

## **Supplementary Material Section 2: Exploratory analysis of risk and illness**

### **perceptions**

#### **Introduction & aim**

As well as directly comparing heart age to 5-year absolute risk using different graphical formats, we were interested in exploring *why* heart age might be more effective for motivating lifestyle change. Previous research has found that different conceptualisations of risk perception are differentially predictive of lifestyle intention,<sup>22</sup> and that more 'concrete' representations of CVD risk may increase lifestyle intention via illness representations that enhance understanding of how current risk relates to lifestyle behaviours and future heart disease.<sup>24</sup> The original aim of including additional risk and illness perception measures in this study was to explore their role as potential mechanisms for an effect of heart age on lifestyle intention. Since this hypothesised effect was not supported, main effects and interactions between risk and graphical formats for the additional outcomes are reported here as exploratory analyses, using the same methods as the main paper.

#### **Additional measures**

Risk perceptions were assessed with single item measures used in a previous study recommending the use of multiple risk perception measures: verbal risk, numerical risk, comparative risk, and feeling of risk.<sup>22</sup> Illness representations were assessed with measures used in previous research, including a two item worry measure and validated Assessment of Illness Risk Representations subscales: personal control of heart disease, coherence (subjective understanding) of heart disease, and timeline (immediacy) of heart disease.<sup>23-24</sup> The question format and response options are reported in Supplementary Material Section 1.

## Results

Tables S2.1 and S2.2 display the additional analyses by risk and graphical format, and p-values for main effects and interactions. There were several risk/graphical format interactions, where the text format of heart age increased numerical risk estimates ( $p=0.001$ ), feeling of risk ( $p<0.001$ ) and worry about heart disease ( $p=0.030$ ) compared to the text format of absolute risk. There was a main effect of graphical format on timeline, where bar graphs appear increased the perceived immediacy of heart disease ( $p=0.008$ ). Finally, younger/same heart age than current age reduced verbal risk perception ( $p=0.017$ ) and feeling of risk ( $p=0.008$ ) compared to absolute risk, but this was not the case for older heart age.

## Discussion

Our previous qualitative research indicated that GPs may avoid assessing and communicating absolute CVD risk when they want to motivate lifestyle change or avoid increasing anxiety amongst lower risk patients.<sup>6,7</sup> These exploratory results suggest that: 1) communicating text-based heart age or adding a bar graph to absolute risk may be beneficial if GPs want to increase risk and illness perceptions for patients with low short-term absolute risk but lifestyle risk factors; and 2) communicating younger heart age may be beneficial for reducing risk perceptions amongst anxious low risk patients, without demotivating good lifestyle behaviours. These hypotheses need to be confirmed in future research.

**Table S2.1: Risk and illness perceptions by risk and graphical format**

	Risk formats:			Heart Age			p values			
	Graph formats:	Absolute risk		Text	Bar	Line	Risk x Graph <sup>¶</sup>	Risk format <sup>**</sup>	Graph format <sup>††</sup>	
		Text (n=85)	Bar (n=105)	Line (n=91)	Text (n=79)	Bar (n=94)	Line (n=116)			
<b>POST-RESULT RISK PERCEPTIONS</b>										
Numerical risk perception <sup>*</sup> , <i>median (IQR)</i>		10 (10 - 30)	20 (10 - 50)	20 (10 - 50)	30 (10 - 50)	20 (10 - 50)	20 (10 - 40)	<b>0.001</b>	0.507	0.977
Verbal risk perception <sup>†</sup> , <i>median (IQR)</i>		2 (2 - 3)	3 (2 - 4)	2 (2 - 4)	3 (2 - 4)	2.5 (2 - 4)	2 (2 - 3)	0.091	0.680	0.415
Feeling of risk perception <sup>†</sup> , <i>median (IQR)</i>		2 (2 - 3)	3 (2 - 4)	3 (2 - 4)	3 (2 - 4)	3 (2 - 4)	2 (2 - 3.8)	<b>&lt;0.001</b>	0.457	0.268
Comparative risk perception <sup>†</sup> , <i>median (IQR)</i>		3 (2 - 4)	3 (2 - 4)	3 (2 - 4)	3 (2 - 4)	3 (2 - 4)	3 (2 - 4)	>0.999	0.292	0.626
<b>POST-RESULT ILLNESS PERCEPTIONS</b>										
Worry (about heart disease) <sup>‡</sup> , <i>median (IQR)</i>		2.5 (0.8 - 4.8)	3.5 (1.2 - 5.0)	3.0 (1.0 - 5.0)	3.0 (1.0 - 5.0)	2.0 (0.5 - 5.0)	2.5 (1.0 - 5.0)	<b>0.030</b>	0.130	0.756
Personal control (of heart disease) <sup>§</sup> , <i>median (IQR)</i>		3.3 (3.0 - 3.7)	3.3 (3.0 - 3.7)	3.3 (3.0 - 3.7)	3.3 (3.0 - 3.7)	3.3 (3.0 - 3.4)	3.3 (3.0 - 3.7)	>0.999	0.345	0.882
Timeline (immediacy of heart disease) <sup>§</sup> , <i>median (IQR)</i>		5 (4.3 - 6.2)	6 (5.0 - 7.3)	5.3 (5.0 - 6.7)	5.3 (5.0 - 6.7)	5.7 (5.0 - 6.7)	5.3 (4.4 - 6.3)	0.200	0.220	<b>0.008</b>
Coherence (understanding of heart disease) <sup>  </sup> , <i>median (IQR)</i>		3 (2.8 - 3.0)	3 (2.8 - 3.0)	3 (2.8 - 3.2)	3 (3.0 - 3.2)	3 (3.0 - 3.1)	3 (2.8 - 3.2)	>0.999	0.117	0.877

\*0-100% scale with 10% increments; †1-7 Likert scale; ‡average of 2 items on 0-10 Likert scale; §average of 3 items on 0-10 Likert scale; ||average of 4 items on 0-10 Likert scale; higher scores indicate more of attribute.

¶Interaction between risk format and graph type tested using a quantile regression for the median of the respective variable.

\*\*Mann-Whitney test, ††Kruskal-Wallis test.

IQR: Interquartile range.

**Table S2.2: Psychological and behavioural outcomes by randomised risk and graphical format**

	Risk formats:			Heart Age			p values			
	Graph formats:	Absolute risk		Text	Bar	Line	Risk x Graph <sup>¶</sup>	Risk format <sup>**</sup>	Graph format <sup>†</sup>	
		Text	Bar	Text	Bar	Line				
		(n=85)	(n=105)	(n=79)	(n=94)	(n=116)			†	
<b>Intention outcomes</b> (post-intervention)										
To reduce smoking <sup>1</sup> , <i>median (IQR)</i>		4.7 (3.3 - 5.3)	4.7 (3.3 - 6.0)	5.0 (4.0 - 7.0)	5.0 (4.0 - 5.5)	20 (10 - 50)	20 (10 - 40)	0.931	0.674	0.485
To improve diet <sup>1</sup> , <i>median (IQR)</i>		4.0 (3.0 - 5.3)	4.3 (3.3 - 5.3)	4.3 (3.0 - 5.7)	4.0 (3.0 - 5.0)	2.5 (2 - 4)	2 (2 - 3)	0.545	0.468	0.420
To improve physical activity <sup>1</sup> , <i>median (IQR)</i>		4.0 (3.3 - 5.3)	4.7 (3.7 - 5.3)	4.7 (3.0 - 5.7)	4.0 (3.7 - 5.0)	3 (2 - 4)	2 (2 - 3.8)	0.144	0.720	0.453
To improve diet/PA or diet/PA/smoking <sup>2</sup> , <i>median (IQR)</i>		4.3 (3.5 - 5.0)	4.5 (3.7 - 5.3)	4.3 (3.3 - 5.8)	4.5 (3.6 - 5.2)	4.0 (3.5 - 5.0)	4.5 (3.5 - 5.2)	0.068	0.724	0.445
To see GP for CVD risk assessment <sup>1</sup> , <i>median (IQR)</i>		2.0 (1.0 - 3.0)	2.0 (1.0 - 3.3)	2.0 (1.0 - 3.7)	2.0 (1.0 - 4.0)	2.0 (1.0 - 3.0)	2.0 (1.7 - 3.3)	>0.999	>0.999	>0.999
<b>Psychological outcomes</b>										
Risk perception (post-intervention), <i>n %</i>										
Results indicate low risk of heart attack/stroke		67 (79%)	90 (86%)	59 (65%)	40 (51%)	47 (50%)	67 (58%)			
Results indicate moderate risk of heart attack/stroke		18 (21%)	14 (14%)	28 (31%)	37 (47%)	42 (45%)	42 (36%)	<b>0.009</b>	<b>&lt;0.001</b>	0.241
Results indicate high risk of heart attack/stroke		0 (0%)	1(1%)	4 (4%)	2 (3%)	5 (5%)	7 (6%)			
Correct recall (post-intervention), <i>n %</i>		50 (59%)	76 (72%)	47 (52%)	48 (61%)	66 (70%)	81 (70%)	<b>0.021</b>	0.140	<b>0.040</b>
Correct recall (after 2 weeks), <i>n %</i>		9 (13%)	16 (19%)	12 (16%)	23 (34%)	25 (31%)	32 (58%)	0.871	<b>&lt;0.001</b>	0.915
Perceived credibility of results <sup>5</sup> (post-intervention), <i>median (IQR)</i>		4.8 (4.0 - 5.8)	5.0 (4.0 - 6.0)	4.8 (4.0 - 5.8)	4.3 (3.3 - 5.3)	4.0 (3.0 - 5.3)	4.8 (3.8 - 5.8)	0.072	<b>&lt;0.001</b>	0.227
Positive emotional response <sup>6</sup> (post-intervention), <i>median (IQR)</i>		6.0 (5.0 - 8.0)	6.3 (5.0 - 7.7)	6.0 (5.0 - 8.0)	5.0 (3.0 - 7.0)	5.0 (4.0 - 7.0)	5.3 (4.0 - 7.5)	0.581	<b>&lt;0.001</b>	0.879

Negative emotional response <sup>6</sup> (post-intervention), <i>median (IQR)</i>	2.0 (1.0 - 4.0)	3.0 (1.0 - 4.0)	2.7 (1.0 - 5.0)	3.0 (1.0 - 5.0)	2.5 (0.7 - 5.0)	2.7 (1.0 - 4.8)	0.175	0.403	0.624
<b>Behavioural outcomes</b>									
Information seeking (post-intervention), <i>n %</i>	81 (95%)	98 (93%)	83 (91%)	73 (92%)	90 (96%)	111 (96%)	0.665	0.428	0.946
Smoker (after 2 weeks), <i>n %</i>	19 (27%)	19 (22%)	20 (27%)	17 (25%)	17 (21%)	21 (23%)	0.919	0.542	0.680
Cigarettes per day (after 2 weeks), <i>median (IQR)</i>	12 (8 - 20)	15 (6 - 20)	10 (5 - 15)	20 (5 - 20)	12 (0 - 20)	10 (3 - 15)	0.357	0.722	0.152
Adequate <sup>3</sup> physical activity (after 2 weeks), <i>n %</i>	28 (39%)	36 (42%)	27 (37%)	30 (44%)	30 (38%)	40 (43%)	0.854	0.671	0.954
Adequate <sup>4</sup> diet (after 2 weeks), <i>n %</i>	13 (18%)	9 (11%)	5 (7%)	8 (12%)	6 (8%)	8 (9%)	0.238	0.361	0.101
Made GP appointment (after 2 weeks), <i>n %</i>	5 (7%)	10 (12%)	8 (11%)	6 (9%)	10 (13%)	11 (12%)	0.789	0.672	0.4323

<sup>1</sup>Average of 3 items on 1-7 Likert scale; <sup>2</sup>Average of 6/9 items on 1-7 Likert scale depending on smoking status; <sup>3</sup>Average of 4 items on 1-7 Likert scale; <sup>4</sup>Average of 3 items on 0-10 Likert scale; <sup>5</sup>≥3 vigorous sessions, or ≥5 moderate sessions, or 1-2 vigorous sessions plus 3-4 moderate sessions, in the last week; <sup>6</sup>≥2 servings of fruit and ≥5 servings of vegetable per day in the last week; higher scores indicate more of attribute.

<sup>¶</sup>Interaction between risk format and graph type tested using a quantile regression for the median of the respective variable.

\*\*Mann-Whitney test, ††Kruskal-Wallis test.

IQR: Interquartile range; PA: physical activity; GP: general practitioner; CVD: cardiovascular disease.