European Journal of Public Health, Vol. 24, No. 2, 310–314

doi:10.1093/eurpub/ckt080 Advance Access published on 28 June 2013

Kicking against the pricks: vaccine sceptics have a different social orientation

Jeroen Luyten[1,2], Pieter Desmet[3], Veronica Dorgali[4,5], Niel Hens[1,6], Philippe Beutels[1,7]

1 Centre for Health Economics Research and Modelling Infectious Diseases, Vaccine and Infectious Disease Institute, University of Antwerp, 2610 Wilrijk, Belgium
2 Institute of Philosophy, Catholic University of Leuven, 3000 Leuven, Belgium
3 Erasmus School of Law, Erasmus Universiteit Rotterdam, 3062 PA Rotterdam, The Netherlands
4 Department of Statistics, Informatics, Applications (DISIA), University of Florence, 50134 Firenze, Italy
5 Department of Economics and Management, University of Pisa, 56124 Pisa, Italy
6 Center for Statistics, Hasselt University, 3590 Diepenbeek, Belgium
7 School of Public Health and Community Medicine, The University of New South Wales, Sydney, Australia

Correspondence: Jeroen Luyten, Faculty of Medicine, Centre for Health Economics Research and Modeling Infectious Diseases, Vaccine and Infectious Disease Institute, Faculty of Medicine, University of Antwerp, Universiteitsplein 1, 2610 Wilrijk, Belgium. Tel: +32 3 265 21 51, Fax: +32 3 265 28 77, e-mail: Jeroen.luyten@ua.ac.be

Background: In any country, part of the population is sceptical about the utility of vaccination. To develop successful vaccination programmes, it is important to study and understand the defining characteristics of vaccine sceptics. Research till now mainly focused either on the underlying motives of vaccine refusal, or on socio-demographic differences between vaccine sceptics and non-sceptics. It remained till now unexplored whether both groups differ in terms of basic psychological dispositions. **Methods**: We held a population survey in a representative sample of the population in Flanders, Belgium ($N = 1050$), in which we investigated whether respondents' attitude to vaccination was associated with their basic disposition toward other community members or society in general, as measured by the Triandis and Gelfand social orientation scale. **Results:** We found that sceptics and non-sceptics have a different social orientation, even when several variables are controlled for. More specifically, vaccine sceptics scored significantly lower on both horizontal individualism and horizontal collectivism, indicating a lower disposition to see others as equals. **Conclusion:** These findings need confirmation in the context of different countries. Such insights can be valuable to optimize the design of effective communication strategies on vaccination programmes.

Introduction

A central mission of public health policy is to ensure sufficiently high vaccination coverage in the population.[1,2] Two goals motivate this objective.[3] First, to maximally prevent infections from occurring: either directly in those being vaccinated or indirectly in unprotected individuals through herd immunity (which is a consequence of reduced circulation of pathogens in a largely vaccinated population[4]). Second, to eradicate pathogens, as was the case for smallpox, and is the intention for polio through continued high coverage polio vaccination around the world.[5]

Several countries, however, experience difficulties in reaching optimal participation in vaccination programmes because increasing numbers of individuals hesitate or refuse to become vaccinated,[6–8] often precipitated by misinformation spread by anti-vaccination lobbies. Therefore, an essential policy challenge consists of establishing an effective dialogue between scientists, policy makers and the public at large, with the aim to sustain public trust in public health policies and to convey the need for continued vaccination efforts.[9–14] Such a strategy requires a thoroughgoing understanding of who refuses vaccination, and for which reasons.[6,12]

Research so far has placed opposition to vaccination in four general motivational categories.[15–21] (I) General distrust of vaccination: those who are not convinced by the ratio of risks vs. benefits of vaccines because of a lack of confidence in science, the pharmaceutical industry or public policy. (II) Free rider motives: those who trust vaccination but who consider it an unnecessary intervention for themselves as long as enough others choose to become vaccinated. (III) Cognitive biases: omission bias (the tendency to consider a similar risk worse when it results from action rather than from omission) or hyperbolic discounting (undervaluing the benefits of future disease protection as compared with the present in which adverse effects may occur). (IV) Fundamental objections: those who hold religious or philosophical worldviews that are irreconcilable with vaccination. Socio-demographic factors have also been shown to differ between vaccine refusers and non-refusers, including household income,[22–24] level of education,[23–26] marital status,[6] race[15] and family size,[24] with refusal often being more prevalent in relatively higher educated, wealthier groups.[6,26]

To our knowledge, little is known about the more general cognitive profile of vaccine sceptics. Nonetheless, such information could be essential for the design of social marketing strategies for vaccines.[12] As vaccination is—at least partly—a matter of being solidaristic with others or not, we hypothesized that differences in social orientation, i.e. in one's basic attitude toward other community members and society in general, may translate into a different valuation of vaccines.

Singelis *et al.*[27] and Triandis *et al.*[28] developed an influential framework to study social orientation. This framework distinguishes two basic relational dimensions: a *collectivism/individualism* axis that reflects someone's sense of social cohesion and his/her willingness to prioritize common goals over personal ones, and a *horizontal/vertical* axis that indicates to what degree an individual expects equality or accepts inequality in social relationships.[28,29] This generates the 4-way typology horizontal and vertical individualism and collectivism (HI, VI, HC and VC) represented in figure 1.

Typically, an HI orientation promotes individuality and autonomy on a basis of equality in interpersonal interaction. A VI orientation encourages personal achievement through competitions,

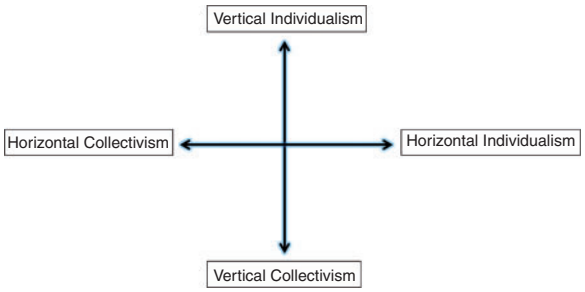

Figure 1 The 4-way typology of social orientation

in which others are predominantly seen as competitors in a hierarchy. An HC orientation emphasizes interdependency, cooperation with others and communal sharing, on a basis of equality. Finally, VC is an orientation that also promotes subordination of personal under group goals while differences in social status and hierarchy are acknowledged. In this article, we report on a survey in which we explored whether vaccine sceptics are different from non-sceptics in terms of these four dimensions of social orientation.

2. Methods

Sample selection

Between March and July 2011, 3740 people were contacted by professional telephone operators using random digit dialing of fixed and mobile telephone numbers (during weekdays from 10 am to 9 pm, on Saturdays from 11 am to 7 pm). Every number was called once, except when respondents asked to call back at a more convenient time. Contacted persons were greeted and asked if they were willing to participate in a scientific survey concerning health policy (without knowing that the subject was vaccination). The 1540 respondents willing to cooperate (41% of those contacted) were consequently asked for their age, gender, educational attainment and location over the five Flemish provinces and were selected when they fulfilled the predetermined quota for these criteria. Consequently, participants were asked whether they wanted to receive the survey either on paper or through an Internet-link, and whether they wanted to return their responses by post (using a prepaid envelope) or online. The sample size of this survey was determined in function of the initial purpose of the survey (a study published elsewhere[30]).

The survey

In our survey, we presented the Triandis and Gelfand scale to determine an individual's position on the four dimensions of social orientation.[28] It consists of 16 value judgements on which every respondent is asked to express his/her agreement on a 5-point Likert scale ranging from 'strongly disagree' to 'strongly agree' (figure 2). All four types of social orientation are characterized by four statements *a priori* designated to reflect one specific type. For example, 'Winning is everything' is held to be a typical VI statement, whereas 'I feel good when I cooperate with others' is held to be typically HC. For every respondent, a score is obtained for all four dimensions (HI, VI, HC and VC) through calculating the average score attributed to the statements belonging to that dimension. The scale has proven to be a valid instrument to indicate how individuals see themselves in relation to other individuals and society as a whole and has been used and validated in numerous studies (for reviews see[31,32]). As the original scale was in English and the respondents are native Dutch (Flemish) speakers, translation and back-translation were conducted to ensure that all items contained equivalent meaning to the original.

To determine the respondents' general attitude toward vaccination, we asked them to indicate their agreement with the following statement on a 5-point Likert scale ranging from 'strongly disagree' to 'strongly agree' (Table 2):

'*If a vaccine exists for a certain disease, then vaccination is usually a good way to protect someone against this disease*'.

In addition, we asked for respondents' age, sex, level of education, profession, ethnic origin of mother and father, family size, age of family members, experience as health care worker, height, weight, smoking status (smoker/non-smoker), experience with travel vaccination, experience with severe illness (personal or within the family) and province, and subjected them to the EQ-5D-3L health survey, including the Visual Analogue Scale. The EQ-5D-3L is a standardized health measurement questionnaire consisting of five health dimensions (mobility, self-care, usual activities, pain/discomfort and anxiety/depression). Respondents can indicate their position on each dimension according to three levels. It allows valuing a patient's present health state in a single score. The Visual Analogue Scale is a rating scale on which respondents can indicate their current health state, ranging from 0, the worst imaginable health state, to 100, the best imaginable health state.[33]

Horizontal Individualism
1. I'd rather depend on myself than others.
2. I rely on myself most of the time; I rarely rely on others.
3. I often do "my own thing."
4. My personal identity, independent of others, is very important to me.

Vertical Individualism
5. It is important that I do my job better than others.
6. Winning is everything.
7. Competition is the law of nature.
8. When another person does better than I do, I get tense and aroused.

Horizontal Collectivism
9. If a coworker gets a prize, I would feel proud.
10. The well-being of my coworkers is important to me.
11. To me, pleasure is spending time with others.
12. I feel good when I cooperate with others.

Vertical Collectivism
13. Parents and children must stay together as much as possible.*
14. It is my duty to take care of my family, even when I have to sacrifice what I want.
15. Family members should stick together, no matter what sacrifices are required.
16. It is important to me that I respect the decisions made by my group*

Figure 2 Triandis' and Gelfand's 16-item scale for horizontal and vertical individualism/collectivism. *Because of unsatisfactory factor loadings, these two items were excluded from the main analysis and were only used in the sensitivity analysis

Analysis

For the statistical analysis, we used SAS and SPSS. We conducted a confirmatory factor analysis of the 16 items of the scale and found the original 4-factor structure replicated. In our sample, all items, except two (VC13 and VC16), highly loaded on the intended dimension. Therefore, in line with the methodology followed in other studies,[34,35] we excluded these two items from the main analysis. The response measuring respondents' attitude toward vaccination was dichotomized, giving 0 to those who indicated 'Agree' and 'strongly Agree' (a positive attitude toward vaccination) and 1 otherwise (a non-positive attitude). First, a univariate regression was performed between every variable in the data set and attitude to vaccination. Then, a logistic regression model was built through forward and backward stepwise selection of all covariates to determine for the 1050 respondents, which variables were significantly associated with attitude to vaccination. The sensitivity of the results was explored by repeating the analyses using different categorizations of the dependent variable, and inclusion of the two previously excluded statements from the scale. Additionally, a mean response model was used to evaluate the impact on the results when the response is treated as continuous (i.e. without dichotomizing the dependent variable).

Results

We reached a sample of 1050 respondents (Table 1), considered representative for the population in Flanders (6 208 877 inhabitants,

about 60% of Belgium[36]). Forty-one percent of the 3740 contacted persons (1540 individuals) consented to participate. Sixty-eight percent of these 1540 candidates were effectively recruited, i.e. 28% of those who were initially contacted. Fifty-one percent of the sample was female, 50% received higher education (university or non-university degree) and the mean age was 43 years.

Five percent of the respondents stated explicitly to be against vaccination, 15% stated to be neutral and 80% considered vaccination a good way to prevent disease (Table 2). The multiple regression results indicated that individuals who indicated a sceptical (i.e. a non-positive) attitude scored significantly lower on the dimensions HC and HI and were less likely to smoke. Per unit increase in their score on HI and HC, respondents had a 28 and 25% lower odds of being vaccine-sceptic, respectively. The odds of non-smokers being vaccine-sceptic were 40% bigger than those of smokers. None of the other variables, including educational attainment, age, current health state, profession or experience with severe illness, had a significant predictive value in the model. On a univariate level, 'vertical collectivism' was the only additional variable with a significant (negative) association. This was no longer significant in the multiple regression model, in which we adjusted for the influence of other variables. The results using the mean response model confirmed a positive association between a more equally oriented profile and a more positive attitude toward vaccination. Furthermore, a second logistic regression model was fitted after reclassifying the neutral responses. However, moving neutral responders from the negative to the positive attitude category resulted in a very small number being classified as having a negative attitude ($n = 51$, or 5%), such that this approach could not produce interpretable estimates. Inclusion of the hitherto omitted Triandis and Gelfand statements (items 13 and 16 in figure 2) did not alter these results.

Table 1 Characteristics of the surveyed population ($N = 1050$)

Variable	Classes	Count (%)
Age	18–25	202 (19)
	26–35	222 (21)
	36–50	241 (23)
	51–60	194 (18)
	61–76	191 (18)
Sex	Male	517 (49)
	Female	533 (51)
Education	None or primary education	28 (3)
	Professional secondary education	76 (7)
	Technical or general secondary education	426 (40)
	Higher non-university education	374 (36)
	University	146 (14)
Profession[a]	Self-employed	125 (12)
	Office worker	540 (53)
	Manual worker	111 (11)
	Houseman/housewife	82 (8)
	Disabled	47 (5)
	Unemployed	28 (3)
	Student	53 (5)
	Other	37 (4)

[a]For 27 respondents, profession was missing.

Discussion

This study identified social orientation as an important determinant of attitude toward vaccination. Our results show that the values of horizontal individualism and horizontal collectivism are associated with whether people take a positive stand toward vaccines. These findings are notable for two reasons. First, given that social orientation was identified as a more important determinant than other more commonly reported socio-demographic variables (such as e.g. education or professional group), our findings underscore the value of investigating the psychological determinants of vaccine scepticism. Second, vaccination is a solidaristic intervention that benefits both the vaccinated individual and the wider community, whereas the risks associated with vaccination remain strictly private. Therefore, one might intuitively expect that people's attitude toward vaccination will be determined by the individualistic vs. collectivistic social orientation of individuals. However, our findings demonstrate that it is not so much individualism or collectivism that is of importance, but particularly the degree to which people value equality in their social relations. The more people see others as equals, the more positive they stand toward vaccination.

Findings like ours may help to improve the design of effective communication strategies for vaccines. In several countries, marketing research has shown that advertisements are more persuasive when their appeal is matched to the social orientation of their targeted audience.[37,38] Individuals who scored high on HI, VI, HC or VC were found to be more susceptible for messages that emphasized self-direction, power, universalism and tradition, respectively.[32] For instance, the higher the HC orientation of participants, the more they were in favour of a brand selling a shopping bag with which 'you're doing your part to save the environment'. The higher the HI orientation, the more participants liked a brand selling T-shirts for which you could 'pick your color, pick your message, and pick your

Table 2 Overview of the sample's attitude to vaccination and logistic regression results of the significant covariates of a sceptical attitude toward vaccines

Attitude to vaccination					
'Vaccination is a good way to prevent disease…'	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
Count (%)	16 (2)	35 (3)	159 (15)	514 (49)	326 (31)

Logistic regression

Effect	**Crude odds ratio**			**Adjusted odds ratio[a]**		
	Point estimate	**95% confidence interval**	***P*-value**	**Point estimate**	**95% confidence interval**	***P*-value**
Smoking status (yes vs. no)	0.640	0.467–0.882	0.0059	0.597	0.424–0.841	0.0031
Horizontal collectivism	0.711	0.611–0.825	<0.0001	0.759	0.642–0.897	0.0012
Horizontal individualism	0.791	0.681–0.917	0.0018	0.724	0.617–0.849	<0.0001

[a]List of non-significant parameters: age, gender, educational attainment, professional group, EQ-5D score, Visual Analogue Scale score, personal experience with severe illness, experience with severe illness in the family, origin mother, origin father, experience with travel vaccination, experience as health care worker, family size, age family members, province, height, weight, vertical individualism and vertical collectivism.

style'.[32] Vaccination could be promoted by appealing to HC values like solidarity and interdependence (e.g. 'vaccination is a matter of taking care of each other') or HI values such as individual freedom and self-expression (e.g. 'vaccines enable you to safely explore the world by traveling' or 'vaccines enable your children to play safely with other children'). Our findings suggest that such marketing strategies are less likely to be persuasive in vaccine-sceptical groups because these groups have a significantly lower HC and HI orientation. However, as we also found a positive association between valuing equality and having a more pro-vaccination attitude, our findings also project that vaccine scepticism may diminish through more structural strategies aimed at stimulating HI and HC orientations. One could speculate that large events that speak to HI or HC values such as music festivals or election days present an opportunity to embed pro-vaccine messages.

Some limitations of our study should be mentioned. First, our study may be influenced by the Flemish context (culture, education, experience with vaccination, etc.). It is noteworthy that most (but not all) childhood vaccines are given free of charge in Belgium. Although only polio vaccination is compulsory,[39] uptake is high for most vaccines,[40] and has remained largely unscathed by general and specific anti-vaccine lobby campaigns (e.g. false claims of causal links between measles-mumps-rubella vaccine and autism[41] and hepatitis B vaccine and multiple sclerosis[42]). Second, non-response bias is always a potential concern in survey-based research. We believe that the overall response (41% of contacted persons consented to participate) was acceptable, given the design and nature of the study. Third, this was an exploratory study. Further research in this area could expand the methodology we used with alternative and/or more specific instruments to capture attitude to vaccination and social orientation. Certainly it would be interesting to validate our study in other countries and to investigate the influence of other psychological attributes, perhaps also on other forms of health care refusal. As the success of infectious disease prevention largely depends on collective cooperation, all knowledge about what differentiates sceptics from non-sceptics allows more successful anticipation, communication and education. The identification of social orientation as an explanatory factor for vaccine scepticism presents an opportunity to conduct further research in this direction.

Acknowledgements

The authors thank market research company 'Day One' for administering the survey and collecting the data. They also thank the anonymous reviewers for their valuable remarks that greatly improved the manuscript.

Funding

The authors acknowledge funding from The Research Foundation - Flanders (FWO, project number G098911N) and the Flemish Agency for Innovation by Science and Technology (IWT, project number 060081).

Conflicts of interest: None declared.

Key points

- Anti-vaccination attitudes are a rising public health concern.
- In this study, vaccine sceptics were found to have a different social orientation.
- Our research helps understanding what drives vaccine sceptics.
- This insight can help improve the effectiveness of communication about vaccination.

References

1 Omer SB, Salmon DA, Orenstein WA, et al. Vaccine refusal, mandatory immunization, and the risks of vaccine-preventable diseases. *N Engl J Med* 2009;360:1981–8.

2 Dawson A. The moral case for the routine vaccination of children in developed and developing countries. *Health Aff (Millwood)* 2011;30:1029–33.

3 Diekema D, Marcuse E. Ethical issues in the vaccination of children. In: Bayer R, Gostin L, Jennings B, Steinbock B, editors. *Public Health Ethics: Theory, Policy and Practice*. New York: Oxford University Press, 2007: 279–88.

4 Fine P, Eames K, Heymann DL. "Herd immunity": a rough guide. *Clin Infect Dis* 2011;52:911–6.

5 Dowdle WR, Cochi SL. The principles and feasibility of disease eradication. *Vaccine* 2011;29(Suppl 4):D70–3.

6 Gust DA, Darling N, Kennedy A, et al. Parents with doubts about vaccines: which vaccines and reasons why. *Pediatrics* 2008;122:718–25.

7 Gill DG. Vaccine refusal and the risks of vaccine-preventable diseases. *N Engl J Med* 2009;361:723; author reply 4.

8 Poland GA, Jacobson RM. Understanding those who do not understand: a brief review of the anti-vaccine movement. *Vaccine* 2001;19:2440–5.

9 Cooper LZ, Larson HJ, Katz SL. Protecting public trust in immunization. *Pediatrics* 2008;122:149–53.

10 Benin AL, Wisler-Scher DJ, Colson E, et al. Qualitative analysis of mothers' decision-making about vaccines for infants: the importance of trust. *Pediatrics* 2006; 117:1532–41.

11 Leask J, Chapman S, Hawe P, et al. What maintains parental support for vaccination when challenged by anti-vaccination messages? A qualitative study. *Vaccine* 2006;24: 7238–45.

12 Opel DJ, Diekema DS, Lee NR, et al. Social marketing as a strategy to increase immunization rates. *Arch Pediatr Adolesc Med* 2009;163:432–7.

13 Hammer LD, Curry ES, Harlor AD, et al. Increasing immunization coverage. *Pediatrics* 2010;125:1295–304.

14 Kata A. A postmodern Pandora's box: anti-vaccination misinformation on the Internet. *Vaccine* 2010;28:1709–16.

15 Asveld L. Mass-vaccination programmes and the value of respect for autonomy. *Bioethics* 2008;22:245–57.

16 Blume S. Anti-vaccination movements and their interpretations. *Soc Sci Med* 2006; 62:628–42.

17 Luyten J, Vandevelde A, Van Damme P, et al. Vaccination policy and ethical challenges posed by herd immunity, suboptimal uptake and subgroup targeting. *Public Health Ethics* 2011;4:280–91.

18 Lee M, Male M. Against medical advice: the anti-consumption of vaccines. *J Consum Mark* 2011;28:484–90.

19 Kaplan M, Y K. Anti-consumption of public services: vacci(not)ion for swine flu. *Manag Res Rev* 2011;34:353–63.

20 Jacobson RM, Targonski PV, Poland GA. A taxonomy of reasoning flaws in the anti-vaccine movement. *Vaccine* 2007;25:3146–52.

21 Kaplan M, Kaplan Y. Anti-consumption of public services: vacci(not)ion for Swine Flu. *Manag Res Rev* 2011;34:353–63.

22 Kennedy AM, Brown CJ, Gust DA. Vaccine beliefs of parents who oppose compulsory vaccination. *Public Health Rep* 2005;120:252–8.

23 Mollema L, Wijers N, Hahne SJ, et al. Participation in and attitude towards the national immunization program in the Netherlands: data from population-based questionnaires. *BMC Public Health* 2012;12:57.

24 Smith PJ, Chu SY, Barker LE. Children who have received no vaccines: who are they and where do they live? *Pediatrics* 2004;114:187–95.

25 Wei F, Mullooly JP, Goodman M, et al. Identification and characteristics of vaccine refusers. *BMC Pediatr* 2009;9:18.

26 Hak E, Schonbeck Y, De Melker H, et al. Negative attitude of highly educated parents and health care workers towards future vaccinations in the Dutch childhood vaccination program. *Vaccine* 2005;23:3103–7.

27 Singelis T, Triandis H, Bhawuk D, et al. Horizontal and vertical dimensions of individualism and collectivism: a theoretical and measurement refinement. *Cross Cult Res* 1995;29:240–75.

28 Triandis HC, Gelfand MJ. Converging measurement of horizontal and vertical individualism and collectivism. *J Pers Soc Psychol* 1998;74:118–28.

29 Triandis HC. Individualism-collectivism and personality. *J Pers* 2001;69:907–24.

30 Luyten J, Dorgali V, Hens N, et al. Public preferences over efficiency, equity and autonomy in vaccination policy: An empirical study. *Soc Sci Med* 2013;77:84–9.

31 Oyserman D, Coon HM, Kemmelmeier M. Rethinking individualism and collectivism: evaluation of theoretical assumptions and meta-analyses. *Psychol Bull* 2002; 128:3–72.

32 Shavitt S, Torelli C, Riemer H. Horizontal and Vertical individualism and collectivism: implications for understanding psychological processes. In: Gelfand M, Chi-yue C, Hong Y, editors. *Advances in Culture and Psychology*. New York: Oxford University Press, 2010: 384.

33 Brazier J, Ratcliffe J, Salomon J, et al. *Measuring and Valuing Health Benefits for Economic Evaluation*. Oxford: Oxford University Press, 2007.

34 Li F, Aksoy L. Dimensionality of individualism-collectivism and measurement equivalence of Triandis and Gelfand's scale. *J Bus Psychol* 2007;21:313–29.

35 Ng KY, Van Dyne L. Individualism-collectivism as a boundary condition for effectiveness of minority influence in decision making. *Organ Behav Hum Decis Process* 2001;84:198–225.

36 Statbel. Population. Brussels. http://statbel.fgov.be/nl/statistieken/cijfers/bevolking/ (15 June 2013, date last accessed) (2011).

37 Shavitt S, Lalwani AK, Zhang J, et al. The horizontal/vertical distinction in cross-cultural consumer research. *J Consum Psychol* 2006;16:325–42.

38 Torelli CJ, Özsomer A, Carvalho SW, et al. Brand concepts as representations of human values: do cultural congruity and compatibility between values matter? *J Mark* 2012;76:92–108.

39 Haverkate M, D'Ancona F, Giambi C, et al. Mandatory and recommended vaccination in the EU, Iceland and Norway: results of the VENICE 2010 survey on the ways of implementing national vaccination programmes. *Euro Surveill* 2012;17:article 4.

40 Theeten H, Vandermeulen C, Roelants M, et al. Coverage of recommended vaccines in children at 7-8 years of age in Flanders, Belgium. *Acta Paediatr* 2009;98:1307–12.

41 Farrington CP, Miller E, Taylor B. MMR and autism: further evidence against a causal association. *Vaccine* 2001;19:3632–5.

42 Ascherio A, Zhang SM, Hernan MA, et al. Hepatitis B vaccination and the risk of multiple sclerosis. *N Engl J Med* 2001;344:327–32.

European Journal of Public Health, Vol. 24, No. 2, 314–321

doi:10.1093/eurpub/ckt040 Advance Access published on 26 March 2013

Examining self-rated health of young Central and Eastern Europeans in the context of other world regions

Margot I. Witvliet[1], Onyebuchi A. Arah[1,2], Karien Stronks[1], Anton E. Kunst[1]

1 Department of Public Health, Academic Medical Center (AMC), University of Amsterdam, 1100 DD Amsterdam, The Netherlands
2 Department of Epidemiology, UCLA Fielding School of Public Health, Los Angeles, CA 90095-1772, USA

Correspondence: Margot I. Witvliet, Department of Public Health, Academic Medical Center (AMC), University of Amsterdam, PO Box 22660, 1100 DD Amsterdam, The Netherlands, Tel: +31 (0) 20 5664828, Fax: +31 (0) 20 6972316, e-mail: m.witvliet@amc.uva.nl

Background: Poor health is more prevalent in the East of Europe as compared with the West. This variation is often attributed to Soviet communism. Few studies investigate this health discrepancy within young adults who were children during this period. We studied the health of young adults by examining variations between world regions in general health between generations (18–65+). The individual and contextual mechanisms that might influence their health were also investigated. **Methods:** World Health Survey data were analysed on young adults aged 18–34 ($n = 91\,823$) and their elders aged 35+ ($n = 132\,362$) from 59 countries. Main outcome was self-reported general health. Multi-level logistic regression was used to assess associations between general health and regions, while accounting for individual- and country-level socio-economic factors across age ranges. **Results:** The prevalence of poor health was much higher for young adults in the Former Soviet Union region than in Western Europe, with the Central European region being in-between.This pattern remained even after full adjustments, for the Former Soviet Union citizens [odds ratio 4.26 (95% confidence interval 1.77–10.24)] and for Central Europeans [odds ratio 1.73 (95% confidence interval 0.90–3.32)] as compared with Western Europe. Age-specific analyses showed East–West health differences usually being larger as age increases (up to 65+). This age pattern seemed reversed for the South–West divide. **Conclusions:** The East–West health gap seems more pronounced for the Former Soviet Union young adults, rather than Central Europeans. It appears as though young adults from Central Europe might have been somewhat insulated from the ill-health effects of communism.

Introduction

Research studies on countries within Central Europe and the Former Soviet Union tend to find that people within these regions have poorer health as compared with people within other countries.[1,2] It is usually concluded that poor health prevalence in people within Central Europe and the Former Soviet Union, as compared with Western Europeans, is attributed to the historical phenomenon related to their communist past.[2,3] Many studies, however, have only examined the Central European and the Former Soviet Union population as a whole, without specifically investigating the health of the younger generations.

Not much is known about health differences between generations within these regions, although it can be argued that, in general, young adults are usually healthier as compared with their elders. However, given the unique history, there might be stark differences in prevalence of poor health between generations. For example, the health of young people (i.e. those aged 18–34) within Central