The development of a measurement tool to assess common Incorrect Beliefs About the causes of Cancer within the general public: The IBAC study

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Background

- Major risk factors for cancer have been identified:
  - Smoking, alcohol consumption, overweight, physical inactivity, diet

- Awareness of known risk factors is mixed:
  - UK national sample\(^1\): Mean = 5 out of 15 known risk factors
  - Lifestyle less likely to be attributed to cancer than heart disease\(^2\)

- Sizeable minority also endorse incorrect risk factors
  - UK National survey\(^1\): Endorsed at least one of the following:
    - Stress, food additives, pollution, power lines

1. Wardle et al., 2001 Public Health
2. Sanderson et al., 2009 Patient Educ Coun
• Prevalence of incorrect beliefs is unclear

• No reliable and validated tool exists for incorrect beliefs
  – Known risk factors assessed with CAM or ABC measures

• Current research uses myriad of incorrect risk factors
  – Generally rely on researcher intuition
  – Or use open-ended responses (recall rather than recognition)

• Public awareness campaigns difficult to evaluate

1. Smith et al., 2016 Prev Med
Aims

- To identify common incorrect beliefs about the causes of cancer within the general public

- Develop a reliable and valid tool of Incorrect Beliefs About Cancer (the IBAC tool)
Item generation – systematic review

- Talk tomorrow, McGowan
  15:27, Castle Suite)

- Public surveys / interviews
  - 1 incorrect risk factor

- 999 studies were identified

- 16 studies were included

- 54 incorrect beliefs identified
Item generation – Interviews

• 16 participants

• Purposively sampled, balanced across age, ethnicity, gender and occupation

• Content analysis = 33 incorrect beliefs
Item generation – Social media

- Lexis Nexis - cancer-related newspaper articles (Jul-Aug)

- Online comments from:
  - Independent, Times, Daily Mail, Mirror, BBC

- Tweets with ‘Cancer’ AND ‘Cause’ OR ‘Prevent’ OR ‘Treat’
  - Passive re-tweets and commercial tweets excluded
  - Beliefs had to be tweeted at least 10 times

- Content analysis:
  - 33,557 tweets or online comments reviewed
  - 93 incorrect beliefs were identified
Item generation - summary

- Systematic review: 54 incorrect beliefs
- Interviews: 33 incorrect beliefs
- Social media analysis: 93 incorrect beliefs
- PPI: 4 incorrect beliefs

Total: 184 incorrect beliefs

103 unique beliefs
Item refinement – researchers

- 3 researchers (SS, LS, JM), excluded if:
  - Association with cancer listed in IARC monograph
  - Could not test for a relationship with cancer (e.g. god, fate)
  - Cancer prevention or treatment rather than cause

- Similar items combined

- 42 beliefs remained in item pool
Item refinement – DELPHI study

- 13 experts (oncology, public health, GPs, psychology)

- Round 1:
  - List all incorrect beliefs they were aware of

- Round 2:
  - Combine 42 item pool with round 1
  - Indicate which items they had heard of
  - Create a ‘top 10’ of most popular incorrect beliefs

- Round 3:
  - Indicate which items should be excluded and included
  - No new items, but consensus on 13 beliefs
Item refinement – online survey

- Online survey (n=527)
- 42 item pool
- Principal component analysis
  - One-component model observed (all items >0.45 loading)
- Item exclusion criteria
  - <20% or >80% of participants provide correct answer (k=0)
  - <15% provide incorrect answer (k=25)
  - Items excluded within Delphi list round 2 (k=1)
Item validation – IBAC measure

‘How much do you agree that each of these can increase a person’s chance of developing cancer?’

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Not sure</th>
<th>Agree</th>
<th>Strongly agree</th>
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<tbody>
<tr>
<td>Exposure to electromagnetic frequencies</td>
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<td>Eating food containing additives</td>
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<td>Living near power lines</td>
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<td>Feeling stressed</td>
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<td>Eating food containing artificial sweeteners</td>
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<td>Using cleaning products</td>
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<td>Using mobile phones</td>
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<td>Eating genetically modified food</td>
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<td>Using aerosols containers</td>
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<td>Physical trauma, for example a punch or squeeze</td>
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<td>Using microwave ovens</td>
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<td>Drinking from plastic bottles</td>
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</table>
Item validation – sensitivity to change

- Non-medical students (n=86)

Baseline IBAC
- Intervention leaflet
  - 1-week IBAC
- Control leaflet
  - 1-week IBAC

Test-retest reliability

\[ r=0.85, \ p<0.01 \]

M=88.3  P=0.002  M=80.3
Item validation – known groups

- Experts (oncology nurses, scientists, CRUK staff)
  - Experts (n=25): M=97.3
  - Students (n=86): M=80.6
  - P<0.001

- Establishes construct validity
Item validation – national survey (n=1967)

- 3.9% refusal rate
- Normally distributed
- $\alpha=0.86$
- Can be used alongside the CAM

**Diagram:**

- **UK national sample**
  - IBAC and CAM (n=1327) $\quad$ CAM only (n=640)
  - M=5.8 $\quad$ M=5.8
  - $P = N.S$
Item validation – Confirmatory factor analysis

• Two-factor better than one factor (p<0.001)
  – CAM and IBAC items should be considered as separate scales

• Model fit good; ‘physical trauma’ reduces fit (p<.001)
  – Item remains due to presence in all areas of generation phase

• Good fit statistics (BIC=38709; GFI=0.99; RMSEA=0.06)
Conclusion

- Identified a range of causal beliefs about cancer
- Series of iterative studies to develop a valid and reliable tool
- Public awareness campaigns\(^1\) can use IBAC within evaluation
- IBAC can be used alongside the CAM

1. Smith et al., 2016 Prev Med
Future steps

• Report the prevalence of incorrect beliefs
  – Stress (41%); food additives (40%); electromagnetic freq (33%)

• Link incorrect beliefs with outcomes
  – Physical activity, BMI, Fruit and Vegetable intake, Smoking, Alcohol
  – Screening uptake

• Investigate relationships between stigma, fear and IBAC

• Develop intervention to address incorrect beliefs
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