Experimental evaluation of anti-tobacco PSAs

Andrew Strasser, Joseph Cappella, Christopher Jepson, Robert Hornik, Martin Fishbein, Caryn Lerman

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Improving Anti-Tobacco Public Service Announcements

• Mass media anti-smoking campaigns have had some promising results, but outcomes have been inconsistent

• Self-report data on message effectiveness have limitations

• Experimental research studies can be used for PSA design and evaluation
Broad Objective

To conduct experimental research on features of anti-tobacco PSAs that influence persuasiveness, and translate this research to the development of more effective media campaigns.

Specific Objective

To test the main and interacting effects of PSA message sensation value (MSV) and argument strength (AS) on physiological responses, persuasion, and behavior change.
Phase I: PSA Rating and Selection

1. Categorizing Topics
2. Evaluating Message Sensation Value
3. Evaluating Arguments
1. PSA Categorization

• 569 smoking-related PSAs were categorized.

• Exclusion Criteria included:
  Target – Children
  Target – Adolescents
  PSAs other than 30-second duration
  non-English speaking
  second hand smoke-focus
Reliability of Categorization

2 Annenberg and 2 TTURC raters categorized the PSAs:

- TTURC raters were >90% in agreement with Annenberg ratings

- TTURC raters were >95% in agreement with each other

- Overall Kappa = 0.89, p<.001
Target Audience (adults)

Promote Tx-Seeking: 42
Neg. Conseq. (any): 59
Knowledge about smoking: 15
2. Evaluating Message Sensation Value

PSAs differ in format, content and audiovisual features. **Message Sensation Value (MSV)** is a measure of these attributes.

**Perceived Message Sensation Value (PMSV)** is the subjective report of the MSV features.

MSV is coded for visual, audio and content dimensions.

<table>
<thead>
<tr>
<th>Category</th>
<th>Item</th>
<th>Scoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual</td>
<td>Length</td>
<td>Time (seconds)</td>
</tr>
<tr>
<td></td>
<td>Animation</td>
<td>0/1</td>
</tr>
<tr>
<td></td>
<td>Cuts</td>
<td>0=1-6; 1=7-14; 2=15+</td>
</tr>
<tr>
<td></td>
<td>Edits</td>
<td>0=1-6; 1=7-14; 2=15+</td>
</tr>
<tr>
<td></td>
<td>Faces</td>
<td>count</td>
</tr>
<tr>
<td></td>
<td>Special Visual Effect</td>
<td>0/1</td>
</tr>
<tr>
<td></td>
<td>Slow Motion</td>
<td>0/1</td>
</tr>
<tr>
<td></td>
<td>Fast Motion</td>
<td>0/1</td>
</tr>
<tr>
<td></td>
<td>Unusual Colors</td>
<td>0/1</td>
</tr>
<tr>
<td></td>
<td>Intense Moments</td>
<td>0/1</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Category</th>
<th>Item</th>
<th>Scoring</th>
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</thead>
<tbody>
<tr>
<td>Audio</td>
<td>Sound Saturation</td>
<td>0/1</td>
</tr>
<tr>
<td></td>
<td>Music</td>
<td>0/1</td>
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<tr>
<td></td>
<td>Sound Effects</td>
<td>0/1</td>
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<tr>
<td></td>
<td>Slow Voice</td>
<td>0/1</td>
</tr>
<tr>
<td></td>
<td>Fast Voice</td>
<td>0/1</td>
</tr>
<tr>
<td>Content</td>
<td>Acted out/ Talking Head</td>
<td>1 vs 0</td>
</tr>
<tr>
<td></td>
<td>Narrative</td>
<td>0/1</td>
</tr>
<tr>
<td></td>
<td>Unexpected Format</td>
<td>0/1</td>
</tr>
<tr>
<td></td>
<td>Surprise/Twist Ending</td>
<td>0/1</td>
</tr>
<tr>
<td></td>
<td>Celebrity</td>
<td>0/1</td>
</tr>
</tbody>
</table>
Reliability of MSV scores

Inter-rater reliability of MSV scoring (2 raters):
MSV scores from subset of 45 of 99 PSAs:
Kendall’s Tau = 0.906, p<0.001.

Internal Consistency (MSV, visual, audio, content dimensions)

<table>
<thead>
<tr>
<th></th>
<th>msv</th>
<th>visual</th>
<th>audio</th>
<th>content</th>
</tr>
</thead>
<tbody>
<tr>
<td>msv Pearson Correlation</td>
<td>1</td>
<td>.961**</td>
<td>.523**</td>
<td>.139</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>1</td>
<td>.000</td>
<td>.171</td>
</tr>
<tr>
<td>N</td>
<td>99</td>
<td>99</td>
<td>99</td>
<td>99</td>
</tr>
<tr>
<td>visual Pearson Correlation</td>
<td>.961**</td>
<td>1</td>
<td>.353**</td>
<td>-.031</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
<td>99</td>
<td>99</td>
</tr>
<tr>
<td>N</td>
<td>99</td>
<td>99</td>
<td>99</td>
<td>99</td>
</tr>
<tr>
<td>audio Pearson Correlation</td>
<td>.523**</td>
<td>.353**</td>
<td>1</td>
<td>-.118</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
<td>99</td>
<td>99</td>
</tr>
<tr>
<td>N</td>
<td>99</td>
<td>99</td>
<td>99</td>
<td>99</td>
</tr>
<tr>
<td>content Pearson Correlation</td>
<td>.139</td>
<td>-.031</td>
<td>-.118</td>
<td>1</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.171</td>
<td>.762</td>
<td>.244</td>
<td>99</td>
</tr>
<tr>
<td>N</td>
<td>99</td>
<td>99</td>
<td>99</td>
<td>99</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed).
3. Evaluating Arguments

Step 1: Argument Extraction
Arguments were extracted in a 2-step process.

1) 2 raters viewed the PSAs and typed explicit and implicit messages from each PSA.
2) 2 new raters viewed PSAs and read previous arguments to form one statement reflecting argument of PSA.

Step 2: Argument Evaluation
Shopping mall-intercept study of 300 participants (149 female) who were each presented 12 PSA arguments such that each argument was presented a minimum of 36 times (36-38 times) during the study.

All participants were current smokers (mean 17.5, sd = 11.7) who had smoked at least 100 cigarettes during their lifetime.
After each statement, participant was asked if the statement (rated 1 strongly disagree to 5 strongly agree):

- Is a reason for quitting smoking that is BELIEVABLE
- Is a reason for quitting smoking that is CONVINCING
- Is a reason for quitting smoking that is NEW to me
- Is a reason for quitting smoking that APPLIES to me
- Gives a reason for quitting smoking that is IMPORTANT TO ME
- Put THOUGHTS in my mind about quitting smoking
- Put THOUGHTS in my mind about wanting to continue smoking
- Helped me feel CONFIDENT about quitting smoking
- Would help my friends quit smoking
- Made me want to quit smoking
- Overall, how much do you agree or disagree with the statement

Is the reason given for quitting smoking a strong or weak reason

* Argument Evaluation Survey adapted from Zhao, Cappella et al (NIDA study)
Descriptive Data on Argument Evaluation

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>99</td>
</tr>
<tr>
<td>Mean</td>
<td>29.68</td>
</tr>
<tr>
<td>SD</td>
<td>2.23</td>
</tr>
<tr>
<td>Minimum</td>
<td>20.85</td>
</tr>
<tr>
<td>Maximum</td>
<td>33.03</td>
</tr>
</tbody>
</table>
## Association of Argument Evaluation with Intention Items (N=300)

<table>
<thead>
<tr>
<th>Pearson Correlation P-value</th>
<th>Arg. Eval.</th>
<th>NFC</th>
<th>Perc. Vul.</th>
<th>Try to quit</th>
<th>Will Quit</th>
<th>Interest in Quit</th>
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<tbody>
<tr>
<td>Argument Evaluation Total</td>
<td></td>
<td>.061 .294</td>
<td>.510 * .000</td>
<td>.424 * .000</td>
<td>.350 * .000</td>
<td>.524 * .000</td>
</tr>
<tr>
<td>Need For Cognition</td>
<td>.061 .294</td>
<td></td>
<td>.193 * .001</td>
<td>.135* .019</td>
<td>.056 .337</td>
<td>.172* .003</td>
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<tr>
<td>Perceived Vulnerability</td>
<td>.510 * .000</td>
<td>.193 * .001</td>
<td></td>
<td>.229 * .000</td>
<td>.182* .002</td>
<td>.476* .000</td>
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<tr>
<td>Try to quit</td>
<td>.424 * .000</td>
<td>.135* .019</td>
<td>.229 * .000</td>
<td></td>
<td>.767* .000</td>
<td>.662* .000</td>
</tr>
<tr>
<td>Will quit</td>
<td>.350 * .000</td>
<td>.056 .337</td>
<td>.182* .002</td>
<td>.767* .000</td>
<td></td>
<td>.604* .000</td>
</tr>
<tr>
<td>Interest in quit</td>
<td>.524 * .000</td>
<td>.172* .003</td>
<td>.476* .000</td>
<td>.662* .000</td>
<td>.604* .000</td>
<td></td>
</tr>
</tbody>
</table>

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Study Design and Procedures

Baseline Questionnaire

View PSAs (as a set of 4)
- Psychophysiology assessment

Outcome Measures
- Beliefs, attitudes, intentions, etc

View PSAs (individually)
- Processing, effectiveness

Recall Measures

Calling TTURC Quit Line

Argument Strength

<table>
<thead>
<tr>
<th>MSV</th>
<th>Weak</th>
<th>Strong</th>
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</thead>
<tbody>
<tr>
<td>Low</td>
<td>N=50</td>
<td>N=50</td>
</tr>
<tr>
<td>High</td>
<td>N=50</td>
<td>N=50</td>
</tr>
</tbody>
</table>

4 PSAs/condition

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Conceptual Model

Activation Theory

Integrated Model

MSV

ARG

PSA

• Arousal
• Process
• Recall

Beliefs

Attitude

Norms

Efficacy

Intention

Activation Theory

Integrated Model
### Descriptive Statistics by PSA Condition

<table>
<thead>
<tr>
<th></th>
<th>N=200</th>
<th>High MSV</th>
<th></th>
<th>Low MSV</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>High Arg</td>
<td>Low Arg</td>
<td>High Arg</td>
<td>Low Arg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(N=49)</td>
<td>(N=48)</td>
<td>(N=50)</td>
<td>(N=53)</td>
</tr>
<tr>
<td>Age</td>
<td>46.4 (12.2)</td>
<td>42.4 (11.7)</td>
<td>44.2 (13.9)</td>
<td>41.3 (11.5)</td>
<td></td>
</tr>
<tr>
<td>Sex (% male)</td>
<td>47.5</td>
<td>44.6</td>
<td>40.8</td>
<td>50.1</td>
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<tr>
<td>Race (% White)</td>
<td>65.0</td>
<td>60.0</td>
<td>57.0</td>
<td>60.3</td>
<td></td>
</tr>
<tr>
<td>Education (%HS)</td>
<td>62.3</td>
<td>58.3</td>
<td>57.1</td>
<td>58.0</td>
<td></td>
</tr>
<tr>
<td>Cigs per day</td>
<td>21.7 (8.8)</td>
<td>20.4 (9.4)</td>
<td>23.3 (14.1)</td>
<td>18.6 (8.2)</td>
<td></td>
</tr>
<tr>
<td>FTND</td>
<td>5.2 (2.2)</td>
<td>5.4 (2.3)</td>
<td>5.5 (2.2)</td>
<td>5.3 (2.5)</td>
<td></td>
</tr>
<tr>
<td>Sensation Seeking</td>
<td>20.8 (4.3)</td>
<td>20.4 (4.4)</td>
<td>21.2 (3.9)</td>
<td>20.4 (4.8)</td>
<td></td>
</tr>
</tbody>
</table>
Conceptual Model

Activation Theory

Integrated Model

MSV

ARG

PSA

• Physio.
• Process
• Recall

Beliefs

Attitude

Norms

Efficacy

Intention

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Zygomatic and Corrugator
Physiological Measures -- Corrugator (mV)

AS: ns
MSV: p=.012
Physiological Measures -- Zygomatic (mV)

Arg

High: ns
MSV: ns
Low: ns
Conceptual Model

Activation Theory

Integrated Model

MSV

ARG

PSA

• Physio.
• Process
• Recall

Beliefs

Attitude
Norms
Efficacy
Intention
“…think about the consequences of quitting smoking as shown in the PSAs”
Conceptual Model

MSV → PSA
  • Physio.
  • Process
  • Recall

Beliefs → Attitude, Norms, Efficacy

Activation Theory

Integrated Model

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Recall -- Percent Correct

AS x MSV: $p = .001$

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Conceptual Model

Activation Theory

Integrated Model

MSV

ARG

PSA

• Physio.
• Process
• Recall

Beliefs

Attitude

Norms

Intention

Efficacy
Positive Beliefs (Mean: 5 items, 5 point scale)

- High
  - MSV: ns

- Low
  - AS: ns
  - MSV: ns
Negative Beliefs (Mean: 7 items, 5 point scale)

High

Low

MSV

Arg

MSV: p=.03

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Conceptual Model

MSV

ARG

PSA

• Physio.
• Process
• Recall

Beliefs

Attitude

Norms

Intention

Efficacy

Activation Theory

Integrated Model
Efficacy (10 item; 1-4 scale)

High

Low

MSV: p=.035

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But... Thanks to Michael Hennessy, we find support for the Integrated Model when using perceived PSA parameters, rather than conditions.... Stay tuned...
This is Your Brain on PSAs....
PSA Video:
"Family Reunion"

Frame #1
00:01:32

Frame #2
00:11:56

Frame #3
00:21:02

Frame #4
00:25:77

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Recognition by MSV Level

% Correct

- Hi MSV
- Lo MSV

RT

- Hi MSV
- Lo MSV
Brain Effects of Anti-Tobacco PSAs

Low MSV PSAs are associated with greater prefrontal and temporal activation; High MSV produced occipital activation

Recognition of PSA frames is positively correlated with prefrontal and temporal, and negatively correlated with occipital activation

Langleben et al. *Neuroimage*, 2008
## Effects of Smoking Cues in Anti-Tobacco PSAs

<table>
<thead>
<tr>
<th>Argument Strength (between-subject)</th>
<th>Smoking Cue (within-subject)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Strong</td>
<td>3 PSAs</td>
<td>3 PSAs</td>
</tr>
<tr>
<td>Weak</td>
<td>3 PSAs</td>
<td>3 PSAs</td>
</tr>
</tbody>
</table>

N=82
Smoking Cues in PSAs with Weak Arguments Increase Urges

Kang et al., 2009

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Eye Tracking Smoking Cues

- Ashley Sanders Jackson, Cappella et al
- Visual attention to smoking cues in ad segment
- 84 adult smokers
- 16 PSAs

EOS = eyes on screen
P < .01
Smoking Cues in Anti-Tobacco PSAs

Model of Cue Effects on Persuasion

Manipulation Smoking Cues + urges physio. Manipulation Argument strength

Cue-Response - Message Processing
•Recall
•Ad effectiveness

Perception
•Persuasion
•Attitudes
•Self-efficacy

Intention to quit + Smoking behavior

We will also explore moderating influences on cues effects, such as nicotine dependence, motivation to quit, and gender.

3 (no cue, central cue, peripheral cue) x 2 (weak, strong argument) factorial design (n=300)...ads balanced for MSV, themes
Implications

• “Attention-grabbing” high MSV format could impede the learning and retention of PSA message

• Smoking cues in PSAs may increase urges and distract attention from PSA message, thereby reducing effectiveness (effect may depend on argument strength and whether cue is central to PSA argument)

• Further experimental support could influence PSA design and effectiveness of future anti-tobacco media campaigns
Collaborators

Andrew Strasser, Robert Hornik, Joseph Cappella, Martin Fishbein

Paul Wileyto, Christopher Jepson, Paul Sanborn

Daniel Langleben, James Loughead, Kosha Ruparel

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