Documenting Trends after Legalization: 
Prevention Opportunities, Needs, and Challenges Related to Marijuana

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Big thank you to...
> Tracy Flinn
> Julie Tieman
> Sarah Mariani
> Jeff Linkenbach

For today
Objectives
> (1) Identify marijuana-related risks/harms that could be addressed in prevention efforts.
> (2) Describe ways in which normative perceptions related to marijuana use could be impacted by factors in your community and even nationally.
> (3) Consider opportunities to promote positive community norms related to marijuana
> (4) Identify at least one possible prevention effort/program that could be utilized in your community.
“What was weed or ‘savage cabbage’ like when you were in high school?”


Archival Report

Changes in Cannabis Potency Over the Last 2 Decades (1995-2014): Analysis of Current Data in the United States

Average potency (nation) = 13.18%
Average potency (Seattle) = 21.62%
Concentrates average potency (nation) = 55.85%
Concentrates average potency (Seattle) = 71.71%


“Who is the primary consumer of marijuana?”
How long does it take for marijuana to totally affect someone?

“How long can you stay high for?”
MARIJUANA USE – onset

- When smoked...
  - Effects begin immediately
  - Last 1-3 hours
- When consumed in food or drink...
  - Effects begin 30-60 minutes
  - Last up to 4 hours

NIDA (2012)

MARIJUANA USE – effects after use

- Feel euphoric or “high” due to action in the reward system of the brain
- After euphoria passes, may feel sleepy or depressed
- Occasionally produces anxiety, fear, distrust, panic

NIDA (2012)

“What's the worst thing that can happen to you when you smoke for the first time?”
MARIJUANA USE – effects after use

- With high doses, may experience acute toxic psychosis
  - Hallucinations
  - Delusions
  - Depersonalization
- Seem more likely when high dose is consumed in food/drink rather than smoked
- Specific causes of symptoms unknown

29 = beats per minute increase in heart rate after marijuana use

“What physical effects does marijuana have on the body?”
Marijuana and cognitive abilities

- **Effects on the brain**
  - Hippocampus
    - Attention, concentration, and memory
  - Research with college students shows impact on these even 24 hours after last use (Pope & Yurgelun-Todd, 1996)
  - After daily use, takes 28 days for impact on attention, concentration, and memory to go away (Pope, et al., 2001)
  - Hanson et al. (2010):
    - Deficits in verbal learning (no longer significant at 2 weeks)
    - Deficits in verbal working memory (no longer significant at 3 weeks)
    - Deficits in attention (still present at 3 weeks)

Marijuana use trajectories: relationship to “discontinuous” enrollment

<table>
<thead>
<tr>
<th>Marijuana use</th>
<th>Stop-out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic/Heavy</td>
<td>40.5%</td>
</tr>
<tr>
<td>Intermediate</td>
<td>36.3%</td>
</tr>
<tr>
<td>Minimal</td>
<td>24.5%</td>
</tr>
</tbody>
</table>

Chronic/Heavy marijuana users were 2.0 times as likely as "minimal users" to have discontinuous enrollment, even after controlling for demographics, personality, and high school GPA.

Source: Aria, 2013
“Is it illegal to smoke and drive?”

**Impaired driving and duration of effects**

- **Effects on the brain**
  - Authors of I-502 set DUI at 5 ng THC/ml of blood for those over 21 (any positive value for those under 21)
  - Why 5 ng? Similarities in impairment to .08% for alcohol
  - How long does it take to drop below 5 ng?
  - Grotenhermen, et al., (2007) suggest it takes 3 hours for THC levels to drop to 4.9 ng THC/ml among 70 kg men
  - From a public health standpoint, Hall (2013) recommends waiting up to 5 hours after use before driving

**Driving (among those who reported using at least once in the past 30 days)**

[Image of survey results]

Washington Young Adult Health Survey, Cohort 1 (2014 data)
More pot use found in fatal crashes, data says

Marijuana use appears to have increased as a factor in fatally random lost lives in Washington.

“Drugged driving eclipses drunken driving in tests of motorists killed in crashes”

“How addictive is marijuana?”
McCoun (2013), Frontiers in Psychiatry

<table>
<thead>
<tr>
<th>Criterion</th>
<th>DSM-IV substance use disorder</th>
<th>DSM-5 Cannabis Use Disorder Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tolerance</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Withdral</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Tolerant longer than intended</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Unsuccessful efforts to quit use</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Great deal of time taken by activities involved in use</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Use despite knowledge of problems associated with use</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Important activities given up because of use</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Recurrent use resulting in a failure to fulfill important role obligations</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Recurrent use resulting in physically hazardous behavior (e.g., driving)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Continued use despite recurrent social problems associated with use</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Caring for the substance</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Mild: 2-3 symptoms
Moderate: 4-5 symptoms
Severe: 6+ symptoms

Screening

- Screening suggestions
  - Revised CUDIT (CUDIT-R)

The Cannabis Use Disorder Identification Test - Revised (CUDIT-R)

```
How many times have you used cannabis over the past six months? YES/NO

If YES, please answer the following questions about your cannabis use. Circle the response that is most correct for you and write in the box next to the correct answer.

1. How often have you used cannabis?
   - None
   - Less than monthly
   - Monthly
   - Weekly
   - More than once a week

2. How often have you used cannabis in the past month?
   - None
   - Less than monthly
   - Monthly
   - Weekly
   - More than once a week

3. How often have you used cannabis in the past week?
   - None
   - Less than monthly
   - Monthly
   - Weekly
   - More than once a week

4. How does your cannabis use make you feel?
   - None
   - Less than monthly
   - Monthly
   - Weekly
   - More than once a week

5. How often have you tried to cut down or cut out cannabis?
   - None
   - Less than monthly
   - Monthly
   - Weekly
   - More than once a week

6. How often have you been in a situation where you wanted to cut down or cut out cannabis?
   - None
   - Less than monthly
   - Monthly
   - Weekly
   - More than once a week

7. How often have you felt that you had to take time off work or school because of cannabis?
   - None
   - Less than monthly
   - Monthly
   - Weekly
   - More than once a week
```

Scoring source: Washington Recovery Helpline

This instrument was designed for self-administration and is scored by marking each of the boxes with a 'YES' or 'NO'.

- Question 1: 0 points
- Question 2: 0 points
- Question 3: 0 points
- Question 4: 0 points
- Question 5: 0 points
- Question 6: 0 points
- Question 7: 0 points

If the total score is 4 or more, you may have a problem with cannabis use. Consider seeking help from a professional.
Considering withdrawal (and management of withdrawal)

Motivations for Use

- Research team utilized qualitative open-ended responses for using marijuana among incoming first year college students to identify which motivations were most salient to this population

Lee, Neighbors, & Woods (2007)
Motivations for Use

<table>
<thead>
<tr>
<th>Motivation</th>
<th>Proportion of Respondents</th>
<th>Proportion of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relaxation (to relax, hang out)</td>
<td>52.14%</td>
<td>24.00%</td>
</tr>
<tr>
<td>Coping (depressed, relieve stress)</td>
<td>42.91%</td>
<td>10.64%</td>
</tr>
<tr>
<td>Anxious reduction</td>
<td>38.71%</td>
<td>1.80%</td>
</tr>
<tr>
<td>Medical use (physical pain, headache)</td>
<td>26.93%</td>
<td>1.20%</td>
</tr>
<tr>
<td>Habit</td>
<td>15.74%</td>
<td>1.10%</td>
</tr>
</tbody>
</table>

Withdrawal: Cannabis

For today

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Social norms: Perception versus reality

- People are influenced by their subjective interpretation of a situation rather than by the actual situation (Lewin, 1943).
- We are influenced by our perception of others’ attitudes, behaviors, and expectations rather than by their actual attitudes, behaviors, or expectations.
- Our perceptions and interpretations are often inaccurate.

Source: Neighbors & Kilmer (2008)

NORM PERCEPTION

- In survey of 5990 participants, 67.4% of students said they hadn’t used MJ in the past year
  - Thus, “most” students don’t use marijuana
- Only 2% of students got this right!
  - 98% of students perceived the typical student to use at least once per year
- Misperceptions were related to use and consequences

Kilmer, et al. (2006)

What are some of the things that contribute to norms related to marijuana in Washington?
“It’s just weed...”
or
“It’s not addictive...”

From a state legislator:

“Low dependence rates:

A study by researchers at the National Institute on Drug Abuse (Anthony, Warner, & Kessler 1994) found that among people who had ever used marijuana, 9% had experienced marijuana dependence at some point in their life.”

DSM-I: 1952
DSM-II: 1968
DSM-III: 1980
DSM-III-R: 1987
DSM-IV: 1994
DSM-IV-TR: 2000
DSM-V: 2013

Comparative Epidemiology of Dependence on Tobacco, Alcohol, Controlled Substances, and Inhalants: Basic Findings From the National Comorbidity Survey

James C. Anthony, Lynn A. Warner, and Ronald C. Kessler

The aim of this article is to report basic descriptive findings from new research on the epidemiology of drug dependence syndromes, conducted as part of the National Comorbidity Survey (NCS), a project funded by the National Institute on Alcohol Abuse and Alcoholism and the National Institute on Drug Abuse.

“News” articles, particularly alongside pro-health messages
Emergence of more visible “open-air drug market”

On 4/21/15 from Seattle Times:

“City officials and business leaders say they are embarking on an ambitious effort to shut down open-air drug dealing and associated crime in Seattle’s downtown core with its new “9½ Block Strategy.””

Seattle tackles drug dealing, disorder in downtown core

“Seattle residents and visitors should not be forced to navigate a dangerous open-air drug market between the downtown retail core and Pike Place Market,” Murray said.

From Seattle Times, April 21, 2015
100 drug arrests kick off new push against downtown crime

The arrests, dubbed “Operation Crosstown Traffic,” involved undercover officers who made 177 purchases of heroin, meth, marijuana, crack cocaine and other drugs from 186 street dealers.

Impact of advertisements and billboards needs to be assessed

Media

Potential role of media

- Impact of media exposure related to alcohol (including television, advertisements, and movie content)
  - In a review of 13 studies, 12 of the 13 showed media exposure was associated with increased likelihood of:
    - Initiating drinking among abstainers
    - Increased consumption among those already drinking


And now, ads for marijuana
Decisions/messaging by parents
Launched February 2017

GOT IT FROM PARENTS WITH THEIR PERMISSION

Data Source: DMHA/UW Washington Young Adult Health Survey 2016 data report

GOT IT FROM FAMILY

Data Source: DMHA/UW Washington Young Adult Health Survey 2016 data report
Jokes, or people laughing it off
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Young Adult Health Survey
Method and Procedures

• UW Center for the Study of Health and Risk Behaviors (CSHRB) partnered with DBHR to conduct internet survey
• Survey developed using existing validated measures when possible, with input from multiple experts, stakeholder groups, and state offices
• Cohorts:
  • 2014, Cohort 1: Internet based survey conducted May through early July 2014 (N=2101)
  • 2015, Cohort 2, Year 1 AND Cohort 1, Year 2: Internet based survey conducted late May through October 2015 (N=1677 new participants, N = 1203 cohort 1 one-year follow up)
  • 2016, Cohort 3, Year 1 AND Cohort 1, Year 3 AND Cohort 2, Year 2: Internet based survey conducted late June through November 2016 (N=2493 new participants, N = 1005 cohort 1 two-year follow up, N=1180 cohort 2 one-year follow-up)

• Participants recruited using a combination of direct mail advertising to a random sample from DOL, as well as online advertising (Facebook, Craigslist, Amazon Mechanical Turk, study website, Facebook fan page)
• Assessed demographics on an ongoing basis and modified strategies to recruit under-represented groups
• Convenience sample, not a random sample
• To improve generalizability, used state census data to conduct post-stratification weighting to more accurately reflect demographic/geographic diversity of WA
• Weighted results closely mirror the unweighted results

Weighted Analyses of DBHR Young Adult Health Survey
Main Findings
Cohort 1, Year 1 (2014) vs. Cohort 2, Year 1 (2015) vs. Cohort 3, Year 1 (2016)
**Personal marijuana use**
(assessed separately from medical use)

Any Personal Marijuana, past year

<table>
<thead>
<tr>
<th>Cohort</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>43.51%</td>
</tr>
<tr>
<td>2015</td>
<td>46.29%</td>
</tr>
<tr>
<td>2016</td>
<td>44.76%</td>
</tr>
</tbody>
</table>

No significant overall trend, nor differences across cohorts
No significant differences in frequency of use

Data Source: DBHR/UW Washington Young Adult Health Survey 2016 data report

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**Personal marijuana use**
(assessed separately from medical use)

Perception remains that the typical person uses:

<table>
<thead>
<tr>
<th>Percentage of cohort who perceive typical person to use 1x/year or more:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cohort 1 (2014): 97.59%</td>
</tr>
<tr>
<td>Cohort 2 (2015): 97.58%</td>
</tr>
<tr>
<td>Cohort 3 (2016): 98.39%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Percentage of cohort who perceive typical person to use 1x/week or more:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cohort 1 (2014): 52.84%</td>
</tr>
<tr>
<td>Cohort 2 (2015): 47.24%</td>
</tr>
<tr>
<td>Cohort 3 (2016): 54.37%</td>
</tr>
</tbody>
</table>

Data Source: DBHR/UW Washington Young Adult Health Survey 2016 data report

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**Opportunity:**
MOST people are not using
Perceived physical risk due to regular marijuana use by cohort

There were statistically significant differences for a linear trend across time/cohort (p=.012), between cohort 1 and cohort 2 (p=.029), and between cohort 1 and cohort 3 (p=.010).

Perceived psychological risk of regular marijuana use by cohort

There were statistically significant differences for a linear trend across time/cohort (p=.002), between cohort 1 and cohort 2 (p=.018), and between cohort 1 and cohort 3 (p=.002).

Opportunity:
There ARE risks (more on this later)
DRIVING AFTER MARIJUANA USE

DRIVING WITHIN 3 HOURS OF MARIJUANA USE, PAST 30 DAYS

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0 times</td>
<td>50.59%</td>
<td>55.29%</td>
<td>58.19%</td>
</tr>
<tr>
<td>1 time</td>
<td>14.13%</td>
<td>13.13%</td>
<td>12.50%</td>
</tr>
<tr>
<td>2-3 times</td>
<td>13.28%</td>
<td>12.34%</td>
<td>11.97%</td>
</tr>
<tr>
<td>4-5 times</td>
<td>6.43%</td>
<td>4.35%</td>
<td>3.48%</td>
</tr>
<tr>
<td>6 or more</td>
<td>15.57%</td>
<td>14.88%</td>
<td>13.85%</td>
</tr>
</tbody>
</table>

There was a statistically significant difference over time/cohort (p=.029).
No significant difference between cohort 1 and cohort 2 (p=.226).
Significant difference between cohort 1 and cohort 3 (p=.028).

Opportunity:
MOST are not driving under the influence

Weighted Analyses of DBHR Young Adult Health Survey
Cohort 1 change from Year 1 (2014) to Year 3 (2016)

Select findings that demonstrate potential shifts within cohort over time
Odds Ratios: Predicting Year 3 Marijuana Use by 5 Factors at Time 1

### ANY MARIJUANA USE, YEAR 3

<table>
<thead>
<tr>
<th>Predictor</th>
<th>OR</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical risk of regular marijuana</td>
<td>0.71</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Psychological risk of regular marijuana</td>
<td>0.59</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Perceived ease of access</td>
<td>0.65</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Descriptive norms for marijuana</td>
<td>1.08</td>
<td>0.047</td>
</tr>
</tbody>
</table>

All models adjusted for age, sex, and baseline level of the outcome.

### AT LEAST WEEKLY MARIJUANA USE, YEAR 3

<table>
<thead>
<tr>
<th>Predictor</th>
<th>OR</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical risk of regular marijuana</td>
<td>0.58</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Psychological risk of regular marijuana</td>
<td>0.45</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Perceived ease of access</td>
<td>0.54</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Injunctive norms for regular marijuana</td>
<td>0.51</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Descriptive norms for marijuana</td>
<td>1.12</td>
<td>0.022</td>
</tr>
</tbody>
</table>

All models adjusted for age, sex, and baseline level of the outcome.

### NUMBER OF MARIJUANA-RELATED CONSEQUENCES, YEAR 3

<table>
<thead>
<tr>
<th>Predictor</th>
<th>OR</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical risk of regular marijuana</td>
<td>0.76</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Psychological risk of regular marijuana</td>
<td>0.61</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Perceived ease of access</td>
<td>0.53</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Injunctive norms for regular marijuana</td>
<td>0.69</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Descriptive norms for marijuana</td>
<td>1.1</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

All models adjusted for age, sex, and baseline level of the outcome.
Opportunity: 
Impacting norm perceptions 
WILL pay dividends down the road

A quick note about 
individually-focused interventions

Opportunities and lessons learned: 
How you talk about marijuana matters...a lot!
Discussing marijuana...word choice matters

- “Do you smoke marijuana?”
  - A person who uses edibles daily can honestly say “no”
  - If screening with a yes/no, consider “do you use marijuana?”
- “Do you use marijuana?” or “have you used marijuana?” followed by, “What does your marijuana use look like?”

Discussing Marijuana Use

- “What are the good things about marijuana use for you?”
- “What are the ‘not-so-good’ things related to your marijuana use?”
- “What would it be like if some of those not-so-good things happened less often?”
- “What might make some of those not-so-good things happen less often?”

Brief Interventions for Marijuana: Norms can be addressed!
Our Findings

3 Month Outcomes

- # Days in last 30
- # Joints per week
- Hours high per week
- Consequences

6 Month Outcomes

- # Days in last 30
- # Joints per week
- Hours high per week
- Consequences
At 3 months, intervention participants reported 24% fewer joints smoked per week relative to control participants.

Opportunity:
Individually focused prevention/intervention efforts with personalized normative feedback

At 3 months, intervention participants reported 21% fewer hours being high per week relative to control participants.
Be mindful in meetings with individuals of other substance use that is a potential “red flag” for needing to explore marijuana use.

Collecting the data

- Partnered with 7 colleges/universities
- During 2015-2016 academic year, received random sample of students from Registrar at each school
- Email to students from each institution before survey launch announcing partnership and survey
- Sent email invitations to complete online survey
- Reminder emails were sent during recruitment time period designated by each school

The sample

- n=2,989 undergraduates between 18-25 years of age
- Average age: 20.34 years
- 17.2% reported non-medical use of prescription stimulants at least once in the past year.
Marijuana Use

- Overall sample:
  - Past year marijuana use: 45.9%
  - Past 30-day marijuana use: 29.6%

- Among those with no past year non-medical use of prescription stimulants:
  - Past year marijuana use: 38.8%
  - Past 30-day marijuana use: 23.0%

- Among those with past year non-medical use of prescription stimulants:
  - Past year marijuana use: 86.0%
  - Past 30-day marijuana use: 66.2%

Wrapping up

For today

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How Can We Use This Information to Prevent & Reduce Harm from Marijuana?

• Correct Normative Misperceptions
  • Most people are not using
  • Most people are not driving under the influence
  • The more people use, the more they think others are using:
  • Opportunity for positive community norms
How Can We Use This Information to Prevent & Reduce Harm from Marijuana?

* Enlist support and power of parents
  - Teach them how to communicate their hopes/values to their children
  - Make sure they understand why that matters
  - Highlight normative misperceptions about what other parents think when relevant

How Can We Use This Information to Prevent & Reduce Harm from Marijuana?

* Make sure people understand that there's a difference between “no evidence” and “insufficient or inconclusive evidence.”

How Can We Use This Information to Prevent & Reduce Harm from Marijuana?

* Increase Risk Perception
  - Get the science out there! There ARE harms!
  - “The Munchies”
    - Those using 2-3 times per month or less: 77.2%
    - Those using weekly or more: 95.1%
  - Low motivation
    - Those using 2-3 times per month or less: 38.2%
    - Those using weekly or more: 61.0%
  - Trouble remembering
    - Those using 2-3 times per month or less: 40.2%
    - Those using weekly or more: 64.8%

Data Source: DBHR/UW Washington Young Adult Health Survey
Slide content: Kilmer & Larimer presentation to Strategic Prevention Enhancement Meeting (July 2016)
How Can We Use This Information to Prevent & Reduce Harm from Marijuana?

- Reduce Motivation to Use/Misuse
  - Already signs of some efforts of wanting to change:
    - Tried to set limits on use
      - Those using 2-3 times per month or less: 34.1%
      - Those using weekly or more: 54.0%
    - Tried to cut down
      - Those using 2-3 times per month or less: 27.0%
      - Those using weekly or more: 39.5%
  - Effective coping; healthy alternatives

Data Source: DBHR/UW Washington Young Adult Health Survey
Data used: Kilmer & Larimer presentation to Strategic Prevention Enhancement Meeting (July 2016)

How Can We Use This Information to Prevent & Reduce Harm from Marijuana?

- Increase motivation to change for those using more heavily or at risk for addiction
  - Brief Motivational Interventions show promise
    - Pilots of brief interventions with mandated students (e.g., Marijuana and Other Drug workshop)
    - In-person, personalized feedback interventions with facilitators trained in motivational interviewing (e.g., Lee, et al., 2013)
  - Chance to provide education about addiction and withdrawal
How Can We Use This Information to Prevent & Reduce Harm from Marijuana?

- Enforce policy restrictions on access, public use
  - NIAAA’s College Alcohol Intervention Matrix (CollegeAIM) emphasizes importance of environmental approaches, including enforcement
- Provide resources for prevention, treatment, & research

Support for policies and enforcement is there!

- A small group students may be quite vocal on campus to the point administrators withhold policy changes assumed to be unsupported by the student body (Lavigne, et al., 2008)
- Among students, Saltz (2007) found a “universal tendency” to underestimate student support for policies

Do the best you can to evaluate programs, add to the list of “what works,” and, when in doubt, consider evidence-based decisions
Margaret Mead

- "What is the first sign you look for to tell you of an ancient civilization? How do you know they were civilized? Was it some instrument, a tool, an article of clothing?"
- "A healed femur."

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