby cellular towers. The supervisee is required to wear an ankle bracelet, which is referred to as a transmitter. This technology only monitors the supervisee when in range of the receiver (located in the residence), which reports when the supervisee enters or leaves the residence. Violations (e.g., tampers, unauthorized stops) cannot be detected when the supervisee is out of range of the receiver. Overall, RF equipment only reports the supervisee's range to the home-based receiver (Gowen, 2001).

Unlike RF, GPS has the capacity of locating supervisees in real-time using a network of 24 satellites that link to cellular networks providing the location (Gowen, 2001). The GPS technology requires the participant to wear an ankle bracelet, referred to as a tracker, and to charge the tracker daily. Additionally, GPS has the software capability to create exclusion zones (prohibited areas) and inclusion zones (permitted areas). An officer will receive immediate notification of any violation (e.g., tampering) and zone crossing. This technology is the most labor-intensive form of monitoring for officers.

Voice recognition differs from both RF and GPS in that no equipment is worn by the supervisee. This type of monitoring is conducted using an automated telephone system that requires supervisees to receive random or scheduled telephone calls to verify their presence at an approved location, which is typically their residence. The automated system uses a stored voice print to authenticate the supervisee's identity (Gowen, 2001). Recent technological advancements have initiated the use of smart phones by allowing supervisees to download a supervision application that has voice recognition capabilities.

Data and Methods

The data for this study was extracted from the Probation and Pretrial Automated Case Tracking System (PACTS) and uploaded into Stata, a statistical software package, for analysis. We used a combination of descriptive and matching techniques for analysis to answer the research questions below. The following

research questions guided this analysis.

- What types of supervisees are most likely to receive LM?
- Is the imposition of LM associated with the risk of recidivism as measured by the federal Post-Conviction Risk Assessment instrument (or PCRA for short)?
- What other supervisee-related factors, including the most serious conviction offense, are associated with LM?
- What types of LM technologies (e.g., RF, GPS) are employed on supervisees?
- How does the imposition of the LM condition vary depending upon whether the condition was imposed at the time of sentencing or during supervision?
- Are supervisees who are placed on LM at the time of sentencing less likely to recidivate compared to similarly situated supervisees who are not placed on LM?

Sample Population

The study data included the 94 U.S. federal judicial districts and comprised persons placed on post-conviction supervision during fiscal years 2012 through 2019 ($n = 428,440$ see Table 1). About 84 percent of these supervisees were placed on supervised release, meaning they had finished an incarceration term under the Federal Bureau of Prisons, while most of the remainder had been sentenced to a term of straight probation. Provided in Table 1 are the descriptive statistics of the sample by race/ethnicity, gender, type of supervision, most serious conviction offense, and PCRA risk category. Table 1 also provides an overview of the number of supervisees and the mean of each category. The majority of the study sample were males (82 percent) and were convicted of a drug offense (42 percent). In addition, over half of the supervisees had a PCRA score of low or low/moderate.² The sample included non-LM supervisees ($n = 362,793$) and LM supervisees ($n = 65,647$) further categorized by imposition of the condition; LM imposed at sentencing ($n = 38,785$) and during supervision ($n = 26,862$). It should be noted that a relatively small component of our sample (less than 1 percent) encompasses persons released from the Federal Bureau of Prisons (BOP) to a residential reentry center with an LM condition. Although these persons are technically under the jurisdiction of the BOP, U.S. probation officers are given authority to monitor these cases prior to commencement

² For a brief explanation of the PCRA, see Findings section.

of their post-conviction supervision term and oversee their LM condition.

Methods

The initial steps to the data analysis involved a descriptive overview of persons placed on LM supervision either at the time of sentencing or during supervision. We conducted this analysis to determine the extent to which those who receive LM differ from supervised persons who did not receive an LM condition. Afterwards, we investigated whether LM conditions imposed at the time of sentencing were associated with lower rearrest activity compared to the rearrest activity of persons who were not placed on LM. As will be shown, because of differences in the risk characteristics between the LM and non-LM groups, we employed matching techniques (e.g., propensity score matching) to reduce the potential for bias between the LM and non-LM groups. The PSM criteria were based on the following: PCRA domain scores of criminal history, education and employment, substance abuse, social networks, and cognitions, gender, race/ethnicity, most serious offense, and judicial districts.

Provided in Appendix 1 (page 42) is the statistical breakdown of LM imposed at sentence and non-LM supervisees from the unmatched groups as well as from the post-matched groups. An example of PSM (see Appendix 1) for most serious offense is demonstrated with the financial offenses: for the unmatched group LM was 35 percent and for the non-LM 18 percent. After matching, the groups are nearly equally balanced; for example, once the matching is completed, nearly equal percentages of supervisees with and without an LM condition were convicted of financial offenses (34 percent).

Findings

Imposition of Location Monitoring

The purpose of the initial examination was to develop an understanding of the reasons for imposing a LM condition on supervisees and the characteristics of those supervisees with ($n= 65,647$) and without ($n= 362,793$) a LM condition. Supervisees with a LM condition are further disaggregated by whether this condition was imposed at sentencing ($n= 38,785$) or during supervision ($n= 26,862$). Table 2 details the distribution of LM conditions for post-conviction supervisees based on a variety of characteristics. We first examined the association between LM and risk as measured by the PCRA (see Table 2, next page). The

PCRA is the risk assessment instrument used by the federal probation system to gauge the likelihood that a supervisee will recidivate while on supervision. Officers use the PCRA to determine the appropriate level of supervision intensity while persons are on federal supervision. The PCRA works by classifying supervisees at different risk levels (low, low/moderate, moderate, or high); for more information about the PCRA, see Johnson et al., 2011; Lowenkamp et al., 2013; Lowenkamp et al., 2015; and Cohen & Bechtel, 2017.³

³ In 2016, the PCRA 2.0, which includes a violence trailer, was implemented. Because violence information for the entire sample was not available, the decision was made not to include that component within the analysis.

Among those placed on federal supervision from fiscal years 2012 through 2019, about 15 percent received an LM condition. Of the 65,647 supervisees placed on LM, about 60 percent received LM at the time of sentencing, while the remainder were placed on LM during their supervision term. Although high-risk supervisees were 6 percentage points more likely to receive LM than their lower risk counterparts, the association between LM and risk depended upon whether it was imposed at sentencing or during supervision. Specifically, persons designated low risk by the PCRA at sentencing were 1.5 times more likely to receive an LM condition (13 percent placed on LM at sentencing) than persons

TABLE 1.
Descriptive statistics of federal supervisees in study sample

Variable	n	% or mean
Race/ethnicity*		
White, non-Hispanic	149,925	35.0 %
Black, non-Hispanic	148,058	34.6
Hispanic, any race	102,377	23.9
Other/a	26,820	6.3
Gender*		
Male	352,311	82.2 %
Female	76,114	17.8
Type of Supervision		
Term of supervised release	358,350	83.6 %
Probation	63,321	14.8
Other/b	6,769	1.6
Most serious conviction offense*		
Drugs	181,003	42.3 %
Financial	84,135	19.7
Weapons/Firearms	67,202	16.0
Violence	31,691	7.4
Immigration/Customs	21,161	4.9
Sex Offenses	14,769	3.5
Traffic/DWI	11,577	2.7
Obstruction/Escape	10,928	2.6
Public Order	5,756	1.3
PCRA risk categories		
Low	129,784	30.3 %
Low/Moderate	156,286	36.5
Moderate	101,096	23.6
High	41,274	9.6
Number of supervisees	428,440	

Note: The * by the variable denotes data will not sum to the total due to missing data. a/ Includes American Indians and Alaska Natives, Asian or Pacific Islander. b/ Includes people on civilian or military parole, etc.

classified as high risk by the PCRA (9 percent placed on LM at sentencing). The nexus between LM and risk manifested a different pattern, however, when LM was imposed at the supervision stage. High-risk supervisees were six times more likely to receive LM than lower risk counterparts if this condition was imposed during supervision.

Figure 1 details the distribution of PCRA scores for non-LM supervisees and those who received an LM condition at the sentencing or supervision stage. Among those receiving LM at sentencing, almost half were classified in the low-risk category, showing a pronounced downward staircase effect; rarely is LM at sentencing imposed on higher risk individuals (9 percent). LM imposed during supervision, however, manifested a different pattern. Over half (56 percent) of persons receiving LM during supervision were classified by the PCRA into the moderate or high-risk categories.

Table 3 (next page) examines the characteristics of persons placed on LM at

sentencing or during supervision by supervision type and most serious conviction offense. Similar to the previous table, the use of LM depended upon whether this condition was imposed at sentencing or during supervision. Nearly a third of those receiving LM at sentencing were sentenced directly to probation, meaning that they had no incarceration term imposed prior to being sentenced. Conversely, 92 percent of persons receiving LM during supervision were on a term of supervised release, meaning that they had been incarcerated prior to being placed on federal supervision. By most serious conviction offense, 34 percent of supervisees placed on LM at sentencing were convicted of financial offenses, and another 31 percent were convicted of drug offenses. In comparison, two-fifths of supervisees placed on LM during supervision were convicted of drug offenses, and another fifth recorded an instant conviction offense for weapons/firearms.

Types of Location Monitoring

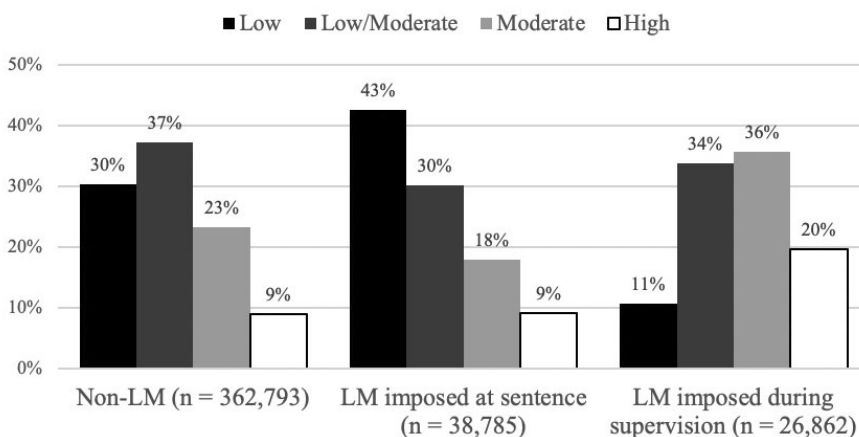
Figure 2 (next page) examines the types of LM equipment used, while Figure 3 (page 40) explores the types of equipment used by PCRA risk levels. The most used types of technology were radio frequency (RF) at 70 percent and global positioning satellite (GPS) at 25 percent. An examination of the imposition of RF vs. GPS by the PCRA risk levels shows that the use of GPS is more closely associated with risk when imposed at sentencing rather than at supervision. Specifically, supervisees classified into the high-risk category by the PCRA were 17 percentage points more likely to receive GPS monitoring than their low-risk counterparts for LM conditions imposed at sentencing (see Figure 3). Supervisees receiving LM during supervision witnessed an eight-percentage-point difference in the use of GPS monitoring across the highest and lowest PCRA categories. The use of GPS also varied by the most serious conviction offense. The percentage of supervisees placed on GPS varied from less than 20 percent for persons convicted of immigration or traffic offenses to over 50 percent for persons convicted of sex offenses (see Figure 4, page 41).

TABLE 2.
Percent of supervisees with location monitoring condition, by PCRA risk levels and imposition time

PCRA characteristics	Number of supervisees	Percent with location monitoring condition		
		Any	At sentencing	During supervision
Any	428,440	15.4%	9.1%	6.3%
PCRA 1.0 risk categories				
Low	129,784	15.0%	12.7%	2.2%
Low/Moderate	156,286	13.3	7.5	5.8
Moderate	101,096	16.4	6.9	9.5
High	41,274	21.4	8.6	12.8

Note: Includes 428,440 supervisees placed on post-conviction supervision between fiscal years 2012–2019.

FIGURE 1.
Post-Conviction Risk Assessment (PCRA) 1.0 Risk Distribution for Supervisees Placed on Location Monitoring (LM)



Examining Recidivism

We then examined recidivism of supervisees who were placed on LM compared to supervisees who were not placed on LM. Table 4 (page 40) provides the percentages of case closures by type and imposition of the LM condition. The data display higher revocation rates for those on LM compared to their non-LM counterparts; however, these findings are primarily driven by those placed on LM during supervision, since nearly three-fourths (72 percent) of these had a revocation. Among those placed on LM at sentencing, revocation rates were relatively similar (27 percent) to those of the non-LM supervisee population (29 percent). The arrest rates were slightly higher for non-LM supervisees (17 percent) than they were for those who receive LM at sentencing (14 percent). However, supervisees who received LM during supervision were 2.5 times more likely to be arrested (43 percent arrested) than non-LM cases (17 percent arrested).

Next, we further examined the relationship between LM and rearrest outcomes. Specifically, we looked at the association between LM conditions and rearrest activity for only those who receive LM at sentencing (n= 35,951). Omitted from the analysis are those supervisees receiving LM during

supervision, because this use of LM is likely related to violative behavior driving rearrest outcomes. In this part of our research, we compared the arrest behavior of supervisees who receive LM at sentencing to the arrest activity of supervisees who were not placed on LM supervision, tracking arrests for a 12-month time frame from the start of supervision. In general, results show similar arrest rates for both groups of supervisees. For example, about 10 percent of supervisees with no LM condition were arrested within 12 months of their supervision start date, while 8 percent of supervisees with an LM condition were arrested within the same time frame.

While the results show similar arrest rates for the LM and non-LM groups, it is useful to accurately assess the data accounting for the imbalance of risk characteristics between the groups through propensity score matching (PSM). For this study, the method of PSM generated groups of supervisees balanced on the following criteria of PCRA domain scores of criminal history, education and employment, social networks, and cognitions, gender, race/ethnicity, most serious offense, and federal judicial district. (An example of the results of PSM is highlighted in Appendix 1, which shows how matched groups were created between supervisees without LM ($n= 34,923$) and with LM at sentencing ($n= 34,923$.) Table 6 (page 41) shows recidivism outcomes of these similarly matched groups. After PSM was completed, we analyzed arrest rates categorized by PCRA risk levels for the 12 months after supervision commenced; these arrests included any arrest and violent arrest. There was no discernible difference in rearrest outcomes of supervisees who received LM at sentencing compared to supervisees without the condition. The same matching and analysis was also completed for arrest rates for supervisees on GPS at sentencing compared to those without the condition, and results indicated no difference in rearrest outcomes (data not shown).

Conclusion

In this study we sought to examine LM for supervisees under federal post-conviction supervision. We were interested in comparing similarly matched groups of supervisees, with and without the LM condition, to help provide a clearer picture of who receives the condition, imposition of the condition, and recidivism outcomes.

Throughout this research, there were two emerging themes of the data. The first is that

LM comports with the principle of risk in certain circumstances, such as when imposed during supervision on higher risk supervisees. This denotes that the condition is used during supervision to address problematic behavior, as a sanction. The use of LM as an intermediate sanction allows an officer to hold the individual accountable without a custodial sentence. The other theme was that the imposition of LM at sentencing likely occurred in lieu of incarceration. This use of LM affords the court the opportunity

to place a supervisee on probation, who might otherwise have received a term of imprisonment.

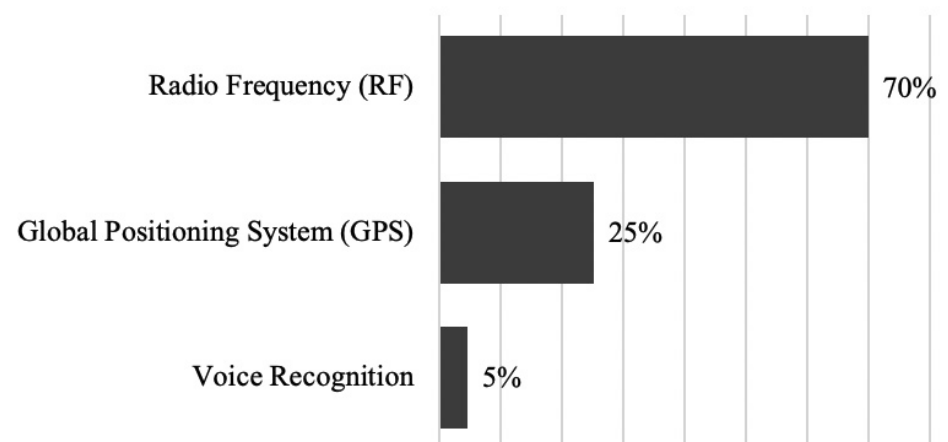
When provided as part of the sentence, LM tends to be imposed on low-risk supervisees convicted of financial crimes. Relatively few high-risk supervisees received LM at the time of sentencing. Imposing LM in place of a custodial sentence can be viewed favorably as a means to salvage the individual from an incarceration environment with more criminally inclined peers (Lowenkamp et

TABLE 3.
Distribution of supervision types and most serious conviction offense for supervisees, by imposition of a location monitoring condition

	Percent location monitoring condition imposed			
	Any	At sentencing	During supervision	Non-LM
Supervision types				
Terms of supervised release	76.3%	65.9%	91.3%	85.0%
Probation	21.9	31.8	7.6	13.5
Other/a	1.8	2.3	1.1	1.5
Most serious conviction offense				
Drugs	35.5%	30.6%	42.4%	43.5%
Financial Offenses	25.3	34.1	12.5	18.6
Weapons/Firearms	17.2	12.9	23.4	15.4
Violence	7.0	5.5	9.2	7.5
Immigration/Customs	5.1	6.8	2.7	4.9
Sexual Offense	4.0	3.1	5.3	3.4
Obstruction/Escape	3.2	3.5	2.8	2.4
Traffic/DWI	1.6	2.0	0.9	2.9
Public Order	1.2	1.6	0.8	1.4
Number of supervisees	65,647	38,785	26,862	362,793

Note: Includes 428,440 supervisees placed on post-conviction supervision between fiscal years 2012–2019. Other/a includes parole, military supervision, prerelease cases from the Bureau of Prisons.

FIGURE 2.
Types of Location Monitoring Programs Imposed



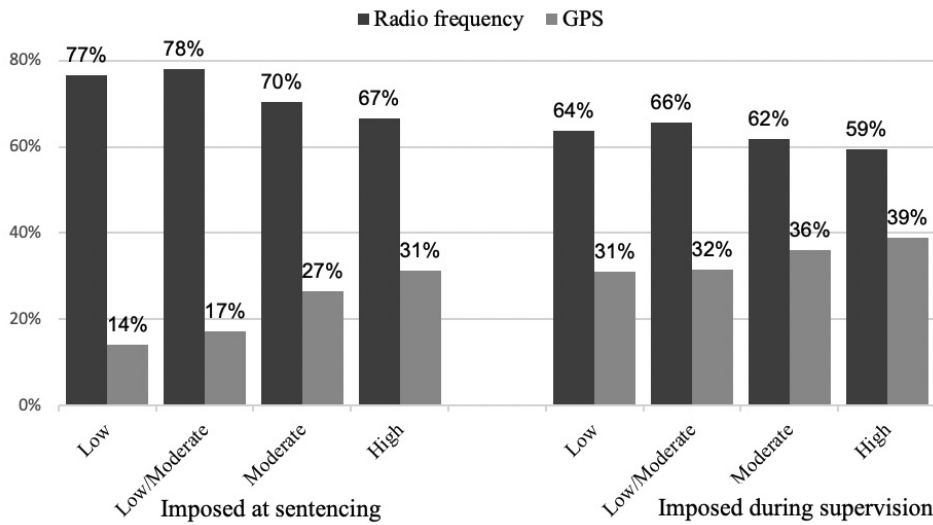
al., 2006). However, the other result is that many low-risk supervisees receive potentially more intensive levels of supervision through monitoring, which could be more detrimental to their chances of success under supervision. We also noted the underutilization of voice recognition, especially for low-risk supervisees. Voice recognition for this

population of cases provides monitoring with a reduced need for equipment inspections and community contacts. Some researchers assert that LM is equally if not more intrusive than incarceration for the individual, potentially causing even more harm (Weisburd, 2021). While the use of LM in lieu of incarceration is potentially positive, it has also resulted

in many low-risk supervisees receiving this potentially intrusive condition. Whether a more refined balance between the use of LM and risk could be obtained is beyond the scope of this article; however, it should perhaps be further considered in the federal probation system. Specifically, it prompts the question of how and when to best use different technologies, such as a supervision application on a smart phone for voice recognition.

This research differs from prior empirical efforts to examine LM, as we were able to distinguish the imposition of LM by whether it was imposed at sentencing or during supervision. This provided a more nuanced examination of recidivism outcomes. The results showed little discernible difference in rearrest outcomes of supervisees who received the condition at sentencing compared to non-LM supervisees. While it is not evident that LM aids in reducing rearrest, we also did not see an increase—essentially, using LM showed no effect on rearrest. These findings provide further evidence that the use of LM does not aid officers in intercepting noncompliant behavior before it occurs, but does afford the opportunity to gather information on the supervisees' behavior patterns. The technology is intended as a tool in the supervision process to make the individual more accountable, thus potentially

FIGURE 3.
Types of Location Monitoring Imposed by PCRA 1.0 Risk Levels



Note: Percentages will not sum to 100% as voice recognition is LM

TABLE 4.
Distribution of types of case closures for supervisees by imposition of a location monitoring condition

Imposition of LM condition	Number of supervisees	Types of case closures				Percent arrested
		Early termination	Successful termination	Any other closure/a	Revoked from supervision/b	
No location monitoring imposed	217,199	15.5%	44.1%	11.6%	28.8%	17.2%
Any location monitoring	43,127	8.5%	39.4%	7.0%	45.1%	26.1%
At sentencing	25,338	12.8	52.1	8.5	26.5	14.2
During supervision	17,789	2.3	21.3	4.9	71.6	43.3

Note: Includes 260,326 supervisees placed on post-conviction supervision between fiscal years 2012 - 2019 with a case closure. Supervisees with open cases omitted from case closure calculations but included in rearrest statistics.
a/ Transfers, deaths, and all other closures included in the other category. b/ Unsuccessful terminations included in revocation rates.

TABLE 5.
Arrest percentages for location monitoring

Imposition of LM condition	Number of supervisees	Any Arrest During 12-Month Period	
		Percent with no arrest	Percent arrested
No location monitoring imposed	358,152	89.6%	10.4%
Location monitoring at sentencing	35,951	91.9	8.1
Violent Arrest During 12-Month Period			
Imposition of LM condition	Number of supervisees	Percent with no arrest	Percent arrested
No location monitoring imposed	358,152	97.4%	2.6%
Location monitoring at sentencing	35,951	98.0	2.0

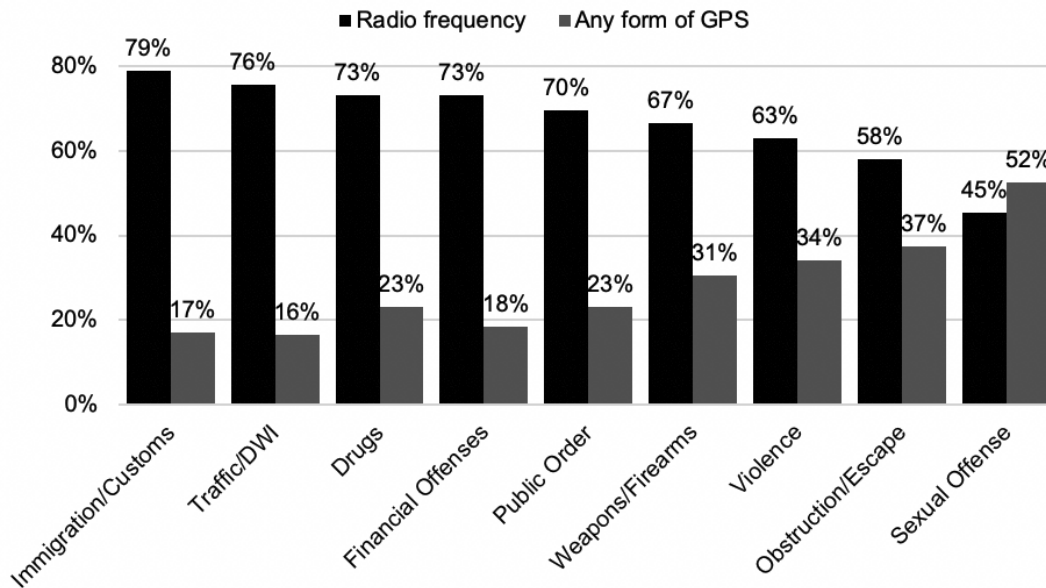
reducing opportunity to engage in maladaptive behavior. The information from LM offers the officer insight into the individual that is intended to create teachable moments for skill-building on behavior change between the officer and supervisee.

LM will continue to be a key component

within the federal community corrections system, especially with the use of this condition for persons incarcerated and who are released in keeping with the policy of compassionate release. Future research would benefit from evaluating recidivism outcomes for compassionate release supervisees due to

COVID-19 that were placed on LM compared to those that were not. Subsequent research efforts should also consider examining whether lower risk supervisees receiving LM could perhaps be provided with a less intensive form of supervision.

FIGURE 4.
Types of Location Monitoring Imposed by Most Serious Conviction Offense



Note: Percentages will not sum to 100% as voice verification LM conditions not shown.

TABLE 6.
Percent of supervisees with new arrests or violent arrest within 12 months of assessment using matched sample, by PCRA risk levels

PCRA 1.0 risk categories	No location monitoring		Location monitoring at sentencing	
	Number	Percent arrested	Number	Percent arrested
Any arrest				
All supervisees	34,923	8.8%	34,923	8.3%
Low	14,670	2.3	14,913	2.0
Low/Moderate	11,376	9.0	10,609	7.9
Moderate	6,247	17.5	6,214	16.0
High	2,630	23.8	3,187	23.8
Violent arrest				
All supervisees	34,923	2.2%	34,923	2.1%
Low	14,670	0.4	14,913	0.3
Low/Moderate	11,376	2.1	10,609	1.6
Moderate	6,247	4.3	6,214	4.5
High	2,630	7.3	3,187	7.6

Note. Supervisees on and not on location monitoring were matched using PSM techniques. The following covariates were used to match the LM and non-LM supervisees: PCRA domain scores of criminal history, education and employment, social networks, and cognitions, gender, race/ethnicity, most serious offense, and federal judicial district. Excluded from the matching was supervisees who received LM during supervision.

APPENDIX 1.

Equivalent Groups Generated by Propensity Score Matching — Location Monitoring Imposed at Time of Sentencing

Matching covariates	Panel A: Unmatched Group of Supervisees				Panel B: Post-matching group of Supervisees				% Bias reduction
	Supervisees with LM (n = 35,951)	Supervisees without LM (n = 358,192)	T-statistic	p Value	Supervisees with LM (n = 34,923)	Supervisees without LM (n = 34,923)	T-statistic	p Value	
PCRA domain scores									
Total score	6.61	7.65	-50.08	0.000	6.67	6.63	1.48	0.138	95.7
Criminal history	3.81	4.52	-53.12	0.000	3.85	3.82	1.53	0.126	95.9
Employment/education	1.11	1.30	-32.90	0.000	1.12	1.11	1.08	0.280	95.6
Drugs/Alcohol	0.42	0.49	-18.78	0.000	0.42	0.43	-0.09	0.372	93.8
Social networks	1.08	0.17	-20.01	0.000	1.09	1.08	1.02	0.306	92.8
Cognitions	0.19	0.17	11.11	0.000	0.19	0.18	1.71	0.087	78.1
Gender (female = 1)	0.03	0.17	46.45	0.000	0.26	0.25	0.94	0.347	96.8
Race									
White	0.39	0.35	15.84	0.000	0.39	0.39	-0.91	0.364	92.0
Black	0.30	0.35	-18.35	0.000	0.30	0.29	2.22	0.027	84.1
Hispanic, any race	0.24	0.24	-0.07	0.992	0.24	0.25	-2.32	0.020	-31304.8
Other	0.07	0.06	4.74	0.000	0.07	0.06	1.73	0.083	49.3
Most Serious Offense									
Drugs	0.31	0.44	-47.01	0.000	0.31	0.31	-0.47	0.642	98.7
Financial Offense	0.35	0.18	73.05	0.000	0.34	0.34	-0.74	0.462	98.4
Immigration/Customs	0.07	0.05	15.96	0.000	0.07	0.07	-0.98	0.328	90.2
Obstruction/Escape	0.04	0.02	11.63	0.000	0.04	0.03	0.37	0.710	95.0
Public Order	0.02	0.13	4.01	0.000	0.02	0.02	0.39	0.694	85.5
Sexual Offense	0.03	0.03	-4.92	0.000	0.03	0.03	0.59	0.556	84.8
Traffic/DWI	0.02	0.03	-7.29	0.000	0.02	0.02	-0.18	0.856	96.9
Violence	0.05	0.08	-14.47	0.000	0.06	0.05	1.50	0.133	87.7
Weapons/Firearms	0.13	0.16	-15.83	0.000	0.13	0.12	0.85	0.398	93.3

Note: In addition to matching on the above covariates, supervisees were matched across the 94 judicial districts (not shown in table).

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