Effects of the Office of National Drug Control Policy's Marijuana Initiative Campaign on High-Sensation-Seeking Adolescents

Philip Palmgreen, PhD, Elizabeth P Lorch, PhD, Michael T. Stephenson, PhD, Rick H. Hoyle, PhD, and Lewis Donohew, PhD

In July 1998, the Office of National Drug Control Policy (ONDCP) launched the National Youth Anti-Drug Media Campaign, the largest national antidrug media campaign in US history. Initially designed as a 5-year, $1 billion effort to prevent and reduce drug use (especially marijuana use) among youths, the campaign, which continues to this day, has been the subject of much controversy. Considered ineffective by many at reducing marijuana use 4 years into its execution, the campaign underwent a major revamping that involved a series of so-called “hard-hitting” antimarijuana messages (termed the “Marijuana Initiative”) featuring the negative outcomes of marijuana use. These messages, which ran from October 2002 to June 2003, reached a large portion of their intended audience.

A combination of elements makes the ONDCP campaign unique in the annals of public health communication efforts. First, its high level of federal funding (approximately $180 million per year for the first 5 years) and donated dollar-for-dollar media match are unprecedented; they have resulted in high audience penetration through multiple media channels, especially television. Second, experts in substance abuse prevention, health campaigns, parenting, and public health have guided the campaign’s planning and execution.

Third, the campaign targets a specific adolescent audience: at-risk nonusers (adolescents predisposed to drug use by various factors) and occasional users, especially high-sensation seekers (i.e., youths with a strong need for novelty and stimulation), who have a high risk of using a variety of substances.

Fourth, high-sensation seekers respond well to messages that are high in sensation value (i.e., dramatic messages that elicit strong sensory, emotional, and arousal responses), so many such messages have been created. Fifth, campaign messages are aimed at a wide variety of ethnic audiences, in several languages. Finally, message concepts and finished ads are subjected to rigorous testing with high-sensation-seeking youths, and messages are placed in media channels most used by the target audiences.

The youth campaign has been directed primarily at marijuana, although other substances have occasionally been targeted. In the first year, it used a variety of old ads. In the second year, new ads specifically designed for the campaign became available. In years 2 through 5, the campaign focused primarily on 2 youth message “platforms,” or strategies: (1) negative consequences of drug use and (2) social norms regarding drug use and positive results of a drug-free lifestyle. Ads based on the latter platform depicted youths engaging in fun or rewarding activities not involving drug use. The platforms were run 1 at a time, normally in 1- to 3-month “flights” (an industry term for a continuous run of ads).

Despite its many elements characteristic of successful campaigns, the ONDCP campaign has been criticized as ineffective. According to benchmark surveys, adolescent marijuana use, climbing since 1991, peaked in 1997 (1 year before the campaign began) and remained essentially flat during the campaign’s first 4 years. The major evaluation of the campaign, the National Survey of Parents and Youth (NSPY), reported no evidence of positive effects on youths’ marijuana use, attitudes, perceived social norms regarding marijuana use, or resistance skills during this period. Consequently, the ONDCP director strongly criticized the campaign in early 2002 as ineffective, claiming that the campaign’s messages (most of which had concentrated on changing social norms and stressing the positive results of a drug-free lifestyle) had been “too indirect.”

THE MARIJUANA INITIATIVE

The result was a major revamping called the Marijuana Initiative (October 2002–June 2003).
EVALUATION OF THE INITIATIVE

The NSPY reported no positive impact of the Marijuana Initiative. The NSPY is based on large nationally representative samples of youths aged 9 to 18 years and their parents from multiple data waves collected over 6-month intervals beginning in late 1999. Waves 1 through 3 were cross-sectional samples, although wave 1 respondents were reinterviewed in waves 4 and 6 and respondents from waves 2 and 3 were reinterviewed in waves 5 and 7. The survey's assessment of the initiative focused on waves 6 (July–December 2002) and 7 (January–June 2003), independent samples composed of different groups of youths that encompassed the entire initiative. The survey's assessment found no significant changes in marijuana use, intentions, attitudes, beliefs, social norms, or perceived ability to refuse marijuana between waves 6 and 7 for any group of adolescents, nor were there any cross-sectional associations between these variables and self-reported exposure to the messages.

There are at least 3 major problems with this NSPY analysis. First, the survey was designed to evaluate the entire ONDCP campaign, not just a portion of it. Specifically, the 6 months of data gathering for wave 6 included the first 3 months of the initiative, whereas wave 7 coincided with the initiative's final 6 months; thus, no true pre–post comparison can be made. Second, only nonusers of marijuana were employed in the analysis, even though the ONDCP campaign has focused on at-risk nonusers and occasional users. Third, although the campaign has largely concentrated on high-sensation seekers, particularly in the Marijuana Initiative, the NSPY's analyses did not consider high-sensation seekers separately, and its decision to evaluate only nonusers should reduce the range of any risk measurement.

We examined the effectiveness of the Marijuana Initiative on high-sensation-seeking youths by using data from a 48-month time-series study involving 2 moderate-size communities. We hypothesized that the initiative would reduce or reverse upward age-related trends in current (30-day) marijuana use among high-sensation seekers.

METHODS

Study Design

We used data from a 48-month, independent-sample interrupted time-series project (one which tests trends before and after an intervention). The project was designed to investigate any differential effects of campaign message types on high- and low-sensation-seeking adolescents in 2 moderate-size communities: Fayette County (Lexington) Kentucky, and Knox County (Knoxville) Tennessee. The interrupted time-series design is one of the strongest quasi-experimental designs for inferring causal effects of an intervention. We combined the data from the 2 counties for our analysis because (1) the campaign was national in scope and the 2 markets received nearly identical versions of the campaign and (2) the communities were similar with regard to a range of relevant variables (Table 1).

Beginning April 1, 1999 (5 months prior to ONDCP's use of new platform-based ads) and ending March 31, 2003, personal interviews were conducted with independent random samples of 100 public school students from the same age cohort in each month in each county (for Fayette, n = 4795; for Knox, n = 4803). Interviews assessed television viewing and exposure to ONDCP campaign television and radio ads, responses to many of the television ads, attitudes toward and use of marijuana and other substances, and various risk and protective factors, particularly sensation seeking. The population cohort followed was initially in the late 4th through 8th grades and at completion in the late 8th through 12th grades. This allowed us to plot trends in marijuana use and other variables in the cohort as it aged over the first 4 years of the platform-based ONDCP campaign, which included the first 6 months of the Marijuana Initiative, where most of the initiative's media gross rating points were concentrated.

### TABLE 1—Demographic Characteristics of Fayette County, Ky, and Knox County, Tenn: 2000 Census

<table>
<thead>
<tr>
<th></th>
<th>Fayette</th>
<th>Knox</th>
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</thead>
<tbody>
<tr>
<td>Total population</td>
<td>269,512</td>
<td>382,032</td>
</tr>
<tr>
<td>Median age, y</td>
<td>23</td>
<td>36</td>
</tr>
<tr>
<td>Aged ≤ 25 y, %</td>
<td>35.9</td>
<td>33.9</td>
</tr>
<tr>
<td>Racial composition, %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>81.0</td>
<td>88.1</td>
</tr>
<tr>
<td>Black</td>
<td>13.5</td>
<td>8.6</td>
</tr>
<tr>
<td>Other</td>
<td>5.5</td>
<td>3.3</td>
</tr>
<tr>
<td>Aged ≥ 25 y, %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school graduates</td>
<td>85.8</td>
<td>82.5</td>
</tr>
<tr>
<td>Some college degree</td>
<td>35.6</td>
<td>29.0</td>
</tr>
<tr>
<td>Below poverty level, %</td>
<td>12.9</td>
<td>12.6</td>
</tr>
<tr>
<td>Median household income, $</td>
<td>39,813</td>
<td>37,457</td>
</tr>
<tr>
<td>Median home price, $</td>
<td>110,800</td>
<td>98,500</td>
</tr>
</tbody>
</table>
The start of the initiative was treated as an "interruption" in the time series. Study funding did not allow data gathering during the final 3 months of the initiative and afterward. Nonetheless, the time-series analyses were sensitive to any shifts in trends in marijuana use (or other variables) that might have been associated with the first 6 months of the initiative. Continuous analyses of the content of the major newspaper in each community and regular contacts with the local school systems indicated no new drug-related programs or events that coincided with the initiative. In addition, the NSPY found little evidence that antidrug messages from other sources increased during the campaign, although it noted some declines.25

Samples
Systematic random sampling with geographic and grade stratification was used in each county to draw 48 monthly pools of potential respondents from enrollment lists of 4th through 8th graders (aged 9 to 13 years) in public schools in spring 1999. Each pool was assigned randomly to 1 of the 48 study months. One hundred respondents (independent samples) in each community were recruited monthly by telephone from the appropriate pool. The participants were aged 13 to 17 years at the beginning of the Marijuana Initiative.

Recruiters asked parents or guardians if a child in their household was in the appropriate grade range. If so, the recruiter described the interview and sought permission, first from the parent or guardian and then from the student, to interview the student; most were interviewed in the home. Because sampling pools were selected prior to the start of interviewing, middle and high school dropouts were not excluded (nor were absentees, because interviews were not administered at school). Written parental consent and student assent were obtained. Interviews were private and anonymous, with self-administration of most, including all sensitive, items via laptop computer, thus increasing the validity of self-report.20-23

Response rates were similar for both counties. The combined sample minimum response rate (50.0%) was obtained by dividing the number of completions by the number of students known (by telephone screening) or estimated (by standard formulas) to be eligible by age. Excluding the estimated eligible students yielded a 63.8% response rate for known eligible students. A third response rate (87.0%) assessed the impact of child refusals by dividing the number of completions by this total plus the number of child refusals.

The Fayette and Knox student samples were similar according to demographic variables (except for a small difference in ethnicity) and sensation seeking, but the Fayette sample had significantly higher means on other drug risk factors (deviant behavior, perceived peer and family marijuana use) and significantly lower means on protective factors (school attachment, grades, religiosity, and family attachment; Table 2). Fayette students also displayed significantly higher levels of use of marijuana, alcohol, tobacco, inhalants, and ecstasy, whereas they did not differ from the Knox students on use of cocaine, methamphetamine, or hallucinogens. Effect sizes for all differences were very small to small according to Cohen’s criteria,24 further supporting our decision to combine the 2 samples for the analysis. Marijuana use in the combined sample was consistent with national norms at the time of the Marijuana Initiative.26,27

<table>
<thead>
<tr>
<th>TABLE 2—Comparison of Respondents Interviewed in Fayette County, Ky, and Knox County, Tenn: April 1999—March 2003</th>
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<tbody>
<tr>
<td>Demographics</td>
</tr>
<tr>
<td>Age, y</td>
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<tr>
<td>Gender&lt;sup&gt;5&lt;/sup&gt;</td>
</tr>
<tr>
<td>Ethnicity&lt;sup&gt;5&lt;/sup&gt;</td>
</tr>
<tr>
<td>Risk factors</td>
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<tr>
<td>Sensation seeking&lt;sup&gt;5&lt;/sup&gt;</td>
</tr>
<tr>
<td>Deviant behavior&lt;sup&gt;5&lt;/sup&gt;</td>
</tr>
<tr>
<td>Perceived peer marijuana use</td>
</tr>
<tr>
<td>Perceived family marijuana use</td>
</tr>
<tr>
<td>Protective factors</td>
</tr>
<tr>
<td>School attachment&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>Grades&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>Religiosity&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>Family attachment&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>Substance use</td>
</tr>
<tr>
<td>Marijuana (30-day use)</td>
</tr>
<tr>
<td>Alcohol (30-day use)</td>
</tr>
<tr>
<td>Tobacco (30-day use)</td>
</tr>
<tr>
<td>Inhalants (30-day use)</td>
</tr>
<tr>
<td>Cocaine (ever used)</td>
</tr>
<tr>
<td>Methamphetamine (ever used)</td>
</tr>
<tr>
<td>Ecstasy (ever used)</td>
</tr>
<tr>
<td>Hallucinogens (ever used)</td>
</tr>
</tbody>
</table>

<sup>1</sup>Sample sizes for each variable ranged from 4759 to 4795, except for inhalant use, where n = 4473.
<sup>2</sup>Sample sizes for each variable ranged from 4765 to 4804, except for inhalant use, where n = 4549.
<sup>3</sup>By 2-tailed t test.
<sup>4</sup>Cohen’s d. According to Cohen,24 small effect size (ES) = 0.20, medium ES = 0.50, and large ES = 0.80.
<sup>5</sup>Sample sizes for each variable ranged from 4765 to 4804, except for inhalant use, where n = 4549.
<sup>6</sup>Sample sizes for each variable ranged from 4759 to 4795, except for inhalant use, where n = 4473.
<sup>7</sup>Sample sizes for each variable ranged from 4765 to 4804, except for inhalant use, where n = 4549.
<sup>8</sup>By 2-tailed t test.
<sup>9</sup>Cohen’s d. According to Cohen,24 small effect size (ES) = 0.20, medium ES = 0.50, and large ES = 0.80.
<sup>10</sup>Sample sizes for each variable ranged from 4765 to 4804, except for inhalant use, where n = 4549.
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<sup>15</sup>By 2-tailed t test.
<sup>16</sup>Cohen’s d. According to Cohen,24 small effect size (ES) = 0.20, medium ES = 0.50, and large ES = 0.80.
<sup>17</sup>Sample sizes for each variable ranged from 4765 to 4804, except for inhalant use, where n = 4549.
<sup>18</sup>By 2-tailed t test.
<sup>19</sup>Cohen’s d. According to Cohen,24 small effect size (ES) = 0.20, medium ES = 0.50, and large ES = 0.80.
<sup>20</sup>Sample sizes for each variable ranged from 4765 to 4804, except for inhalant use, where n = 4549.
<sup>21</sup>By 2-tailed t test.
<sup>22</sup>Cohen’s d. According to Cohen,24 small effect size (ES) = 0.20, medium ES = 0.50, and large ES = 0.80.
<sup>23</sup>Sample sizes for each variable ranged from 4765 to 4804, except for inhalant use, where n = 4549.
<sup>24</sup>By 2-tailed t test.
<sup>25</sup>Cohen’s d. According to Cohen,24 small effect size (ES) = 0.20, medium ES = 0.50, and large ES = 0.80.
<sup>26</sup>Sample sizes for each variable ranged from 4765 to 4804, except for inhalant use, where n = 4549.
<sup>27</sup>By 2-tailed t test.
<sup>28</sup>Cohen’s d. According to Cohen,24 small effect size (ES) = 0.20, medium ES = 0.50, and large ES = 0.80.
<sup>29</sup>Sample sizes for each variable ranged from 4765 to 4804, except for inhalant use, where n = 4549.
<sup>30</sup>By 2-tailed t test.
<sup>31</sup>Cohen’s d. According to Cohen,24 small effect size (ES) = 0.20, medium ES = 0.50, and large ES = 0.80.
Measures

Sensation seeking was measured using the Brief Sensation Seeking Scale, where $\alpha=.74$.25 The primary dependent variable was current (30-day) marijuana use in each monthly sample. Thirty-day use of alcohol and tobacco were measured as "control constructs." Use of several other substances (Table 2) also was measured.

Attitude toward marijuana use was assessed using a 5-item scale ($\alpha=.86$). A 2-item marijuana beliefs scale employed the 2 negative consequences ("Makes you do stupid things" and "Hunts people's coordination") that featured consistently in the initiative's messages ($\alpha=.73$). Risk and protective factors (Table 2) were measured with multi-item scales (except the single-item perceived peer and family marijuana use measures) with good reliability. Social norms were assessed by a 6-item scale that measured perceptions of use of marijuana by peers, social acceptance of marijuana, and friends' approval of marijuana ($\alpha=.78$). Self-reported exposure to television and radio antimarijuana ads over the past month was measured via single-item frequency scales.

The perceived message sensation value$^{16}$ of 42 television antimarijuana ads produced by the ONDCP campaign, which represented most such ads shown during the study, was measured. The ads were displayed audiovisually on a laptop computer, with approximately 1000 respondents rating each ad. The sensation value of each ad was measured using a 5-item scale ($\alpha=.81$) based on a longer previously validated scale.$^{12}$ Higher scores on this scale have been associated with greater message effectiveness for high-sensation seekers.$^{12,20,27}$

RESULTS

Full-sample Brief Sensation Seeking Scale medians (with age, gender, and race/ethnicity controlled to reduce possible item bias and because these variables generally are correlated with sensation seeking) were used to divide the sample into high-sensation seekers and low-sensation seekers. We analyzed the aggregate monthly data points separately for high- and low-sensation seekers by employing a regression-based interrupted time-series procedure amenable to series with fewer than 50 observations.$^{28}$

Marijuana Use, Attitudes, and Beliefs

The interrupted time-series regression plots of 30-day marijuana use for high- and low-sensation seekers for the 42 months before and the 6 months following the start of the Marijuana Initiative are shown in Figure 1. The strong linear upward developmental trend for high-sensation seekers before the initiative was followed by a sharp downturn in use ($P<.001$ for slope change) at the initiative's onset, which continued over the last 6 months of data gathering (adjusted $R^2=.718$). First-order autocorrelation was low ($p=-.018$). This downturn was statistically significant in separate county analyses as well. Other interrupted time-series analyses for the combined sample also indicated statistically significant reductions in mediating variables such as positive marijuana attitudes ($P<.002$) and beliefs ($P<.04$) over the same period. Before the initiative, low-sensation seekers (not specifically targeted by the campaign) displayed much weaker upward developmental trends in marijuana use, attitudes, and beliefs; this trend was not altered by the initiative. The great majority of low-sensation seekers were nonusers of marijuana (30-day use) even at the end of data gathering.

Control Substances

Two control substances considered precursors to marijuana use—tobacco and alcohol—also showed strong upward trends in 30-day use before the initiative among high-sensation seekers ($P<.001$ for the linear trend for each substance). As expected, these trends were not affected by the Marijuana Initiative and thus cannot explain the downturn in marijuana use (for tobacco, $P<.33$; for alcohol, $P<.46$). The much weaker 30-day tobacco and alcohol upward trends among low-sensation seekers also were not affected.

Marijuana Social Norms

Both high- and low-sensation seekers displayed linear upward developmental trends ($P<.001$) on the 6-item scale assessing social norms. As expected, interrupted time-series analyses showed that these trends were not interrupted by the initiative.

Gross Rating Points, Message Exposure, and Marijuana Use

The Marijuana Initiative was bolstered in months 2 through 6 by a sharp upturn in both radio and—in particular—television gross rating points. These were accompanied by statistically significant upturns (interrupted time-series analyses) in monthly aggregate reported exposure by both high- and low-sensation seekers to television ($P<.001$) and radio ($P<.001$) ads soon after the start of the initiative. This raises the question whether the sharp reductions in current marijuana use by high-sensation seekers were simply a function of higher exposure to campaign ads rather than the content and style of the ads. An aggregate level (monthly) multiple regression analysis ($n=48$) was conducted for high-sensation seekers with 30-day mean marijuana use as the dependent variable, television mean ad exposure and radio mean ad exposure as independent variables, and television rating points, radio rating points, and month of interview as control variables. This analysis showed no significant effects on use of any exposure or rating point variable, indicating that aggregate monthly levels of exposure to campaign ads had no association with monthly levels of marijuana use by high-sensation seekers.

Although sensation value data for the initiative's ads were available only for the 4 television ads shown during the Marijuana Initiative's first 3 months, 1 of these ads had the highest sensation value among high-sensation seekers of all 42 ads tested; another was ranked seventh, and a third was well above the median. The 4 television ads run during the next 3 months also clearly had high sensation values. The initiative ads thus were truly "hard-hitting" in that they elicited strong sensory, emotional, and arousal responses. This finding, combined with the exposure analysis, indicates that the dramatic negative-consequence nature of the Marijuana Initiative ads was principally responsible for their various positive effects (although these effects may have been bolstered by the increased audience penetration achieved by the initiative).
Interrupted time-series analyses support the conclusion that in 2 southeastern cities, the first 6 (and most important) months of the ONDCP Marijuana Initiative had dramatic effects on the marijuana use, attitudes, and beliefs of a primary target audience—high-sensation-seeking adolescents. Because of the nature of the design and the interrupted time-series analyses, a key strength of this study is that the effects observed are not based on self-reported message exposure but are most plausibly a function of the campaign messages actually presented via various channels (especially television) at a given time. Additional data suggest that these effects were partly caused by the strong dramatic nature of the initiative’s negative-consequence messages. The extended length, number of messages, and high audience penetration of the initiative undoubtedly also played key roles.

The effects apparently were not caused, however, by (1) high levels of message exposure alone, (2) trends in the use of gateway substances like tobacco and alcohol, or (3) mediating variables like social norms, which were not addressed by the initiative. In addition, the effects did not carry over to low-sensation seekers, who because of their much lower use of marijuana, have not been a major target of the ONDCP campaign in general and certainly were not a target of the Marijuana Initiative, with its more graphic and stimulating messages more suited to high-sensation seekers.

Because this study is based on 2 moderate-size communities with primarily White youth populations, caution must be employed in attempts to generalize to the national impact of the Marijuana Initiative. However, the initiative in these 2 cities was implemented in essentially the same manner as in most US markets. In addition, although the 2 major national drug use surveys, Monitoring the Future and the National Survey on Drug Use and Health, do not measure sensation seeking, both did find evidence of a decline in marijuana use by adolescents from 2002 to 2003 (the period during which the initiative took place).  

Monitoring the Future found statistically significant declines in annual use among 8th graders. The National Survey on Drug Use and Health detected a statistically significant 2002–2003 decline in 30-day marijuana use by adolescents aged 12 to 13 years. More significantly, it found a 21.2% drop across this same period in the number of 12- to 17-year-olds reporting daily or almost daily use of marijuana and a corresponding 20.1% decline in the number of adolescents in this
age bracket reporting marijuana use on 20 or more days in the past month. Because heavy substance use is much more prevalent among high-sensation seekers than low-sensation seekers, it is plausible that these large declines were mostly among high-sensation-seeking youths.

This study provides additional support for the approach to drug abuse prevention termed SENTAR (for “sensation-seeking targeting”), which has received considerable empirical support. To prevent risky behaviors, this approach targets high-sensation seekers with messages containing high-sensation value. It was only when the ONDCP campaign introduced a sustained, high-saturation flight of such messages, which stressed the negative consequences of use, that this study witnessed an immediate and sharp downturn in current use of marijuana in a cohort of high-sensation-seeking youths in 2 communities.

We report on the effects of the Marijuana Initiative, not those of the entire ONDCP youth campaign. It is tempting, however, to interpret the upward developmental trend in marijuana use by high-sensation seekers during the 42 months prior to the initiative (Figure 1) as evidence that the earlier portion of the campaign was ineffective. Such an interpretation, however, fails to consider the possibility that, without the ONDCP campaign, the slope of this trend could have been significantly steeper. The lack of a comparison region for this national campaign makes it impossible to tell. The evidence is accumulating, however, that substance use prevention messages can be employed more effectively in media campaigns within the framework of a sensation-seeking approach to message design and audience targeting.

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This article was accepted March 3, 2006.

Contributors
P. Palmgreen was principal supervisor of the data analysis and led the writing of the article. E. P. Lorch assisted with the writing. M. T. Stephenson supervised portions of the data analysis and assisted with the writing, and R. H. Hoyle and L. Donohew reviewed the article and suggested revisions. All authors contributed to the design, planning, and execution of the study and helped to conceptualize ideas, interpret findings, and edit drafts.

Acknowledgments
This research was supported by the National Institute on Drug Abuse (grant R01 DA12371-07). We thank Ronald Langley, director, University of Kentucky Survey Research Center, and Linda Daugherty, project director, University of Tennessee Social Science Research Institute, for their professionalism and diligence in directing the personal interviews. Thanks are also due to Michael Lewis-Reck for his advice on the time-series analyses and to research assistant Stephanie Mullins-Sweat for her contributions to the data analysis.

Human Participant Protection
This study was approved by the institutional review board of the University of Kentucky.

References