

Wellbeing and food safety

Paper 2

Food and You Waves 1-3 secondary analysis

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Wellbeing and food safety

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**Food and You
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Summary

- Measures of wellbeing are being increasingly used by governments around the world as indicators of social progress, as well as a way of evaluating the impact of health and economic policies. The FSA is similarly interested in the concept of wellbeing and how it relates to its work to protect consumers and represent their interests. To support its aims, in 2014, the FSA introduced four ONS-harmonised wellbeing measures into its flagship consumer survey, Food and You. These were life satisfaction (an ‘evaluative’ dimension), perception of life being worthwhile (a ‘eudemonic’ dimension), and happiness and anxiety (examples of a ‘hedonic’ dimension).
- This paper evaluated the inclusion of these wellbeing measures in Food and You by comparing findings with those for the same indicators in the ONS Annual Population Survey (APS). Levels of personal wellbeing in Food and You were found to be broadly similar to those in the APS, in terms of distribution of ratings and correlations between measures. Some differences were observed, with Food and You respondents reporting slightly higher levels of wellbeing across all four measures of wellbeing.
- The paper then sought to investigate the relationship between food safety and wellbeing, about which very little is currently known. Personal wellbeing has been found to predict a range of health-related behaviours, with higher levels of wellbeing linked with a range of positive health outcomes. As food safety is linked to health, in terms of risk from foodborne illness, it was hypothesised that higher wellbeing might also be linked to the extent to which people undertake activities relating to food safety. Preparing and cooking food for others can also be thought of as a ‘pro-social behaviour’, and as this kind of behaviour has been found to be associated with the eudemonic dimension of wellbeing (relating to the sense of engagement and fulfilment in life), we decided to explore the different dimensions of wellbeing and their relationship with food safety.
- Analysis of food safety and wellbeing found that respondents reporting high levels of life satisfaction and life being worthwhile were more likely to report food safety activities in line with FSA recommendations than those reporting low levels. This did not change after controlling for the effect of social and economic factors, attitudinal statements relating to food safety, and social relationships. No association was found between likelihood of reporting food safety activities in line with Agency recommendations, and levels of anxiety or happiness.
- These findings lend support to the use of wellbeing measures to help quantify the public health benefits of the FSA’s work relating to food safety. Potential applications could include the use of wellbeing measures as part of economic appraisals, impact assessments, benefits mapping and realisation, and for prioritising resources reflecting on the greatest net improvement in social wellbeing. However, further research would be required draw conclusions about the level and direction of causality, and the factors that might explain any relationship.

Introduction

The Food Standards Agency (FSA or ‘the Agency’) is an independent government department responsible for food safety and hygiene in England, Wales and Northern Ireland.¹ As part of the Agency’s responsibility for protecting public health from risks which may arise in connection with the consumption of food, a key priority is the prevention of foodborne illness. Improving understanding of the population’s food safety behaviour, attitudes and knowledge is important to the successful delivery of this aim.

This paper, the second in a series based on secondary analysis of Waves 1–3 of the FSA’s Food and You survey,² focuses on wellbeing and its relationship with food safety.

Wellbeing has long been considered an essential element of both mental and physical health.³ Increasingly, governments around the world are measuring the wellbeing of their populations as an indicator of social progress and the achievement of health and economic policies, alongside other traditional indicators such as growth in GDP. The FSA is similarly interested in the concept of wellbeing and how it relates to the Agency’s work to protect consumers and represent their interests.

In order to inform and evaluate policy and communications, the Agency currently uses a number of information sources, including measures of incidence of foodborne disease, as well as reported behaviours, attitudes and knowledge of consumers. However, the Agency is also interested in exploring the extent to which measures of wellbeing could potentially serve as an additional tool for helping to quantify the public health benefits of the Agency’s work relating to food safety. For example, measures of wellbeing could form part of economic appraisals, impact assessments, and benefits mapping and realisation work. They might also help the FSA prioritise its resources by identifying particular policies and projects than might deliver the largest net improvement in social wellbeing. The Agency has taken a number of steps towards this, including introducing ONS-harmonised measures of wellbeing into its flagship consumer survey, Food and You, and contributing to growing cross-Government engagement with the concept of wellbeing through the ‘What Works Centre for Wellbeing’.⁴ This paper was commissioned to complement ongoing work, by evaluating the wellbeing measures in Food and You and investigating the relationship between food safety and wellbeing, about which very little is currently known.

¹ The FSA was previously the body for food safety across the UK. In April 2015, its responsibilities in Scotland were transferred to the new independent Scottish food safety body, Food Standards Scotland (FSS). This research was commissioned prior to this change, and is based on data from Waves 1–3 of the FSA’s Food and You survey, which was undertaken across the UK. For the purposes of this research, analysis and findings therefore relate to aggregate UK-level data.

² The topics of these papers were developed in consultation with leading academics in the fields of food and social science research, as well with reference to the FSA’s own policy-, science- and consumer-engagement-related priorities.

³ World Health Organisation (2001) Mental Health: New Understanding, New Hope. The World Health Report 2001. http://www.who.int/entity/whr/2001/en/whr01_en.pdf?ua=1

⁴ An independent non-government organization with cross-Government representation that “aims to improve the wellbeing of the people in the UK by bringing together the best evidence, making it easy to use and easier to make”. See <http://whatworkswellbeing.org/about/>

Wellbeing and public health

Because of its relevance to public health, wellbeing is likely to be increasingly relevant to the FSA'. Wellbeing is a complex phenomenon and while some debate remains over aspects of its definition and measurement, there is now a solid foundation in both theory and evidence linking high levels of wellbeing with a range of positive health outcomes, such as reduced levels of chronic disease risk and longer length of life.⁵ However, the links are complex and do not operate equally for different aspects of wellbeing, which can be positive (e.g. meaning in life, happiness) or negative (e.g. anxiety, stress). There is growing evidence that the positive and negative aspects of wellbeing function independently of each other,⁶ and interestingly, mortality has been predicted more strongly by the absence of positive wellbeing than by the presence of negative wellbeing.^{7 8 9} The view that positive and negative wellbeing are distinct domains (the independence view) has led to the practice, employed in this study, of measuring and analysing both domains as separate variables. Wellbeing can also be divided into different dimensions: with eudemonic wellbeing (relating to the sense of engagement and fulfilment in life), evaluative wellbeing (relating to an

overall assessment of aspects of life or life satisfaction) and hedonic wellbeing (relating to emotions such as feelings of happiness and enjoyment, sometimes known as 'experienced' wellbeing). In line with current research in psychology, all these aspects of wellbeing are measured in this study.

In terms of relationships between wellbeing, food and health, there is evidence linking eudemonic wellbeing with some health-promoting activities, including consumption of fruit and vegetables,^{10 11} physical activity, taking up health advice, and not smoking.¹² Beyond this, knowledge of possible links with other food-related health behaviours is very limited, and we were not aware of any other studies that had examined wellbeing alongside food safety. We therefore hypothesised that, as a health-related behaviour, food safety could also be related to wellbeing, and sought to explore this further. Food safety activities may also, depending on social context, affect the health of others as well as the self, and so may be considered as an example of pro-social behaviour. As pro-social behaviour has been found to be associated with the eudemonic dimension of wellbeing we also hypothesised that food safety may be linked to the eudemonic dimension of wellbeing along these lines.¹³

⁵ Ryff C.D. (2014) Psychological well-being revisited: Advances in the science and practice of eudaimonia. *Psychotherapy and Psychosomatics* 83: 10-28.

⁶ Ryff C.D., Diener E., Lay P., Love G., Urry H.L., Muller D., Rosenkranz M.A., Friedman E.M. et al. (2006) Psychological well-being and ill-being: Do they have distinct or mirrored biological correlates? *Psychotherapy and Psychosomatics* 75(2): 85-95.

⁷ Diener E. (1984) Subjective well-being [Review]. *Psychology Bulletin* 95(3): 542-575.

⁸ Huppert F. A. (2009) Psychological well-being: Evidence regarding its causes and consequences. *Applied Psychology: Health and Well-Being* 1(2): 137-164.

⁹ Huppert F. A., and Whittington J. E. (2003). Evidence for the independence of positive and negative well-being: Implications for quality of life assessment. *British Journal of Health Psychology* 8(1): 107-122.

¹⁰ Blanchflower D., Oswald A., Steward S. (2012) Is psychological well-being linked to the consumption of fruit and vegetables? Warwick Economic Research Papers No 996. University of Warwick. <http://wrap.warwick.ac.uk/53081/>

¹¹ Chanfreau J., Lloyd C., Byron C., Roberts C., Craig R., De Feo D., McManus S. (2013) Predicting Wellbeing. <http://www.natcen.ac.uk/media/1127221/what%20predicts%20wellbeing%20-%20full%20report.pdf>

¹² Huffman J., DuBois C., Millstein R., Celano C., Wexler D. (2015) Positive psychological interventions for patients with type 2 diabetes: Rationale, theoretical model, and intervention development. *Journal of Diabetes Research*. <https://www.hindawi.com/journals/jdr/2015/428349/>

¹³ Ryan R., Huta V., Deci E. (2008) Living well: A self-determination theory perspective on eudaimonia. *Journal of Happiness Studies* 9(1):139-170.

Research aims

As this is the first time that the new wellbeing data from the Food and You survey have been analysed, this paper first sets out to evaluate the data in terms of the distribution of responses and the correlation between variables, with comparison to findings from another population survey. The paper then sets out to investigate the issues above, focusing on the following research questions, developed in partnership with the FSA and advice from the expert academic advisor:

- Are higher levels of reported wellbeing associated with a higher likelihood of reporting food safety activities in line with Agency recommendations?
- If so, is this association stronger for some aspects and dimensions of wellbeing than for others?
- What factors might be linked with any association?

About the analysis

The FSA's Food and You survey is a biennial, random probability, cross-sectional survey of adults living in private households in the UK. The survey includes a range of questions around people's reported behaviour, attitudes and knowledge relating to food- and food-safety-related issues. There have been three waves of the survey (2010, 2012 and 2014) and the Office for National Statistics (ONS) harmonised personal wellbeing questions were introduced in the third wave.¹⁴ The analysis here is based on the 3,453 participants aged 16 and over from Wave 3 of the survey.¹⁵

Measuring personal wellbeing in Food and You

The four core ONS-harmonised questions that were included in Food and You capture a range of different aspects and dimensions of wellbeing:

- “Overall, how satisfied are you with your life nowadays?” (*life satisfaction*) – a positive, evaluative measure.

- “Overall, to what extent do you feel the things you do in your life are worthwhile?” (*life being worthwhile*) – a positive, eudemonic measure.
- “Overall, how happy did you feel yesterday?” (*happiness*) – a positive, hedonic measure.
- “Overall, how anxious did you feel yesterday?” (*anxiety*) – a negative, hedonic measure.

Respondents answered each of the four indicators of personal wellbeing using a response scale (0 to 10, where 0 was ‘not at all’ and 10 was ‘completely’). For the three positive statements (*life satisfaction*, *life being worthwhile* and *happiness*) a higher score indicates higher wellbeing. For *anxiety*, which is a negative statement, a higher score indicates lower wellbeing.

Food safety activities

To capture food safety activities, we used the Agency's Index of Recommended Practice (IRP). It is a composite measure which allows participants' responses to be categorised as in line (or not in line) with FSA recommendations, and has been used in previous secondary analysis.¹⁶ The IRP is made up of 10 items based on questions or groups of questions covering five domains of domestic food safety activities: chilling, cooking, cleaning, avoiding cross-contamination and use-by dates. Each

¹⁴ In 2012, the Office for National Statistics (ONS) developed four personal wellbeing questions as part of their Measuring National Wellbeing programme. These questions are grouped together in one of the ten domains that form their wellbeing framework. The domain is named personal wellbeing, because this term was found by ONS to be more meaningful to general readers than the other wider used term, ‘subjective’ wellbeing.

¹⁵ The four measures were screened for possible inconsistent response patterns, e.g. very low score on worthwhile and very high on life satisfaction (two measures which tend to be highly, positively correlated). Five cases showing evidence of random responding have been removed from the analysis to reduce bias in the dataset.

¹⁶ Roberts C., Calcutt E., Hussey D., Howard M., McManus S. (2014) Understanding domestic food safety practices. http://www.food.gov.uk/sites/default/files/869-1-1612_Understanding_domestic_food_safety_practices_report_FINAL_with_cover_0.pdf

item is scored 1 for responses in line with recommendations or 0 for responses not in line with recommendations. The overall score is then converted to a score out of 100 to provide an ordinal measure of general food safety to facilitate analysis.¹⁷

Other variables used in this analysis

We selected other variables from the Food and You survey that we hypothesised (based on previous research, literature and advice from the the expert academic advisor) could affect the direction and/or strength of any relationship seen between wellbeing and food safety (including the possible effect of optimism bias).¹⁸ These were:

- social and economic factors;
- attitudinal statements relating to food safety e.g. 'I often worry about whether the food I have is safe to eat'; and
- indicators of social relationships e.g. cooking for and/or eating with others.

Bivariate analysis was used to identify variables that were significantly associated with IRP score. We then looked at the effect of these variables on the relationship between wellbeing and IRP score. Figure 1 shows a conceptual model outlining the proposed analysis. A full list of the variables used is presented in Appendix Table A5.

Figure 1: Conceptual model outlining the proposed analysis



¹⁷ 'Not applicable' responses are scored as missing so an individual's IRP is calculated based only on those items where respondents have given a valid response. Respondents answering less than half (five) of the ten items do not receive an overall score.

¹⁸ 'Optimism bias' is a psychological construct referring to the tendency to view others as being at greater risk than oneself.

Personal wellbeing in the Food and You survey

Personal wellbeing ratings from Food and You are broadly in line with those from the ONS Annual Population Survey, although Food and You respondents are somewhat more likely to report higher wellbeing. Correlations between the wellbeing indicators were similar to those found in previous research.

Distribution in wellbeing across the population

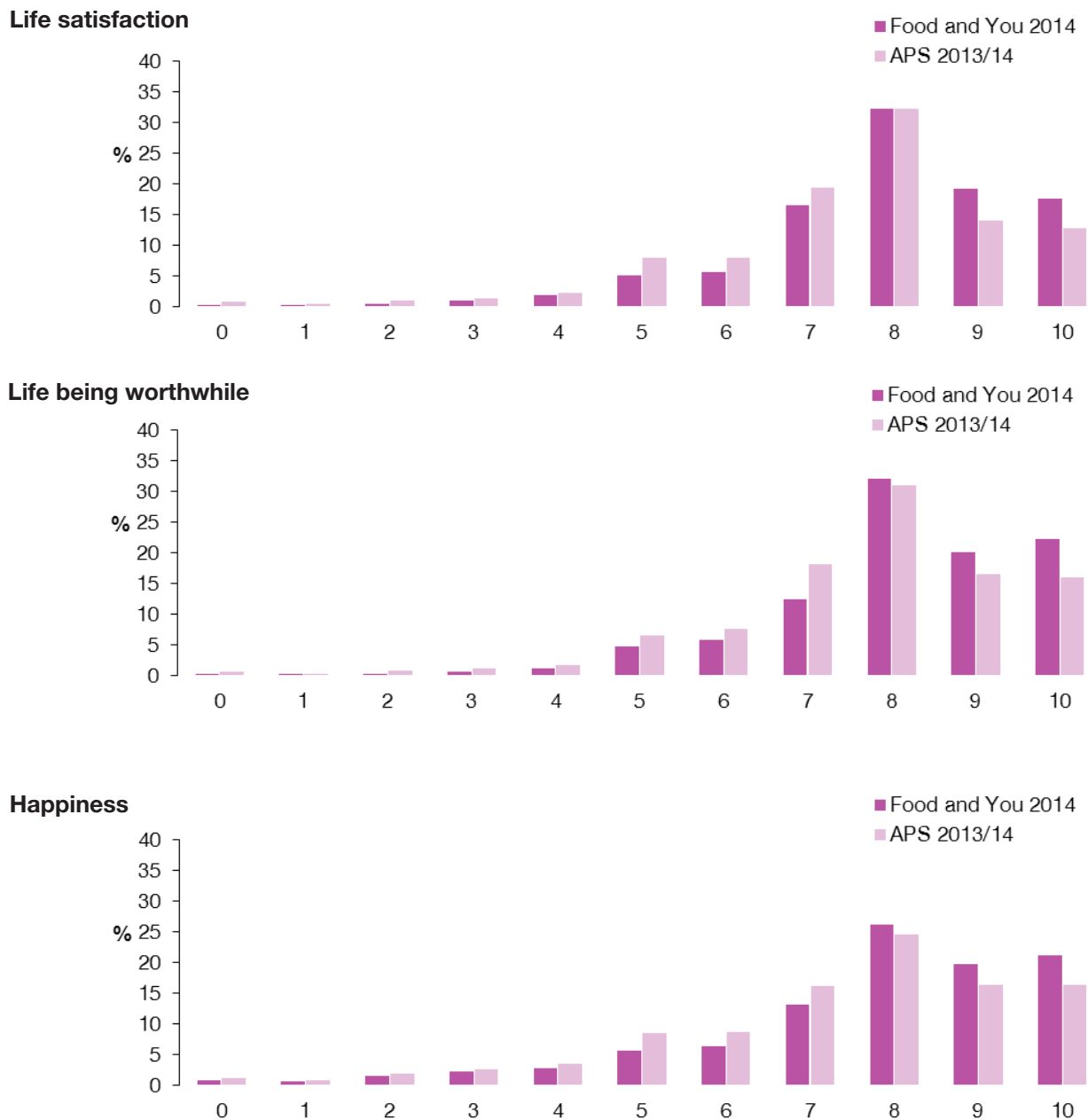
Over a third (37%) of participants in Food and You rated their life satisfaction at the highest levels (9 or 10) compared to 4% at the lowest levels (0 to 4).¹⁹ Forty-three percent of participants rated their perception of what they do as worthwhile at the highest levels compared to 3% at the lowest levels. Similarly, 41% rated their happiness at the highest levels while 8% rated their happiness at the lowest levels. Half (51%) of participants rated their anxiety at the lowest levels (0 or 1, indicating higher wellbeing) compared to 16% at the highest levels (6 to 10, the most anxious).

To check that the personal wellbeing reports are consistent with distributions found elsewhere, we compared the profile of responses found in the Food and You survey dataset with that of the Annual Population Survey (APS). The APS covers a large UK-wide sample (about 165,000 adults aged over 16 years annually) and includes the same four key measures of personal wellbeing that are in Food and You. As Figure 2 shows, levels of personal wellbeing in Food and You were broadly similar to those in APS. However, a higher proportion of Food and You participants than APS participants rated life satisfaction, perception of what they do as worthwhile, and happiness, at the highest levels. For example, 37% of those in Food and You rated their life satisfaction at the highest levels compared to 27% of those in APS. For anxiety, a higher proportion of Food and You participants rated this at the lowest levels compared to APS participants (51% compared to 40%). There may be many reasons for these differences, such as survey length and context, location of the wellbeing questions in the questionnaire, and the topic of the investigation.²⁰

¹⁹ The ONS thresholds are labelled Very low (0-4/ 6-10 for anxiety); Low (5-6/ 4-5 for anxiety); Medium (7-8/ 2-3 for anxiety) and High wellbeing (9-10/ 0-1 for anxiety).

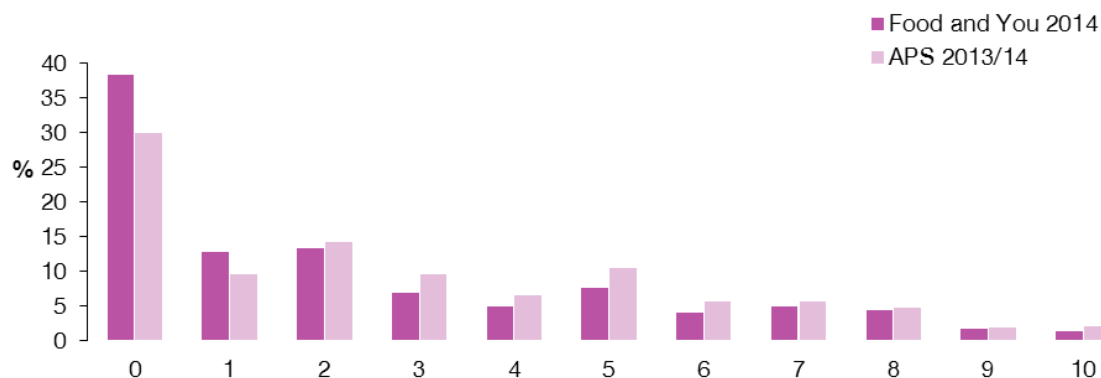
²⁰ Tourangeau R., Rips L., Rasinski, K. (2000) The Psychology of Survey Response. Cambridge University Press.

Figure 2: Distribution of personal wellbeing ratings from Food and You (2014) and Annual Population Survey (2013/14)²¹



²¹ Office for National Statistics (2015) Measuring national well-being: life in the UK, 2015. <http://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing/articles/measuringnationalwellbeing/2015-03-25>

Anxiety



Appendix Table A1

Links between wellbeing indicators

As the four ONS-harmonised measures all relate to personal wellbeing, some association between the four measures would be expected, so someone who responds positively to one measure will also be more likely to respond positively to another. However, as the four indicators measure different aspects of wellbeing, one would also expect some variation in the extent to which the measures are related. A correlation matrix was produced, summarising the strength of associations across the four wellbeing indicators used in Food and You.²² *Life satisfaction* was strongly linked with both the perception of *life being worthwhile* ($r=0.67$) and *happiness* ($r=0.53$). This is not unexpected, given that the questions are all measuring positive aspects of wellbeing and involve a similar process of evaluation. *Anxiety* showed a moderate (inverse) correlation with *happiness* ($r=-0.39$), mainly because both questions relate to the subjective, experienced feelings about

yesterday. A weak inverse (but statistically significant) association was found between *anxiety* and both *life satisfaction* and *life being worthwhile*, which has also been found in other data sources.²³

Appendix Table A2

As the findings in this section suggest, the established and widely-used indicators of personal wellbeing introduced to the 2014 Food and You survey do appear to be generally in line with other datasets such as the much larger Annual Population Survey, both in terms of distribution of ratings and correlations between different indicators. It should be noted that, potentially due to sampling variation or the context within which the questions are asked, respondents within the Food and You survey sample appear to report slightly higher levels of wellbeing across all four measures. However, we do not expect this to have a significant impact on the patterns reported on in this paper.

²² The strength of association between two variables can be summarised with a correlation coefficient. A general rule of thumb for interpreting these coefficients is that a score of:

- 0.50 or more indicates a strong association between two variables;
- 0.30 to 0.49 indicates a weak to moderate association; and
- Less than 0.30 indicates weak, or no, association.

²³ Chanfreau J., Cullinane C., Calcutt E., McManus S. (2014) Wellbeing in Wales: secondary analysis of the National Survey for Wales 2012-13. <http://www.natcen.ac.uk/our-research/research/wellbeing-in-wales/>

Wellbeing and food safety activities

Participants in Food and You who reported high levels of **life satisfaction** and **life being worthwhile** were more likely to report food safety activities in line with FSA recommendations than those with low levels. This did not change after controlling for the effect of social and economic factors, attitudinal statements relating to food safety, and social relationships. There was no association seen between levels of anxiety and happiness, and being more likely to follow recommended food safety activities.

Links between wellbeing and Index of Recommended Practice (IRP) score

Looking at the strength of association between the IRP score (representing the extent to which people report practices in line with recommended practice) and the four wellbeing indicators, there was a weak but statistically significant correlation for perception of life being worthwhile ($r=0.1$) and life satisfaction ($r=0.06$). Respondents reporting higher levels of life being worthwhile and life satisfaction therefore appeared to be slightly more likely to score more highly on the IRP. No correlation was found between IRP score and the 'hedonic' wellbeing measures of happiness and anxiety.

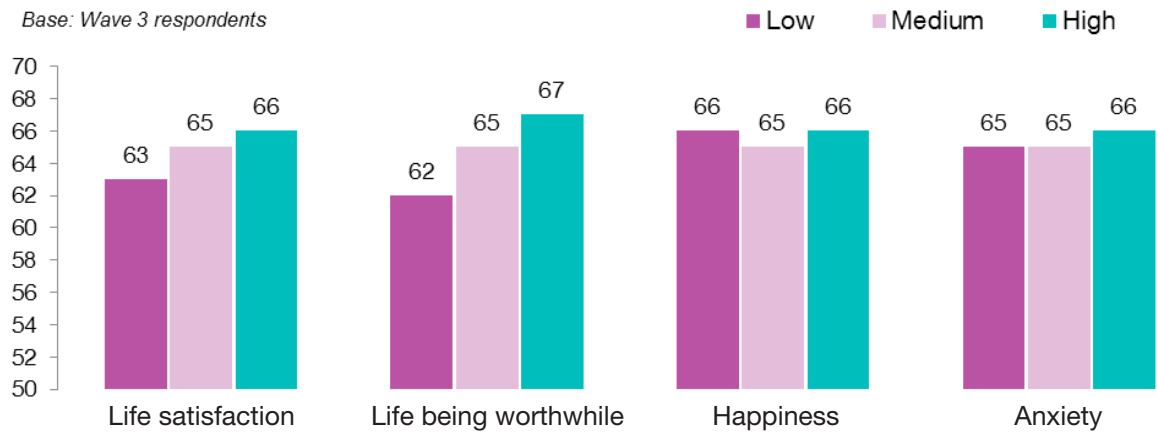
We then grouped the responses into three categories:

- 'low' wellbeing was defined as those who gave scores of 0 to 6 (4 to 10 for anxiety),
- 'medium' wellbeing was defined as a score of 7 or 8 (2 or 3 for anxiety), and
- 'high' wellbeing as a score of 9 or 10 (1 or 0 for anxiety).

These groupings are based on the four ONS threshold groupings,¹⁹ but due to small numbers in this analysis, the 'very low' and 'low' categories are combined to create just three categories.

The mean IRP scores across the three groups are presented in Figure 3. Descriptive analysis showed that people who reported medium and high levels of *life satisfaction* and *life being worthwhile* were more likely to report food safety practices in line with recommended practice (as indicated by a significantly higher IRP score) than those with low levels of wellbeing.

Figure 3: Mean IRP score for low, medium and high categories of wellbeing



Appendix Table A4

Across the four wellbeing indicators, respondents with medium and high levels of wellbeing tended to have a very similar score on the IRP. However, the mean IRP score for people scoring low on *life being worthwhile* was significantly different from the IRP mean of people scoring low on the hedonic *happiness* and *anxiety* measures.²⁴

Other factors influencing the association between wellbeing and IRP score

Given that bivariate analysis showed a significant difference in the mean IRP score and levels of *life satisfaction* and *life being worthwhile*, we ran regression models for each of these two wellbeing indicators, using IRP score as an outcome measure. To be able to monitor an effect of other variables on the relationship between wellbeing and IRP score, and isolate the effects of wellbeing indicators, we controlled for other variables entering them in blocks, the first block being social and economic factors, the second block, attitudinal

statements relating to food safety, and the third block, variables representing social relationships.

Appendix Table A5

For *life being worthwhile*, the initial regression analysis showed that those with medium or high levels of wellbeing had a significantly higher IRP score than those with low levels. Once social and economic factors were entered into the model, only those with high levels of wellbeing had a significantly higher IRP score than those with low levels (medium levels were no longer significant). This relationship remained significant even after attitudinal statements relating to food safety and social relationship variables were added to the model. After controlling for all other variables in the final model, respondents with high levels of *life being worthwhile* scored, on average, 2.7 points more on the IRP scale than those with low levels. As previous research has shown socio-demographic factors are related to IRP scores, we hypothesised

²⁴ Based on an analysis of the 95% confidence interval for mean, coming from the ANOVA (analysis of variance).

that they could affect the direction and/or strength of the relationship between wellbeing measures and IRP score. Indeed, inclusion of other variables in our model resulted in a decrease in the importance of *life being worthwhile* in predicting IRP scores.²⁵ The inclusion of food safety attitudes and variables representing social relationships did not affect the association between life being worthwhile and IRP score.

Appendix Table A6

For *life satisfaction*, in the initial model, only those with high levels of wellbeing had a significantly higher IRP score than those with low levels (medium levels were not significant) and this did not change after controlling for other variables. The same effect of the social and economic variables was observed for *life satisfaction* as for *life being worthwhile* – a decrease in its relative importance in predicting IRP scores. However, the inclusion of food safety attitudes brought a slight increase in its importance, which is related to a significant association of life satisfaction score with food safety attitudes (all except for *People worry too much about getting food poisoning* and *A little bit of dirt won't do you any harm*). The results of the final full model suggest respondents with high levels of *life satisfaction* score, on average, 1.9 points more on the IRP scale than those with low levels.²⁶

Appendix Table A7

Controlling for the same blocks of variables in the relationship between IRP score and both *anxiety* and *happiness* score did not change the initial results; and no association was found.

Individual food safety activities

Given that there may be a strong link for one type of food behaviour only, which would not be picked up within the overall IRP, we also looked at the association between the individual behaviour questions that make up the IRP and wellbeing indicators grouped into low, medium and high as before. We chose to look at just *life being worthwhile* and *anxiety* as these represented the eudemonic and hedonic dimensions of wellbeing. Although no association was found with IRP score, it was hypothesised that there may be a relationship between *anxiety*, concern about food safety, and likelihood of reporting some food safety activities, such as washing hands.²⁷

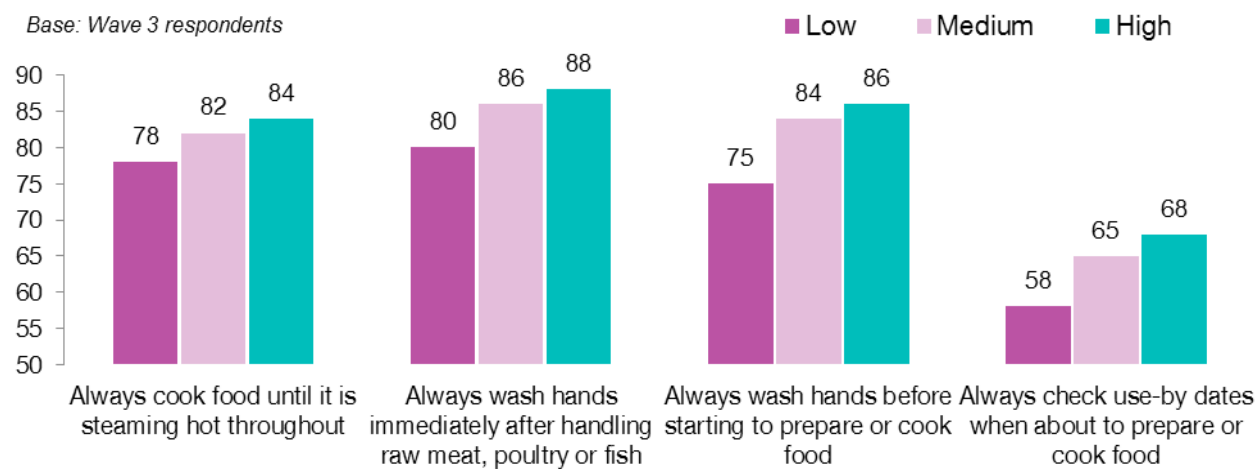
For *life being worthwhile*, the proportion of participants who reported a range of food safety activities in line with Agency recommendations increased with wellbeing level (Figure 4).

²⁵ A decrease in absolute values of the coefficients of life being worthwhile and its relative importance in the model were observed.

²⁶ Regression with numeric transformed wellbeing measures as predictors of IRP score was also carried out as the wellbeing indicators do not have normal distributions and using untransformed variables in the regression could distort relationships and significance tests. The direction and strength of the relationship was found to be the same.

²⁷ Giorgetta C. et al (2012) Reduced risk taking behaviour as a trait feature of anxiety. *Emotion* 12(6): 1373-83

Figure 4: Proportions following recommended practice for some food safety activities by high and low levels of life being worthwhile



Appendix Table A8

For anxiety, there were fewer food safety activities where there were significant differences between levels of wellbeing. Those with medium levels were significantly more likely to report that they always cooked food to steaming hot (recommended practice) than those with high or low levels. Significant differences were found between low, medium and high levels of anxiety in the proportions who ate leftovers on the same day (10%, 14% and 17% respectively).

Appendix Table A9

Discussion and next steps

This analysis found that when looking at high, medium and low levels of wellbeing, higher levels of *life satisfaction* and *life being worthwhile* were significantly associated with scoring higher on the Index of Recommended Practice, even when a wide range of co-variables were included in the model, suggesting this is a robust association. As this association was not seen with *anxiety* and *happiness*, it suggests that there is a clear distinction between eudemonic and hedonic wellbeing as predictors of IRP score.

This resonates with other research cited in the introduction that has found that eudemonic wellbeing is linked with better health outcomes and behaviours than hedonic wellbeing and also the links are stronger than with negative wellbeing. Eudemonia is a way of living that is focused on what is intrinsically worthwhile to human beings and studies indicate that people who score higher on eudemonic living measures tend to behave in more pro-social ways, and are more socially responsible.¹³

What remains unclear are the precise causal links between higher levels of wellbeing and health-promoting behaviours, including food safety activities. The regression analysis was not able to identify what factors might have influenced the association found here, but our previous work has shown that food safety activities are associated with social context and relationships with others, with higher IRP scores seen among younger women, households with children and those who cook for others.¹⁵ The findings of this analysis also suggest that there is more to understand

in terms of identifying factors that explain the relationship between wellbeing and food safety activities, including our relationships with others and pro-social behaviours such as food preparation. The results also support the argument that the hedonic and eudemonic dimensions of positive wellbeing are distinct and should be considered and analysed separately.

These findings lend support to the use of wellbeing measures to help quantify the public health benefits of the FSA's work relating to food safety. Potential applications could include the use of wellbeing measures as part of economic appraisals, impact assessments, benefits mapping and realisation, and for prioritising resources reflecting on the greatest net improvement in social wellbeing. However, further research would be required draw conclusions about the level and direction of causality, and the factors that might explain any relationship.

It should be noted that the four ONS measures do not provide a particularly robust measure of eudemonic wellbeing, as the *life being worthwhile* question is the only item to cover this domain. In future waves of Food and You it may be preferable to include the Warwick-Edinburgh Mental Well-being Scale (WEMWBS), which is a measure that comes out of a positive psychology tradition, and covers this domain more robustly.²⁸ It also includes engagement with others as an aspect of wellbeing.

²⁸ The Warwick-Edinburgh Mental Well-being Scale was funded by the Scottish Government National Programme for Improving Mental Health and Wellbeing, commissioned by NHS Health Scotland, developed by the University of Warwick and the University of Edinburgh, and is jointly owned by NHS Health Scotland, University of Warwick and University of Edinburgh.

Appendix

Table A1: Personal wellbeing ratings from Food and You (2014) and ONS Annual Population Survey (2013/14)

Score	Life Satisfaction		Life being worthwhile		Happiness		Anxiety	
	Food and You 2014 %	ONS 2013/14 %	Food and You 2014 %	ONS 2013/14 %	Food and You 2014 %	ONS 2013/14 %	Food and You 2014 %	ONS 2013/14 %
0	0.2	0.7	0.1	0.6	0.8	1.1	38.3	30
1	0.3	0.4	0.2	0.3	0.7	0.8	12.8	9.5
2	0.4	0.9	0.3	0.7	1.4	1.9	13.3	14.2
3	1.0	1.4	0.6	1.1	2.2	2.5	7.0	9.5
4	1.9	2.2	1.2	1.7	2.7	3.4	4.8	6.5
5	5.0	7.9	4.8	6.5	5.7	8.5	7.7	10.4
6	5.6	8.0	5.9	7.6	6.3	8.6	4.0	5.6
7	16.5	19.4	12.5	18.1	13.1	16.1	4.9	5.7
8	32.3	32.3	32	31.1	26.2	24.6	4.4	4.8
9	19.2	14.1	20.2	16.6	19.7	16.3	1.7	1.9
10	17.6	12.7	22.3	16.0	21.2	16.3	1.3	2.0

Table A2: Correlation matrix for the four personal wellbeing indicators (N=3450)²⁹

Pearson's correlation coefficients	Life satisfaction	Life being worthwhile	Happiness	Anxiety
Life satisfaction	1			
Life being worthwhile	0.667	1		
Happiness	0.533	0.482	1	
Anxiety	-0.245	-0.202	-0.385	1

All correlation coefficients significant at 0.01 level.

²⁹ Five cases showing evidence of random responding have been removed from the analysis.

Table A3: Correlation between four personal wellbeing indicators and IRP score (N=3438)

Pearson's correlation coefficients	Life satisfaction	Life being worthwhile	Happiness	Anxiety
IRP score	0.057**	0.099**	-0.002	-0.030

All correlation coefficient significant at 0.01 level.

Table A4: IRP score by low, medium and high groups for wellbeing indicators (N=3438)

	Low	Medium	High	P-Value
Life satisfaction	63	65	66	0.001
Life being worthwhile	62	65	67	<0.001
Happiness	66	65	66	0.179
Anxiety	65	65	66	0.664

Table A5: List of all the variables in each block

Blocks	Factor	Category	N	%
Socio-economic characteristics	Age*Sex	Male 16-34 (Ref)	527	15
		Male 35-64	808	24
		Male 65+	336	10
		Female 16-34	539	16
		Female 35-64	830	24
		Female 65+	394	12
	Country	England (Ref)	2886	84
		Wales	167	5
		Scotland	291	9
		Northern Ireland	95	3
	Highest educational qualification	Degree or Higher (Ref)	897	26
		A Level/ Diploma/ Apprentice	1171	34
		GCSE	754	22
		Other/None	610	18

Table A5: List of all the variables in each block (cont.)

Blocks	Factor	Category	N	%
Socio-economic characteristics	Housing Tenure	Owner occupied (Ref.)	2235	65.0
		Private tenant	519	15.1
		Social tenant	564	16.4
		missing	120	3.5
	Household size	1 (Ref)	582	65
		2	1220	15
		3+	1636	16
	Presence of a child under age 16 in the household	Yes (Ref)	993	29
		No	2445	71
	Income level	Up to £10,399 (Ref.)	328	10
		£10,400 to £25,999	804	23
		£26,000 to £51,999	886	26
		£52,000+	727	21
		Missing	694	20
	Socio-economic status (NS-SEC)	Managerial/Professional (Ref.)	1312	38
		Intermediate	742	22
		Routine/Manual	1195	35
		Never worked/ longterm unemployed/ not classified	189	6
	Marital status	Single/Widowed/Divorced (Ref.)	1715	50
		Married/Living as married	1716	50
	Ethnicity	White (Ref)	3076	90
		BME/Other	357	10
	Work status	In work (Ref)	1963	57
		Retired	788	23
		Unemployed	137	4
		Other	548	16
	Religion	Christian (Ref)	1967	58
		Non-Christian	252	7
		No religion	1191	35

Table A5: List of all the variables in each block (cont.)

Blocks	Factor	Category	N	%
Socio-economic characteristics	Self-reported health	Good/Very good (Ref)	2787	81
		Fair	512	15
		Bad/Very bad	139	4
	Disability/long-lasting illness	Yes (Ref)	581	17
		No	2855	83
	Index of Multiple Deprivation (quintiles)	1 (Most deprived) (Ref)	637	19
		2	770	22
		3	709	21
		4	693	20
		5 (Least deprived)	627	18
Food safety attitudes	I always avoid throwing food away	Agree (Ref)	1999	58
		Neither agree or disagree	373	11
		Disagree	1061	31
	I am unlikely to get food poisoning from food prepared in my own home	Agree (Ref)	2636	77
		Neither agree or disagree	301	9
		Disagree	493	14
	It's just bad luck if you get food poisoning	Agree (Ref)	783	23
		Neither agree or disagree	464	14
		Disagree	2175	64
	If you eat out a lot you are more likely to get food poisoning	Agree (Ref)	1428	42
		Neither agree or disagree	787	23
		Disagree	1197	35

Table A5: List of all the variables in each block (cont.)

Blocks	Factor	Category	N	%
Food safety attitudes	Restaurants and catering establishments should pay more attention to food safety and hygiene	Agree (Ref)	2574	76
		Neither agree or disagree	589	17
		Disagree	244	7
	I often worry about whether the food I have is safe to eat	Agree (Ref)	773	23
		Neither agree or disagree	425	12
		Disagree	2237	65
	People worry too much about getting food poisoning	Agree (Ref)	1402	41
		Neither agree or disagree	733	22
		Disagree	1265	37
	A little bit of dirt won't do you any harm	Agree (Ref)	1938	57
		Neither agree or disagree	369	11
		Disagree	1125	33
Social	Cook for self	No (Ref)	181	5
		Yes	3201	93
	Cook for others	No (Ref)	702	20
		Yes	2680	78
	Eaten out in last 7 days	No (Ref)	847	25
		Yes	2591	75
	Mainly ate evening meal alone in last 7 days	No (Ref)	2680	78
		Yes	659	19
		No answer	99	3

Table A6: Coefficients of the categorised life being worthwhile measure for all models (N=3293)

		Unstandardized Coefficients ^a		Standardized Coefficients ^a	t	Sig.
		B	Std. Error	Beta		
Model 1	Low (ref)	0.0	-	-	-	-
	Medium	2.4	0.8	8.2	2.989	.003
	High	4.1	0.8	13.8	5.005	.000
Model 2	Low (ref)	0.0	-	-	-	-
	Medium	1.3	0.8	4.4	1.576	.115
	High	2.9	0.8	9.7	3.438	.001
Model 3	Low (ref)	0.0	-	-	-	-
	Medium	1.0	0.8	3.5	1.265	.206
	High	2.7	0.8	9.1	3.247	.001
Model 4	Low (ref)	0.0	-	-	-	-
	Medium	0.9	0.8	3.2	1.154	.249
	High	2.7	0.8	9	3.198	.001

Model 1: constant, worthwhile (3 categories)

Model 2: constant, worthwhile (3 categories), socio-economic characteristics

Model 3: constant, worthwhile (3 categories), socio-economic characteristics, food safety attitudes

Model 4: constant, worthwhile (3 categories), socio-economic characteristics, food safety attitudes, social relationship variables

^a All coefficients have been multiplied by 100 as the IRP is a score out of 100

Table A7: Coefficients of the categorised life satisfaction measure in all stages of the block regression analysis (N=3293)

		Unstandardized Coefficients ^a		Standardized Coefficients ^a	t	Sig.
		B	Std. Error	Beta		
Model 1	Low (ref)					
	Medium	1.5	0.8	4.9	1.863	0.063
	High	2.6	0.8	8.5	3.226	0.001
Model 2	Low (ref)					
	Medium	1	0.8	3.2	1.199	0.231
	High	1.7	0.8	5.6	2.026	0.043
Model 3	Low (ref)					
	Medium	1.1	0.8	3.8	1.430	0.153
	High	1.9	0.8	6.3	2.326	0.020
Model 4	Low (ref)					
	Medium	0.9	0.8	3.1	1.175	0.240
	High	1.9	0.8	6.2	2.267	0.023

Model 1: constant, life satisfaction (3 categories)

Model 2: constant, life satisfaction (3 categories), socio-economic characteristics

Model 3: constant, life satisfaction (3 categories), socio-economic characteristics, food safety attitudes

Model 4: constant, life satisfaction (3 categories), socio-economic characteristics, food safety attitudes, social relationship variables

^aAll coefficients have been multiplied by 100 as the IRP is a score out of 100

Table A8: Food safety activities by levels of life being worthwhile measure

		Low %	Medium %	High %	p-value*
Do you cook food until it is steaming hot throughout?					>0.001
	1 Never	1	1	-	
	2 Sometimes	5	3	3	
	3 Most of the time	10	11	8	
	4 Always	78	82	84	
	5 Not applicable	6	2	4	
Do you wash hands before starting to prepare or cook food?					>0.001
	1 Never	5	1	-	
	2 Sometimes	6	5	3	
	3 Most of the time	10	9	9	
	4 Always	75	84	86	
	5 Not applicable	4	1	1	
Do you wash hands immediately after handling raw meat, poultry or fish?					>0.001
	1 Never	3	1	1	
	2 Sometimes	3	4	2	
	3 Most of the time	5	5	3	
	4 Always	80	86	88	
	5 Not applicable	9	4	5	
Do you check use-by dates when you are about to cook or prepare food?					>0.001
	1 Yes, always	58	65	68	
	2 Yes, depending on the food type	15	17	14	
	3 Sometimes	12	11	8	
	4 Never	14	7	10	
Unweighted Bases		505	1523	1420	

*chi-squared

Table A9: Food safety activities by levels of anxiety measure

		Low %	Medium %	High %	p-value*
Do you cook food until it is steaming hot throughout?					0.01
	1 Never	1	1	-	
	2 Sometimes	3	6	-	
	3 Most of the time	9	13	7	
	4 Always	83	75	89	
	5 Not applicable	4	5	4	
If you made a meal on Sunday, what is the last day that you would consider eating the leftovers?					>0.001
	1 The same day	10	14	17	
	2 Monday	39	39	42	
	3 Tuesday	33	27	27	
	4 Wednesday	12	16	9	
	5 Thursday	3	3	-	
	6 Friday	1	-	1	
	7 Saturday	-	-	-	
	8 The following Sunday	-	-	3	
	9 More than a week	1	-	1	
Unweighted bases		3003	327	118	

*chi-squared

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