The Vulnerable Populations Approach to Implementation & Dissemination Research: Theory and Case Studies in Language and Literacy Disparities

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CA Department of Public Health
“Somebody has to do something, and it's just incredibly pathetic that it has to be us.”

-Jerry Garcia
The Inverse Care Law (Tudor-Hart 1971)

The access to and quality of health care varies inversely with the needs of the population
Vulnerable Populations are defined as being at “greater risk of risks”

Vulnerabilities tend to cluster
GENERATING A DIFFERENTIAL DIAGNOSIS OF PSYCHOSOCIAL VULNERABILITIES.

V ioence
U ninsured
L iteracy and Language
N eglect
E conomic hardship/food insecurity
R ace/ethnic discordance, discrimination
A ddiction
B rain disorders, e.g. depression, dementia, personality disorder
I mmigrant
L egal status
I solation/Informal caregiving burden
T ransportation problems
I llness Model
E yes and Ears
S helter

Schillinger 2007
The General Population Approach

FIGURE 1—Hypothetical homogenous effect of a population-approach intervention on the distribution of risk in a population.

TABLE 1—Effective Population Approach Interventions That Increased Health Disparities

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Study</th>
<th>Resulting Disparity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical cancer screening</td>
<td>Katz and Hofer 1994\textsuperscript{13}</td>
<td>Women with higher incomes were more likely to be screened for cervical cancer in Ontario and the United States than those with lower incomes.</td>
</tr>
<tr>
<td>Neonatal intensive care and surfactant therapy to reduce rates of infant low birthweight</td>
<td>Victora et al. 2001\textsuperscript{14}</td>
<td>New population-level interventions in Brazil increased inequity because they initially reached those who were already better off socioeconomically.</td>
</tr>
<tr>
<td>Health information campaigns regarding smoking</td>
<td>Federico et al. 2007\textsuperscript{15}</td>
<td>Gaps in initiation rates among educational groups may be because of comprehensive information campaigns that were most effective among individuals with higher levels of education.</td>
</tr>
</tbody>
</table>

Frohlich AJPH 2008
The Population Approach

Source. Adapted from Rose. Note. Arrows depict the shifting of the curve after a population-level approach. Circles indicate where the variation in risk is most flagrant.

FIGURE 2—Illustration of a potential increase in the variation of risk following a population-approach intervention.

Frohlich AJPH 2008
Comparison of 3 approaches

| TABLE 2—Three Different Public Health Approaches to Improving Health |
|--------------------|-----------------|-----------------|-------------------|
| **Intervention Approach** | **Objective** | **Target for Intervention** | **Critiques** |
| Populations at risk (Lalonde) | Prevent disease in those individuals at higher risk | Reduce the specific risk exposure for individuals at higher risk through behavioral (or biochemical) changes | Blames the victim; does not prevent other individuals from becoming at risk |
| Population approach (Rose) | Increase overall population health | Shift distribution of population risk exposure toward a lower mean through changes in environmental conditions that lead to increased risk | May increase health inequalities |
| Vulnerable populations (this essay) | Decrease health inequalities between socially defined groups | Shift to a lower level the risk exposure distribution of socially defined groups through changes in social and environmental conditions that make groups at higher risk of risks | May lead to positive discrimination; may lead to stigmatization; may be less efficient in terms of population health |

\(^3\)The critiques directed at the populations-at-risk approach are empirically documented. The critique listed for the population approach is currently being researched, and those associated with vulnerable populations are speculative.
• Case 1: The Digital Divide

  – Unequal Diffusion of Innovation?
Cumulative % of new registered users each year by education level

- All
- No degree earned
- High School/GED
- Some college
- College Grad/Post Grad

N=11,921
Implications

• Clear disparities in use of a patient portal
• Racial disparities in particular appear to extend beyond limitations in internet access
• Those most at risk for poor diabetes health outcomes may fall farther behind
• Internet-based health care services require
  – attention and tailoring of services
  – expanded computer/ internet access
Case 2: Financial Incentive for Mail Order Pharmacy Use

- insufficient absorptive capacity
Figure 1. Prevalence of mail order pharmacy use the year after the mail order incentive was introduced.
Table 2. New MOP Pharmacy Benefit increased disparities in MOP Use among 10,590 diabetes patients

<table>
<thead>
<tr>
<th>Crude Prevalence of MOP Use</th>
<th>Risk Difference*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>All subjects</strong></td>
<td></td>
</tr>
<tr>
<td>Switched to 30-day benefit</td>
<td>0.30</td>
</tr>
<tr>
<td>remained on 100-day benefit</td>
<td>0.09</td>
</tr>
<tr>
<td>with MOP incentive</td>
<td>0.21 (0.19, 0.23)</td>
</tr>
<tr>
<td>with no MOP incentive</td>
<td>0.26 (0.22, 0.30)</td>
</tr>
<tr>
<td>Unadjusted (95% CI)</td>
<td></td>
</tr>
<tr>
<td>Adjusted† (95% CI)</td>
<td></td>
</tr>
<tr>
<td>Adjusted Difference in Risk</td>
<td></td>
</tr>
<tr>
<td>Difference† (95% CI)</td>
<td></td>
</tr>
<tr>
<td><strong>Economic status</strong></td>
<td></td>
</tr>
<tr>
<td>&lt;$25K (ref)</td>
<td>0.25</td>
</tr>
<tr>
<td>$25K-$49K</td>
<td>0.32</td>
</tr>
<tr>
<td>$50K-$79K</td>
<td>0.34</td>
</tr>
<tr>
<td>$80K +</td>
<td>0.37</td>
</tr>
<tr>
<td>Income</td>
<td></td>
</tr>
<tr>
<td>&lt;$25K (ref)</td>
<td>0.08</td>
</tr>
<tr>
<td>$25K-$49K</td>
<td>0.08</td>
</tr>
<tr>
<td>$50K-$79K</td>
<td>0.12</td>
</tr>
<tr>
<td>$80K +</td>
<td>0.12</td>
</tr>
<tr>
<td>Unadjusted (95% CI)</td>
<td>0.18 (0.14, 0.21)</td>
</tr>
<tr>
<td>Adjusted† (95% CI)</td>
<td>0.26 (0.19, 0.32)</td>
</tr>
<tr>
<td>Adjusted Difference in Risk</td>
<td></td>
</tr>
<tr>
<td>Difference† (95% CI)</td>
<td></td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
</tr>
<tr>
<td>Caucasian (ref)</td>
<td>0.44</td>
</tr>
<tr>
<td>African Am.</td>
<td>0.21</td>
</tr>
<tr>
<td>Asian</td>
<td>0.39</td>
</tr>
<tr>
<td>Filipino</td>
<td>0.25</td>
</tr>
<tr>
<td>Latino</td>
<td>0.21</td>
</tr>
<tr>
<td>Unadjusted (95% CI)</td>
<td>0.32 (0.28, 0.37)</td>
</tr>
<tr>
<td>Adjusted† (95% CI)</td>
<td>0.37 (0.31, 0.44)</td>
</tr>
<tr>
<td>Adjusted Difference in Risk</td>
<td></td>
</tr>
<tr>
<td>Difference† (95% CI)</td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
</tr>
<tr>
<td>No degree (ref)</td>
<td>0.25</td>
</tr>
<tr>
<td>HS/GED</td>
<td>0.29</td>
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<tr>
<td>Some college</td>
<td>0.33</td>
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<tr>
<td>College +</td>
<td>0.38</td>
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<tr>
<td>Unadjusted (95% CI)</td>
<td>0.18 (0.14, 0.22)</td>
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<tr>
<td>Adjusted† (95% CI)</td>
<td>0.22 (0.15, 0.30)</td>
</tr>
<tr>
<td>Adjusted Difference in Risk</td>
<td></td>
</tr>
<tr>
<td>Difference† (95% CI)</td>
<td></td>
</tr>
<tr>
<td><strong>Limited English Proficiency</strong></td>
<td></td>
</tr>
<tr>
<td>No (ref)</td>
<td>0.33</td>
</tr>
<tr>
<td>Yes</td>
<td>0.21</td>
</tr>
<tr>
<td>Unadjusted (95% CI)</td>
<td>0.24 (0.21, 0.27)</td>
</tr>
<tr>
<td>Adjusted† (95% CI)</td>
<td>0.27 (0.23, 0.32)</td>
</tr>
<tr>
<td>Adjusted Difference in Risk</td>
<td></td>
</tr>
<tr>
<td>Difference† (95% CI)</td>
<td></td>
</tr>
<tr>
<td><strong>Inadequate Health Literacy</strong></td>
<td></td>
</tr>
<tr>
<td>No (ref)</td>
<td>0.40</td>
</tr>
<tr>
<td>Yes</td>
<td>0.26</td>
</tr>
<tr>
<td>Unadjusted (95% CI)</td>
<td>0.31 (0.27, 0.35)</td>
</tr>
<tr>
<td>Adjusted† (95% CI)</td>
<td>0.35 (0.27, 0.42)</td>
</tr>
<tr>
<td>Adjusted Difference in Risk</td>
<td></td>
</tr>
<tr>
<td>Difference† (95% CI)</td>
<td></td>
</tr>
<tr>
<td><strong>Financial hardship</strong></td>
<td></td>
</tr>
<tr>
<td>No (ref)</td>
<td>0.36</td>
</tr>
<tr>
<td>Yes</td>
<td>0.26</td>
</tr>
<tr>
<td>Unadjusted (95% CI)</td>
<td>0.27 (0.23, 0.30)</td>
</tr>
<tr>
<td>Adjusted† (95% CI)</td>
<td>0.31 (0.24, 0.37)</td>
</tr>
<tr>
<td>Adjusted Difference in Risk</td>
<td></td>
</tr>
<tr>
<td>Difference† (95% CI)</td>
<td></td>
</tr>
</tbody>
</table>

New MOP Pharmacy Benefit increased disparities in MOP Use among 10,590 diabetes patients.
Case 3: Improving Advance Directive Completion

Simplifying communication for those with communication barriers
My Doctor said "Only 1 glass of alcohol a day". I can live with that.

“The problem with communication is the assumption that it has occurred.”

-GB Shaw
Redesigned Multilingual Advance Directive Reduces Decisional Uncertainty and Improves Completion Rates

16% reported filling out the new advance directive vs. 5% of those assigned to the standard form, \( P = 0.02 \)

Sudore, Schillinger PEC 2008
www.iha.org
Acceptability of Advance Directive, stratified by literacy and language

Acceptability with advance directives, stratified by literacy and language

<table>
<thead>
<tr>
<th></th>
<th>Ease of use and understanding (nine items)</th>
<th>Usefulness in decisions/discussions (eight items)</th>
<th>Value in care planning (six items)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Randomization</td>
<td>$P^1$</td>
<td>$P-I^1$</td>
</tr>
<tr>
<td></td>
<td>Redesigned (%)†</td>
<td>Standard (%)</td>
<td></td>
</tr>
<tr>
<td>Literacy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limited</td>
<td>65.2</td>
<td>32.8</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Adequate</td>
<td>71.5</td>
<td>59.2</td>
<td>0.008</td>
</tr>
<tr>
<td>Language</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spanish</td>
<td>70.3</td>
<td>48.7</td>
<td>0.002</td>
</tr>
<tr>
<td>English</td>
<td>68.6</td>
<td>48.7</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Number of participants in each group:
Participants with limited literacy assigned to redesigned advance directive, $n = 41$ and assigned to the standard, $n = 41$.
Participants with adequate literacy assigned to redesigned advance directive, $n = 62$ and assigned to the standard, $n = 61$.
Spanish-speaking participants assigned to redesigned advance directive, $n = 33$ and assigned to the standard, $n = 27$.
English-speaking participants assigned to redesigned advance directive, $n = 70$ and assigned to the standard, $n = 75$.

† Numbers reflect percent of scale items with affirmative responses.
$P$ for Interaction assessed the interaction between literacy and randomization and language and randomization for each outcome.
Case 4: Improving Medication Concordance

• Enhancing communication for those with communication barriers
  – Tailoring of service
  – Participatory approach
## Computerized Visual Medication Schedule + Teach-Back

<table>
<thead>
<tr>
<th>Name</th>
<th>Got this Photo on</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>在這個日期收到這一張圖片</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Day</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coumadin 6 mg</td>
<td>Coumadin 6 mg</td>
<td>Coumadin 6 mg</td>
<td>Coumadin 6 mg</td>
<td>Coumadin 6 mg</td>
<td>Coumadin 6 mg</td>
<td>Coumadin 3 mg</td>
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</tbody>
</table>

**Remember:** Take these pills correctly and you can prevent strokes and bleeding!

記住：正確的服用這一些藥片您就可以預防中風和流血！

Machtinger, Schillinger 2007 J Comm J Qual Safety
Intervention reached safe and effective target faster; important subgroup effects

N.B. Spanish: 33 days for intervention vs 53 days for the control; $p = .02$

Machtinger, Schillinger 2007
J Comm J Qual Safety
Case 5: Using ‘teach-back’ or ‘teach-to-goal’ strategy to promote learning in heart failure

-A cautionary tale of mixed results?

DeWalt, Baker, Schillinger et al. 2011
Single education session (~ 40 minutes)

Caring for Your Heart: Living Well with Heart Failure

Given a new digital scale

Randomization
Stratified by Literacy

No further intervention
Single Session Only (SSO)

Additional Education
Teach to Goal (TTG)
Single Session *insert text*

#1 — How do I feel today?

You can tell how well your heart is doing by how you feel and what you can do.

Am I short of breath walking?

Heart failure can make you feel short of breath while walking.

Doing well — walk easily with no shortness of breath
Getting worse — shortness of breath after walking a short distance
Call your doctor — shortness of breath at rest

When Should I Call?

Call us if:

- You are short of breath at rest or more short of breath than usual.
- You have to sleep upright or in a chair.
- You have more swelling in your legs than usual.
- You have a lot of dizziness or light-headedness that is worse than usual.
- Your weight goes up by 4 or more pounds from your target weight.

Phone ________________
Teach to Goal

- Teach diuretic self-adjustment
- 5-8 calls first month
- Call every 2-4 weeks thereafter
- Topics discussed based on set knowledge and behavior goals
- Call frequency based on demonstrated mastery of goals
- All intervention focused on patient education, not system change

A Plan for Weight Changes

Use your weight to find out what zone you are in. Your weight will help you decide how many water pills to take.

- Weigh yourself.
- Find your weight on your Water Pill Guide.
- See what weight zone you are in.
- Take the number of water pills listed in that zone.
- Write it on Daily Water Pill Plan.
HF-Related Hospitalization

All: 0.90 (0.70, 1.15)
Low Lit: 0.53 (0.29, 0.96)
High Lit: 1.36 (0.88, 2.12)
Case 6: Providing Tailored diabetes self-management support

- Using basic health IT with tiered support for those with greater needs
Improving Diabetes Outcomes and Overcoming Communication Barriers for Vulnerable Communities through Health IT-assisted Self Management Support
Automated Telephone Diabetes Self-Management Support (ATSM)

- Interactive health technology, touch tone response
- Weekly surveillance using easy-to-understand questions
- Tailored health education (39 weeks=9 mos) using jargon-free narratives
- In patients’ preferred language (English, Spanish or Cantonese)
- Generates weekly reports of out of range responses that trigger call-backs'
- Live phone follow-up through a bilingual nurse
IDEALL Development Process

Identify priority population/condition and objectives
Harness registry and network to identify population
Develop queries to solicit questions and concerns
Write and revise health education (cooperative process)
Pilot questions and health education responses with patients
Translate and adapt toward cultural appropriateness
Record and code
Design callback algorithm (scenarios) and trigger reports
Beta-test
Train clinical staff
Launch
# Key Findings of IDEALL Program

## RE-AIM Framework

### Composite reach product

<table>
<thead>
<tr>
<th></th>
<th>ATSM</th>
<th>Group Visits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>22.1</td>
<td>4.8</td>
</tr>
<tr>
<td>English</td>
<td>20.0</td>
<td>6.4</td>
</tr>
<tr>
<td>Chinese</td>
<td>22.0</td>
<td>2.7</td>
</tr>
<tr>
<td>Spanish</td>
<td>24.3</td>
<td>4.0</td>
</tr>
<tr>
<td>Adequate Literacy</td>
<td>15.6</td>
<td>7.6</td>
</tr>
<tr>
<td>Limited Literacy</td>
<td>28.0</td>
<td>3.6</td>
</tr>
</tbody>
</table>

ATSM Improved Self-Care at 6 mos (n=249)

<table>
<thead>
<tr>
<th>Overall DM Self-Care</th>
<th>Adjusted* Difference (95% CI)</th>
<th>Standardized Effect Size*</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.2 (0.1, 0.04)</td>
<td>0.29</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Physical Component SF-12</td>
<td>Adjusted Difference (95% CI)</td>
<td>Standardized Effect Size</td>
<td>p-value</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------------------------</td>
<td>--------------------------</td>
<td>---------</td>
</tr>
<tr>
<td></td>
<td>2.0 (0.1,3.9)</td>
<td>0.25*</td>
<td>0.04</td>
</tr>
</tbody>
</table>

* Effect size 0.54, p=.04 among Spanish speakers
* Effect size 0.33, p=0.06 among Limited Literacy
• The 3 different public health approaches can have disparate effects on health inequities

• Specific targeting and tailoring is necessary for vulnerable populations
  • Attend to barriers to diffusion of innovation and absorptive capacity

• Communication barriers can be overcome through participatory approach, use of simple HIT, hierarchical logic to overcome inverse care law