

The Impact of Crime on Physical Activity: Incorporating Crime Measures in Trail Use Models

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Crime and Outdoor Physical Activity

Concerns over crime and safety are well-recognized as potential barriers to outdoor physical activity

However, it is unclear whether official levels of crime significantly influence physical activity, and to what extent crime measures help explain trail traffic

- We hypothesize that official levels of violent crime (i.e., Aggravated Assaults, Homicides, Rapes, and Robberies) are inversely related to trail use in Indianapolis, Indiana.

Crime and Outdoor Physical Activity

As an extension of the ALR-funded project, *Modeling Urban Greenway Trails**, we:

- extend previous trail models by examining official levels of crime in trail neighborhoods; and
- explore the relationship between perceived risk of criminal victimization and trail use

*Lindsey, G., Y. Han, J. Wilson, and J. Yang. 2006. "Neighborhood Correlates of Urban Trail Traffic." *Journal of Physical Activity and Health*, Vol. 3, Supplement 1, S139-S157.

(http://www.activelivingresearch.org/downloads/jpah_10_lindsey.pdf)

Lines of Investigation

Forecasting Model of Trail Traffic includes:

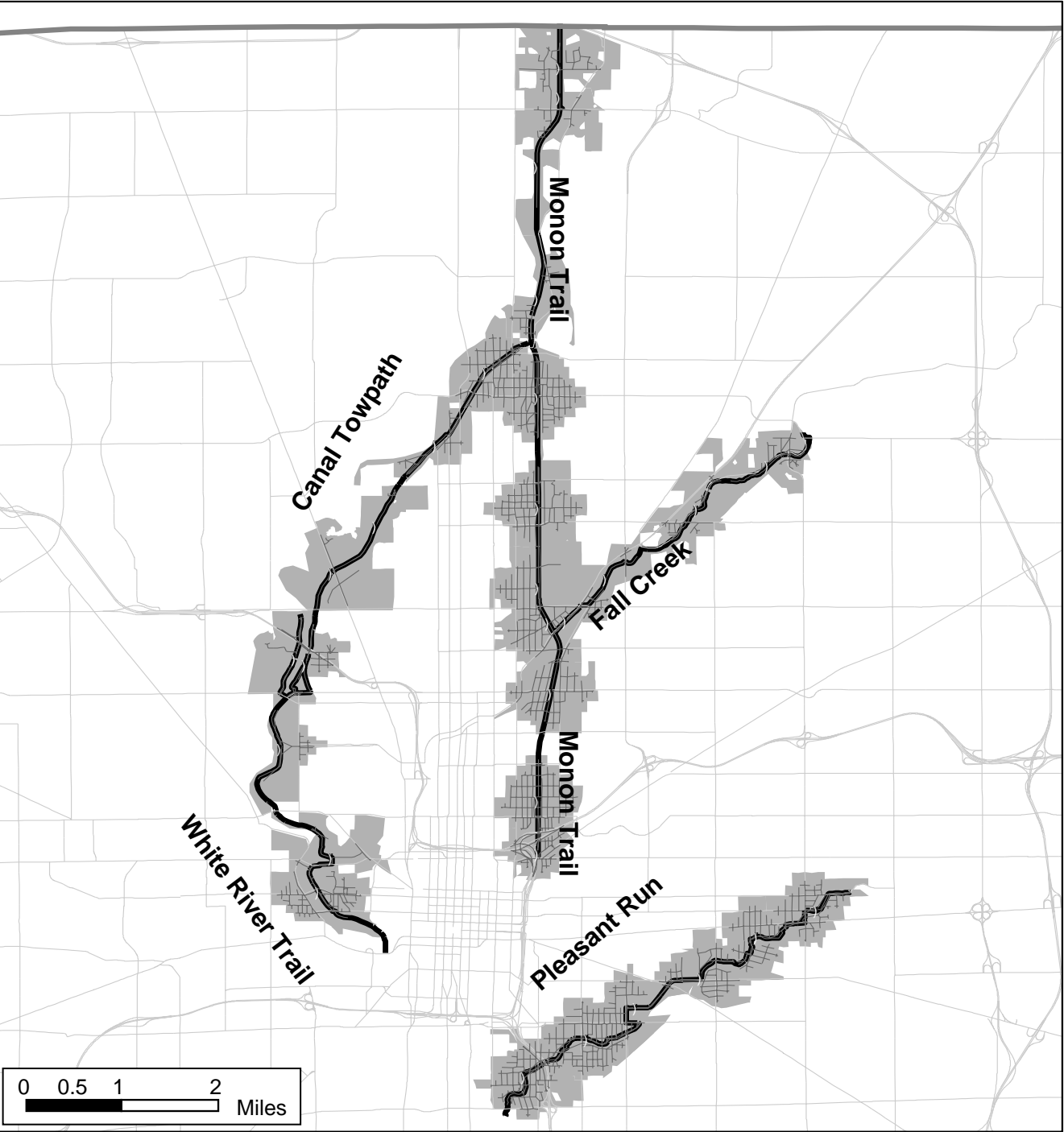
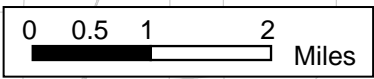
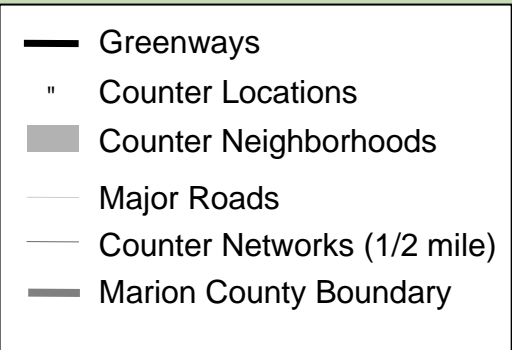
- Seasonal factors, neighborhood socio-demographics, neighborhood urban form, and trail characteristics
- **Measured levels of Crime as mapped by GIS**

Survey of crime and trail use:

- Survey trail users in census tracts adjacent to trails through the Indianapolis Trail Use and Physical Activity Survey (ITMS)
- **Asked specific questions about perceptions of safety from crime, victimization, and risk management**

Trail Monitor Neighborhoods

Pedestrian access zones or catchments defined by ½ mile street network from monitor locations



Crime Measures

Uniform Crime Reports (UCR) for serious violent crimes

- Homicide, Rape, Robbery, Aggravated Assault
- Data obtained from the Indianapolis Police Department (IPD) and the Marion County Sheriff's Department (MCSD)

Examined multiple measures of crime in trail neighborhoods at various distances from monitors (0.25 – 1.0 mile Buffers)

- ❖ Very few reported crimes occur on the trail, because the trail does not have an address

Models

Negative Binomial Regression Models were estimated for trail traffic:

- Model A: **with no crime measure**
- Model B: **with contemporaneous measure** of violent crime (one for each offense category) within 0.5-mile buffer of monitoring locations
- Model C: **with a lagged measure** of violent crime (one for each offense category) within 0.5-mile buffer of monitoring locations

Negative Binomial Regression Models	Model A: No Crime Measure		Model B: With Contemporaneous Crime Measure		Model C: With 10-Month Lag Crime Measure	
	Coeff.	s.e.	Coeff.	s.e.	Coeff.	s.e.
UCR Violent Crime 0.5	N/A	N/A	-0.0023	0.0043	-0.0091	0.0043
Constant	10.3070	1.0409	10.1295	1.0875	10.5927	1.0489
Temporal Control						
Feb	0.2483	0.0806	0.2468	0.0809	0.2547	0.0805
Mar	0.5422	0.0803	0.5447	0.0808	0.5584	0.0804
Apr	1.3068	0.0804	1.2713	0.0971	1.3117	0.0803
May	1.3086	0.0737	1.3132	0.0820	1.3137	0.0736
Jun	1.5286	0.0811	1.5326	0.0819	1.5356	0.0810
Jul	1.5834	0.0808	1.5871	0.0814	1.5799	0.0806
Aug	1.6194	0.0808	1.6227	0.0814	1.6165	0.0806
Sep	1.5550	0.0794	1.5572	0.0798	1.5398	0.0795
Oct	1.0414	0.0796	1.0444	0.0802	1.0242	0.0798
Nov	0.4375	0.0802	0.4374	0.0805	0.4275	0.0801
Dec	-0.3597	0.0817	-0.3615	0.0821	-0.3755	0.0819
Demographic Variables						
College25Ave%	0.5623	0.0019	0.5554	0.0022	0.0546	0.0021
MHHIncAve	-0.9033	0.0969	-0.8855	0.1014	-0.9072	0.0970
YoungOld%	-0.2507	0.0036	-0.0248	0.0037	-0.2541	0.0036
Black%	0.0122	0.0008	0.0119	0.0009	0.1177	0.0009
Other%	0.0222	0.0048	0.2068	0.0058	0.0157	0.0057
Urban Form Variables						
D_NDVI	0.3969	0.3462	0.3112	0.3835	0.1563	0.3643
PopDensity	0.0001	0.0000	0.0002	0.0000	0.0002	0.0000
Commercial%	0.0430	0.0056	0.0437	0.0059	0.0434	0.0056
PrkLotArea	0.0153	0.0061	0.0160	0.0064	0.0164	0.0061
StreetLngh	0.2324	0.0686	0.2381	0.0713	0.2197	0.0684
Pseudo R-squared	0.1495		0.1510		0.1500	

Model (B) for Each Contemporaneous Crime Measure	Coeff.	Std. Error	Pseudo R2
<i>No Crime Measure in Model</i>	N/A	N/A	0.1495
Violent Crimes (and all other correlates)	-0.0022668	0.0042627	0.1510
Aggravated Assaults (and all other correlates)	-0.0030693	0.0050131	0.1510
Homicides (and all other correlates)	-0.0371125	0.0713733	0.1510
Rapes (and all other correlates)	0.0375361*	0.0420913	0.1510
Robberies (and all other correlates)	-.0034713	0.0143368	0.1510
Model (C) for Each Lagged Crime Measure			
Violent Crimes 10-months	-0.0090966*	0.0042766	0.1500
Aggravated Assaults 10-months	-0.0099916*	0.0048269	0.1500
Homicides 7-months	-0.1874344**	0.0713277	0.1502
Rapes	<i>No Significant Lagged Effects for Rapes</i>		
Robberies	<i>No Significant Lagged Effects for Robberies</i>		

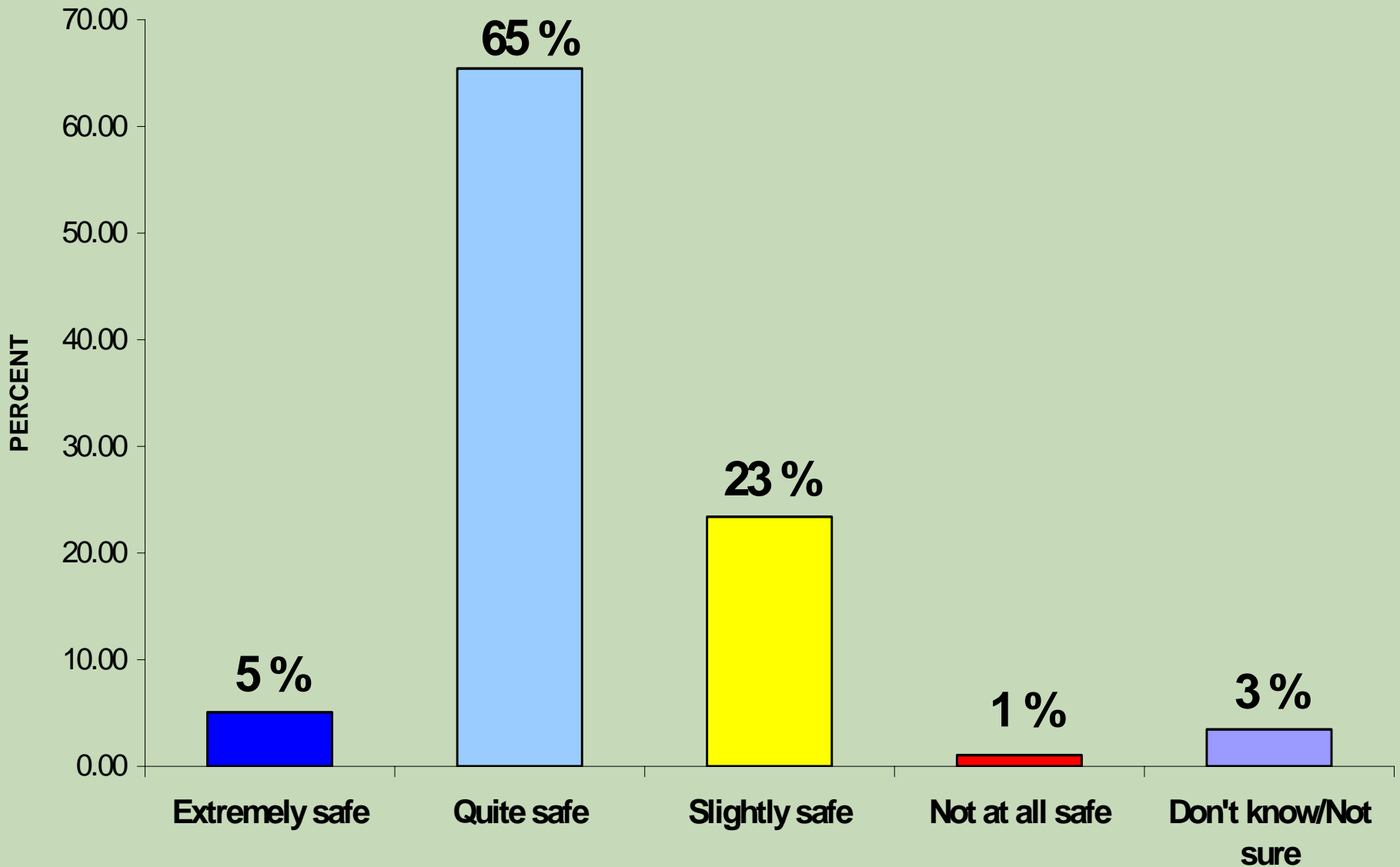
➤ Mean monthly trail count is the dependent variable (n= 258,501). *p<0.05; **p<0.01

Perceptions of Trail Users

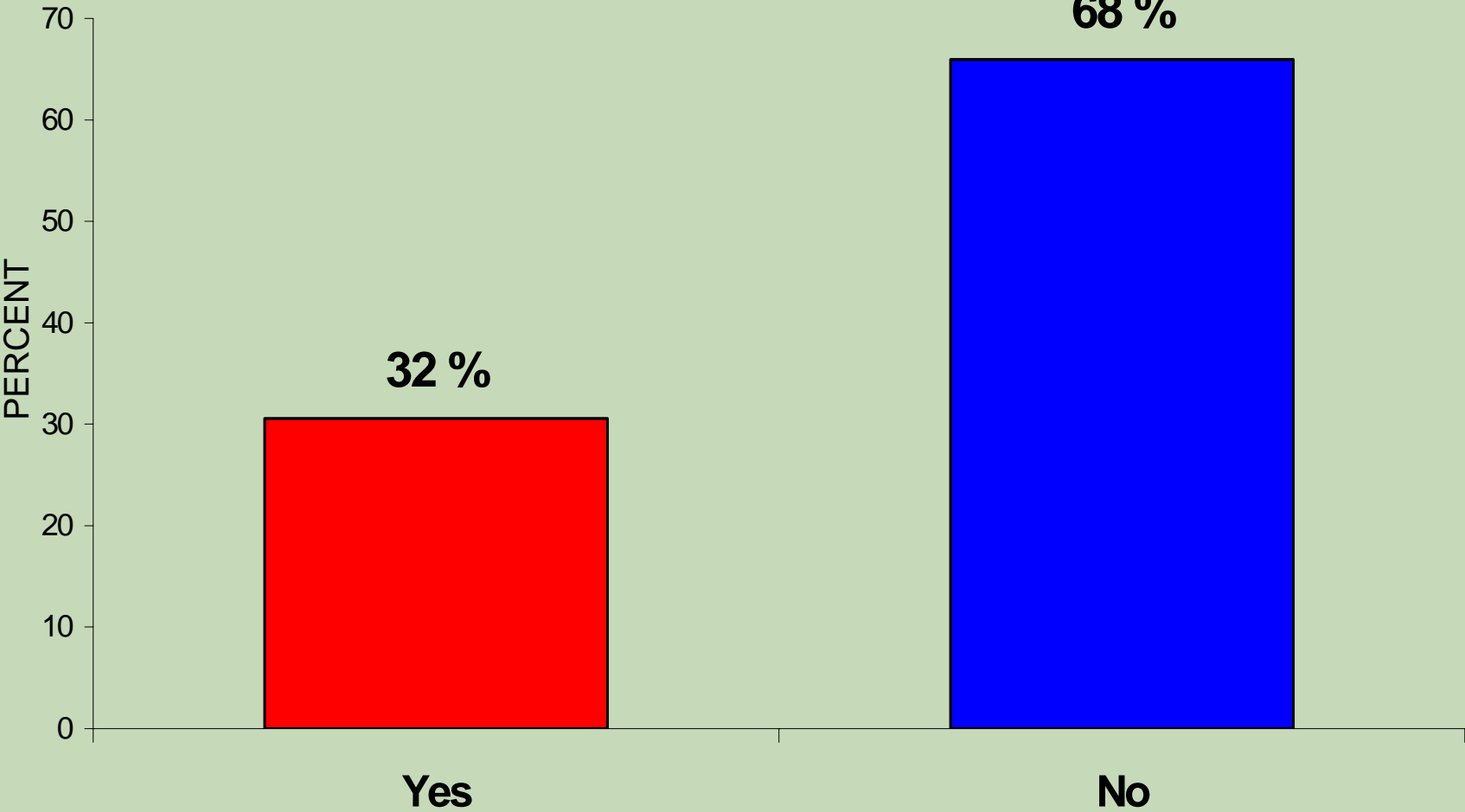
Indianapolis Trail Use and Physical Activity Survey (ITMS):

- ❑ Telephone screening sample size = 3,197 (41% trail users)
- ❑ Mail survey responses: 465 of 812 trail users (57% response rate)
 - Included both trail use and perceptions of crime/safety measures

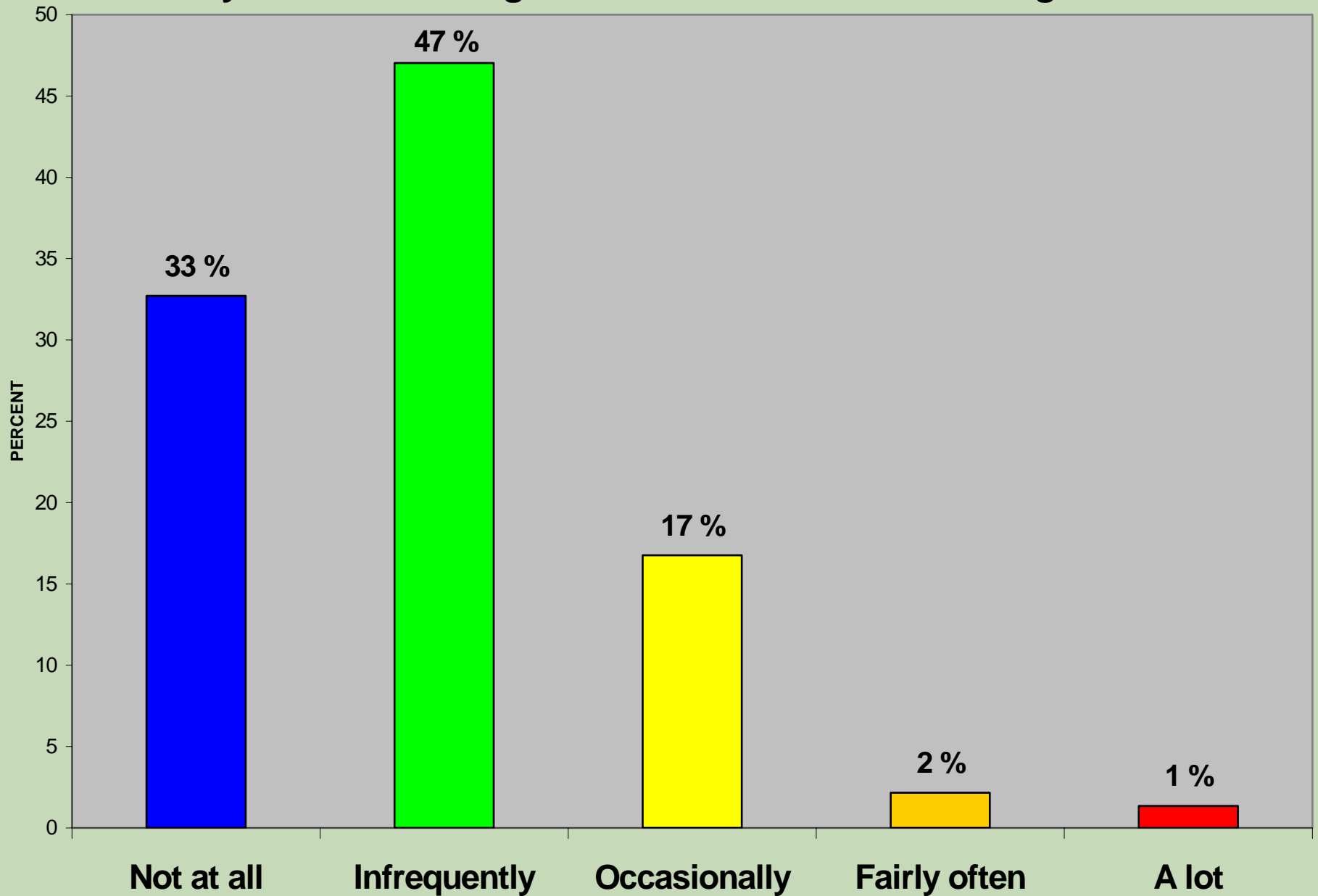
How safe from crime do you consider the trails to be?



Has concern about crime ever limited your use of the trails?



Do you fear becoming the victim of a crime while using the trail?



Rank Ordering of Precautions Taken by Users

- 244 use the trail only at certain times (22%)
- 202 do not carrying valuables (18%)
- 192 carry a cell phone (17%)
- 165 use the trail with others (15%)
- 126 lock their car or bike (11%)
- 122 let others know they are using the trail (11%)
- 35 carry pepper spray/mace (3%)
- ❖ ***However, only 2% of Respondents Reported Being a Victim of Crime While Using the Trail within the last year***

Closing Thoughts

Official Crime Data:

- ✓ Do not contribute much to our trail models
- ✓ The effect of crime on trail use appears to be delayed
- ✓ “Trail” Crime versus “Trail Neighborhood” crime
 - o Time of Day?
- ✓ Disorder (Social & Physical) may be more relevant than reported levels of crime

Perceptions of Crime:

- ✓ Users feel the trails are safe and few fear victimization
- ✓ Few users (2%) report victimization, but users take multiple precautions to minimize risk