“Prevention”

Research Leaders Symposia
August 26th 2009
School of Public Health

Adrian Bauman
Prevention Research Collaboration
School of Public Health
Sydney University

RLS III – Prevention (and health promotion)

- Thinking about research directions
- Stimulate interaction and debate
- Maybe, collaboration, but at least better understanding
- Why we are “leaders in the field”
  - Our field is public health approaches to Physical activity, obesity and nutrition and their role in chronic disease prevention

Following in big footsteps

What is Your Global Footprint?

Why prevention is current, topical in public health research and practice

Strategic in 2009

Targets for the healthiest country by 2020
- Halt and reverse the rise in overweight and obesity
- Reduce the prevalence of daily smoking to 5% or less
- Reduce the prevalence of harmful drinking for all Australians by 30%
- Contribute to the ‘Close the Gap’ target for Indigenous people, reducing the 17-year life expectancy gap between Indigenous and non-Indigenous people

Prevention Research Collaboration (PRC) – our work in context, then who we are
- a.k.a PANORG
- a.k.a CPAH
- a.k.a CPHN
- Formerly COD
- Affiliated with BIONE
- Soon to be WHO CC PANO
- The Centre for Acronyms and Public Health
Trying to describe the frameworks that underpin our prevention work...
Behavioral epidemiology: a conceptual model

Theoretical antecedents of behavioral risk factors

Behavioral risk factors

Behavioral risk factors

Health outcome or risk of disease

Risk factor 1

Risk factor 2

Risk factor 3

What causes disease

Link between structural factors and health: Behavioral epidemiology as mediators

Behavioral risk factors

Structural variables

Mediating variables

Behavioral risk factors

Inactivity

Nutrition

Overweight

Healthy lifestyles

Inactivity

Nutrition

Overweight

Healthy lifestyles

Prevention levels

Primary prevention

Whole population, through public health policy

Prevent disease well before it develops (e.g., Risk factor Reduction)

Secondary prevention

Selected individuals identified at high risk

Early detection of disease (e.g., Screening, Early intervention)

Tertiary prevention

Treat established disease to maintain health & prevent deterioration

Prevention comprehensively covered in these SPH key areas

Research and teaching in SPH
**Simplified causal pathway of NCDs**

1. **UNDERLYING CAUSES**
   - Social / economic, cultural, political factors
   - Physical environments, global influences urbanisation

2. **PROXIMAL BEHAVIORAL RISK FACTORS**
   - Tobacco use
   - Alcohol abuse
   - Unhealthy diet
   - Physical inactivity

3. **PROXIMAL PHYSIOLOGICAL RISK FACTORS**
   - Overweight / obesity
   - Elevated blood pressure
   - Elevated blood glucose
   - Abnormal blood lipids
   - Other Metabolic issues

4. **CHRONIC DISEASES**
   - Diabetes
   - Heart disease
   - Stroke
   - Cancer
   - Respiratory dis.

---

**PRC - Who we are, what we do**

- A moderate sized research group in SPH
- (10% employed by UoSyd, 90% on soft $)
- We work around prevention and health promotion through:
  - Research grants
    - Category I research grants
    - Applied research, contract research
  - MPH related teaching, Public health training
  - service & policy roles for Government, NGOs, WHO

---

**What kinds of prevention research do we do?**

- Systematic reviews of the evidence
- Prevention research / evaluation of targeted chronic disease preventive interventions: physical activity, nutrition, obesity
- Applied research, informing policy
- Complex public health program evaluation
- Behavioural measurement, surveillance (systems), and methodological related research
- Replication, dissemination and translation research; for use in public health practice
- Other [diverse] health promotion research and evaluation

---

**We are ‘on the edge’ [of campus]**

---

**PRC is:**

- A diverse group
- Multiple sets of research skills
- And, from a personal perspective, a really excellent team to work with
- With links to other research groups

---

**Stages in research and evaluation in evidence building**


- Problem definition
- Solution generation
  - Intervention theory
  - Intervention development
  - Pre-/Post-testing
  - Methods and materials
  - Literature review, meta-analysis

*This provides a research design framework for what we do*
**Examples of what we do**

- Generic examples (not focusing on ‘publications’ or people)
- Taking a “public health approach” (population approach)
- Examples of the kinds of work that fit into the ‘prevention’ areas that we work in
- Range of research and evaluation methods
- Opportunities for working more broadly

**We measure trends & correlates of risk factors**

- Obesity increasing: adults, children, toddlers, dogs
- PA [leisure time] also increasing ! Other domains of activity decreasing, and sitting time increasing
- Local/ NSW/ Australian/ global trend studies
- Studies of correlates of physical activity, nutrition and obesity [including the physical environment]
- Other health promotion measures – social capital, social connectedness, social support and health
Case study 1: Evidence Reviews

- Reviewing evidence of effectiveness in obesity prevention (diet, activity, sedentariness)
- Formal systematic reviews and meta-analyses of health promoting/prevention interventions
  - Appraising results for Australian context
  - Interpreting “uncertain information”
  - Identifying policy and practice implications
  - Identifying research ‘gaps’ in practice-relevant interventions

CASE STUDY 2: Walking to School Research

- *defining the problem* – children’s physical activity declining – walking to school less prevalent
- *collaborating with Area Health Services to evaluate solutions*

Trends in walking and cycling to school 1985-2004

![Graph showing trends in walking and cycling to school 1985-2004](image)

The Central Sydney Walk to School Research Program

A 2-year Cluster RCT to increase the percentage of primary school children (year 4&5) who walk to school

- 24 schools
- A cohort of 1234 students (85% FU RR)
- A cohort of 807 parents (50% FU RR)

<table>
<thead>
<tr>
<th>Travel mode to school</th>
<th>Intervention N=683</th>
<th>Control N=594</th>
<th>P-value adjusted for cluster effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walk all the way all days</td>
<td>0.5%</td>
<td>0.5%</td>
<td>0.60</td>
</tr>
<tr>
<td>Walk all the way some days</td>
<td>4.6%</td>
<td>0%</td>
<td>0.40</td>
</tr>
<tr>
<td>Car all the way all days</td>
<td>3.4%</td>
<td>1.3%</td>
<td>0.69</td>
</tr>
<tr>
<td>Car all the way some days</td>
<td>8.3%</td>
<td>8.3%</td>
<td>0.73</td>
</tr>
</tbody>
</table>

Change in travel pattern from baseline (2005) to follow-up (2006) as reported by students using travel diary of one school week

Students’ five days diary of one school week
- *Increases in walking in both intervention and control groups (1.4% vs. 5.0%, respectively), but differences NS*
- *Students in intervention group 80% more likely to travel by methods other than car compared to controls, adjusting for proximity to school and access to public transport*
**Policy implications**

- This ‘walk to school’ intervention used primarily “educational” strategies and may have not addressed factors that influence the journey to school.
- It is likely that no single method of increasing active travel will be effective for students and parents at all schools.
- So even more intensive and locally responsive programs may be needed if this is a public health setting for physical activity promotion.

**CASE STUDY 3**

‘Food marketing to children’ research

- Documenting (the magnitude of) children’s exposure to unhealthy food marketing
  
  *Public Health Nutrition, 2007 10(11), 1234-1240.*

- Use of research for media and policy advocacy
  
  - Bibliometric and media analyses
  
  - Using data for influencing policy

**Magnitude findings: food marketing to children**

- High levels of exposure to unhealthy food advertising (est. up to 63 high-fat, high sugar food ad exposures / week @2 hour TV per day)
- Highest levels of unhealthy food ads during peak viewing times / popular programs (5 unhealthy food ads/hour) (NOT during children’s programs)
- Implications that any effective regulations need to apply at times when large numbers of children are viewing

Acknowledgment: S Holding & S Chapman for data capture

**Several case studies around Lifestyle interventions- applying behaviour change to diverse settings**

- Clinical prevention (lifestyle) trials
  - Chronic liver disease lifestyle trials
  - PA promotion in cardiac rehabilitation setting
  - Lifestyle interventions for women with Gestational diabetes
  - Interventions for obese adolescents
  - Trials with indigenous communities
- Community trials
  - Pedometer intervention in community settings
  - Walk to school – cluster RCT

**Multi component evaluation**

1. Did the marketing of the GHS reach the population?
2. Who uses the GHS service – process evaluation
3. Impact evaluation – does the counselling change risk factors (pre – post), but many 1000s in cohort
### Case study 4: Diabetes Prevention projects: intervening with at-risk populations to prevent diabetes

- **Da Qing**, includes 2008 20 year follow up
- **Finnish DPP**
- **US DPP**
- **Indian DPP**
- **Others**

**Effect attributable to lifestyle Δ**: Diet/nutrition and PA ± 5% weight loss

### Relative Risk Reduction in Lifestyle Intervention vs. annual risk in Controls in Diabetes prevention trials

<table>
<thead>
<tr>
<th>Country</th>
<th>Relative Risk Reduction for Lifestyle Modification (%)</th>
<th>Baseline Annual Risk From Control Group (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>35</td>
<td>7.5</td>
</tr>
<tr>
<td>U.S.A.</td>
<td>29</td>
<td>12.5</td>
</tr>
<tr>
<td>Finland</td>
<td>50</td>
<td>20</td>
</tr>
</tbody>
</table>

### US DPP

- At risk of pre diabetes: ~ 6-10% adults
- i.e. > 15,000,000 Americans

**Public health approach**

- 14,998,000 still to intervene with

### Sydney DPP

- Replication study – can it work in a community real world setting

(secondary prevention)
**Sydney Diabetes Prevention Program: Translational research in action**

**Evaluation design**
- Population eligible for screening (aged 40-65 yrs)
- Population screened (B)
- Number attended further testing (C)
- Newly diagnosed T2DM
- High metabolic risk identified as High risk for diabetes (cohort assembled) (D)
- Baseline measures
- INTERVENTION DELIVERED
- Follow up measures 3 months and 12 months
- Evaluation of un-diagnosed T2DM
- Evaluation of recruitment
- Process evaluation
- Impact evaluation
- Case study 5: Another area for physical activity?
  - Cardiac rehabilitation
    - Exercise is an evidence based intervention for stable post-cardiac event patients
    - [tertiary prevention]

**A public health view of Cardiac Rehabilitation**
- Exercise is evidence based intervention for stable post-cardiac event patients
- Many with CVD eligible for cardiac rehab programs
- Only 18-25% actually attend CRPs
- Cardiac event: Patients eligible for CRP (80% of all Cardiac pts)
  - Attend CRP
  - Don't attend any structured CRP Programs
  - Evidence of benefit
  - Routine care? Y/ N
  - This group are the 'underserved' from a public health perspective... yet very little programmatic attention is paid to these

---

**CSGPN**
- Screen up to 15,000 English-speaking people aged 50-65 years attending GP Practices
- Opportunistic and targeted screening
- Arabic, Chinese and Aboriginal streams
Results

- Change in self report 6 weeks and maintained at 6 months
- Validated by objective fitness measure
  - bike ergometry PWC150 – increase in VO2 submax I > C
- ‘evidence’ of effects

......so what should happen next?

Replication study

- Testing in multi centres [n=6]
- Identify those NOT attending CRP but eligible
- Offer them this ‘evidence based’ home based / telephone program for PA
- Assess Process and Impact

Methodological research

- Example A: refining global physical activity surveillance (or understanding Mali and Mauritania better)
- Example 2: understanding how health promotion works – the intervening causal variables in social marketing campaigns
- Example 3: Improving self report behavioral measures

And last... The next ‘big’ area of our research 2010-2014
Building the research evidence

- Measurement of sitting
- Global descriptive epidemiology of sitting
- Metabolic and health effects of sitting – are they independent of ‘physical activity’?
- Working with physiologists to develop biologically plausible mechanisms
- How much sitting is harmful to health?
- Can we trial interventions to reduce sitting, eg. ‘Sitting breaks’ in workplaces

So where to next?

Prevention research and evaluation in the SPH and beyond

- There are many others working in chronic disease prevention, using diverse methodologies
- Our areas of expertise in complex program evaluation, in lifestyle change, and in translation research

The challenges around Prevention research development at Usyd I

- This work, eg. complex multi-component program evaluation, is multi-disciplinary, needing qualitative and quantitative methods
- Need to apply formative, process and impact evaluation methods, and costing studies
- Carry out elusive, but public health important, replication and translation studies
- Prevention related policy & advocacy research

The challenges around Prevention research development at Usyd II

- Lost some of the sense of ‘being on the same team’ – ‘silos’ mentality even within SPH
- Inter-departmental or inter-faculty work becomes increasingly complicated
- Category 1 research dominance ...
- Challenges of applied public health research - University not supportive of applied and contractual research with Government, NGOs
Towards solutions

- 2005 Cell to Society ‘prevention and health promotion’ review in the University
- 2009 Review of ‘prevention teaching’ by PH Phongsavan, our senior health promotion academic
- Calls for ‘Integrated prevention oriented grants’ that require teams
- Goodwill in the SPH, just not enough time for busy individuals
- rumour goin’ round that there’s [prevention] gold [funding] in “them hills”