

## Modern health worries in medical students

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### Abstract

**Objective:** The aim of this study was to investigate the association between modern health worries (MHW), subjective health complaints, and use of health care services in first-year Dutch medical students, and to compare MHW in Dutch and New Zealand cohorts. **Methods:** Two hundred and twenty-seven Dutch first-year medical students completed questionnaires assessing MHW, subjective health complaints, positive and negative affect (PA and NA, respectively), and use of health care services. **Results:** Dutch medical students were most concerned about drug resistant bacteria and least concerned about vaccination programmes. Overall, female

students were more concerned about modern health issues than were male students. Students' scores on the MHW scale were significantly associated with subjective health complaints. Subjective health complaints were also significantly related to the use of health care services. The factor structure of the MHW scale was replicated. Respondents reported significantly lower scores on all MHW items than did New Zealand students. **Conclusions:** Worries about modernity are reliably associated with subjective health complaints and use of health care services in Dutch medical students.

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*Keywords:* Attitude toward health; Health care utilization; Medical students; Modernity; Subjective health

### Introduction

Individuals are becoming increasingly worried about potential environmental health threats such as environmental pollution, radiation from cell phones, genetically modified food, and depletion of the ozone layer [1]. A number of factors are believed to be associated with the heightened societal concern for environmental health threats, including the difficulty in adjustment to the rapid introduction of new technologies. New knowledge is often associated by the public with new potential health threats (such as the discovery of a hole in the ozone layer), and new technologies, such as in the field of genetics and food processing, are accompanied by public distrust and concern [2]. Furthermore, increased media attention on the environmental causes of illness and the underreporting of more plausible factors associated with the development of

diseases, such as lifestyle factors, are believed to heighten public concern [3–5]. Finally, individuals are believed to be increasingly aware of health issues and of their vulnerability to illness [6].

Along with a heightened societal concern for environmental health threats, an increase in functional somatic environmentally associated diseases, such as sick building syndrome, multiple chemical sensitivity syndrome, and mercury poisoning from dental fillings, is reported [7–11]. Increased concerns about the environment and modernity have been found to be related to symptom reporting [12,13], use of alternative health care services, and individuals' perceptions of the cause of illness [1]. Normal everyday symptoms are nowadays more easily interpreted as being signs of disease [14].

In a study on modern health worries (MHW) in New Zealand medical students, Petrie et al. [1] presented the MHW scale and examined its relationship to symptoms and perceptions of health and health care utilization. Researchers have been consistent in finding a high prevalence of stress-related health problems in this group

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of individuals [15,16]. Our aim was to investigate the MHW of first-year Dutch medical students and their possible role in students' health complaints and utilization of health care services. We hypothesized that students' MHW would be significantly related to both their health complaints and medical care utilization. We also predicted that health complaints would mediate the relationship between MHW and medical care utilization. Finally, we sought to investigate whether the nature and strength of the MHW reported by students in New Zealand would be similar to those in Dutch students.

**Method**

*Participants*

A total of 227 first-year medical students from Leiden University Medical Centre participated in this study. The group was composed of 58 males (26.4%) and 162 females (73.6%; 7 individuals did not report their gender), with a mean age of 19.3 years (S.D.=2.1; range=17–35).

*Procedure and instruments*

At the time of this study, the students were enrolled in a first-year course on psychosocial development. They were asked to complete an anonymous questionnaire. All students agreed to participate.

*Modern health worries*

We used a Dutch translation of the MHW scale to investigate to what extent students were worried about aspects of modern life that could affect their health. Items were scored from 1 (*no concern*) to 5 (*extreme concern*). The scores on all items were summed to obtain a total MHW score, with higher scores indicating more concern.

*Subjective health complaints*

We used a Dutch version of the Subjective Health Complaints scale (SHC; [17,18]). The scale comprised 29 items focussing on the severity and duration of subjective somatic and psychological complaints, from which five factors can be derived: musculoskeletal pain, pseudoneurology, gastrointestinal problems, allergy, and flu. Students were asked to rate, on a four-point scale (*not at all*=0, *severely*=3; Cronbach's  $\alpha$ =.80), how severely they were affected by each complaint in the last month and the duration (number of days) of each complaint during the last month.

*Positive and negative affect*

To assess these two affective state dimensions, we used the Dutch translation of the Positive and Negative Affect Schedule (PANAS) with two subscales, Positive Affect (PA) and Negative Affect (NA), each consisting of 10 items reflecting distinct mood states [19]. Students were asked to

rate on a five-point scale (ranging from *not at all* to *extremely*), the extent to which they generally (or on average) experience each mood state. The scores on each item were summed, with higher scores indicating higher ratings of PA or NA (Cronbach's  $\alpha$  PA scale=.85; Cronbach's  $\alpha$  NA scale=.81).

*Use of health care services*

Students were asked to report their number of visits to their general practitioner, a medical specialist, a psychologist or psychiatrist, a physiotherapist, and an alternative healer in the last year, on a four-point scale ranging from 1 (*never*) to 4 (*five times or more*). They were also asked to report how often they used prescribed drugs, over-the-

Table 1  
Principal components analysis of the Modern Health Worries scale, factor scores, and Cronbach's  $\alpha$  for each factor

MHW scale items	Toxic interventions	Environmental pollution	Tainted food	Radiation
Leakage from microwave ovens	<b>.72</b>	.15	.09	.12
Bacteria in air conditioning systems	<b>.70</b>	.20	.19	.05
Contaminated water supply	<b>.69</b>	.29	.20	-.03
Amalgam dental fillings	<b>.68</b>	.08	.26	.14
Fluoridation of water	<b>.66</b>	.11	.30	.20
Toxic chemicals in household products	<b>.63</b>	.31	.22	.11
Overuse of antibiotics	<b>.49</b>	.19	.43	-.01
Medical and dental X-rays	<b>.47</b>	.13	-.09	.42
Vaccination programmes	<b>.45</b>	.07	.33	.18
Poor building ventilation	<b>.40</b>	.12	.38	.14
Traffic fumes	.15	<b>.88</b>	.20	.03
Depletion of the ozone layer	.20	<b>.82</b>	.16	.06
Other environmental pollution	.21	<b>.81</b>	.19	.06
Air pollution	.16	<b>.80</b>	.19	.12
Pesticide spray	.23	<b>.55</b>	.49	-.02
Noise pollution	.25	<b>.41</b>	.26	.15
Antibiotics in food	.23	.19	<b>.83</b>	.11
Hormones in food	.20	.20	<b>.82</b>	.19
Pesticides in food	.38	.30	<b>.65</b>	.11
Additives in food	.21	.31	<b>.64</b>	.32
Drug-resistant bacteria	.47	.21	<b>.56</b>	-.09
Genetically modified food	.18	.40	<b>.53</b>	.23
Radio or cell phone towers	.08	-.02	.17	<b>.81</b>
High-tension power lines	.19	.12	.15	<b>.65</b>
Cell phones	.04	.08	.10	<b>.67</b>
<i>n</i>	225	223	226	227
Total sums of squared loadings	9.63	1.59	2.04	1.35
Percent explained variance (%)	38.5	6.3	8.2	5.4
Cronbach $\alpha$	.86	.88	.89	.63
Total Cronbach $\alpha$	.93			

Bold=Retained items in factors.

counter drugs (such as aspirin), and homeopathic drugs in the last year, on a four-point scale, ranging from 1 (*never*) to 4 (*everyday*). The scores on each item were summed to obtain a total score, with higher scores indicating a more frequent use of health care services (Cronbach's  $\alpha = .78$ ).

## Results

### Factor structure of the Dutch MHW scale

Principal components analysis with a forced choice of four factors, using varimax rotation, of the Dutch version of the MHW scale revealed a comparable factor structure to that of the original version ([1]; Table 1), with one exception: One item in the Dutch version (“drug-resistant bacteria”) did not load highest on the same factor as it did in the New Zealand study. To be able to compare our findings with those of the original study, we choose to reallocate that one item in accordance with the factor structure of the original version of the MHW scale [1]. Internal reliability assessed by Cronbach's  $\alpha$ , of the four subscales, was comparable with those obtained in the New Zealand study ([1]; Table 1). We labelled them according to the original version of the MHW scale: “toxic interventions”, “environmental pollution”, “tainted food”, and “radiation”.

### MHW scores

Medical students reported being most concerned about “drug-resistant bacteria”, “depletion of the ozone layer”, and “traffic fumes” (25.5%, 23.7%, and 18.5% of students,

respectively, were “very worried” or “extremely worried”), and least about “vaccination programmes” (75.3% of students were “not worried”). Overall, the profile of the Dutch medical students' scores was comparable to that of the university students involved in the New Zealand study, except that Dutch students scored lower on all MHW items (see Fig. 1). Independent samples *t* tests showed that Dutch medical students scored significantly lower on all four factors when compared with New Zealand students [toxic interventions: mean=39.06 (S.D.=12.69) vs. mean=55.62 (S.D.=16.15); environmental pollution: 48.12 (14.19) vs. 65.18 (16.93); tainted food: 44.43 (16.32) vs. 55.70 (20.81); radiation: 28.49 (10.10) vs. 44.50 (16.90), for Dutch ( $n=227$ ) vs. New Zealand ( $n=526$ ) students, respectively; all differences in means statistically significant at  $P < .001$ ].

### Use of health care services

Compared with Dutch individuals between the ages of 20 and 44 [20], medical students made, in 1 year, fewer visits to a general practitioner (a mean of 2.2 visits compared with 4.0), medical specialist (1.4 visits vs. 1.7), and physiotherapist (1.4 visits vs. 2.5). In addition, a lower percentage of students (6.6%) made one or more visits to an alternative healer in 1 year compared with Dutch individuals between ages 20 and 44 (8.1%). However, a larger percentage of medical students used prescribed drugs (44.8% vs. 25.4%) and over-the-counter drugs (63.6% vs. 40.8%). It was not possible to test the statistical significance of these differences because the specific data were not available (Dutch individuals between ages 20 and 44 [20]).

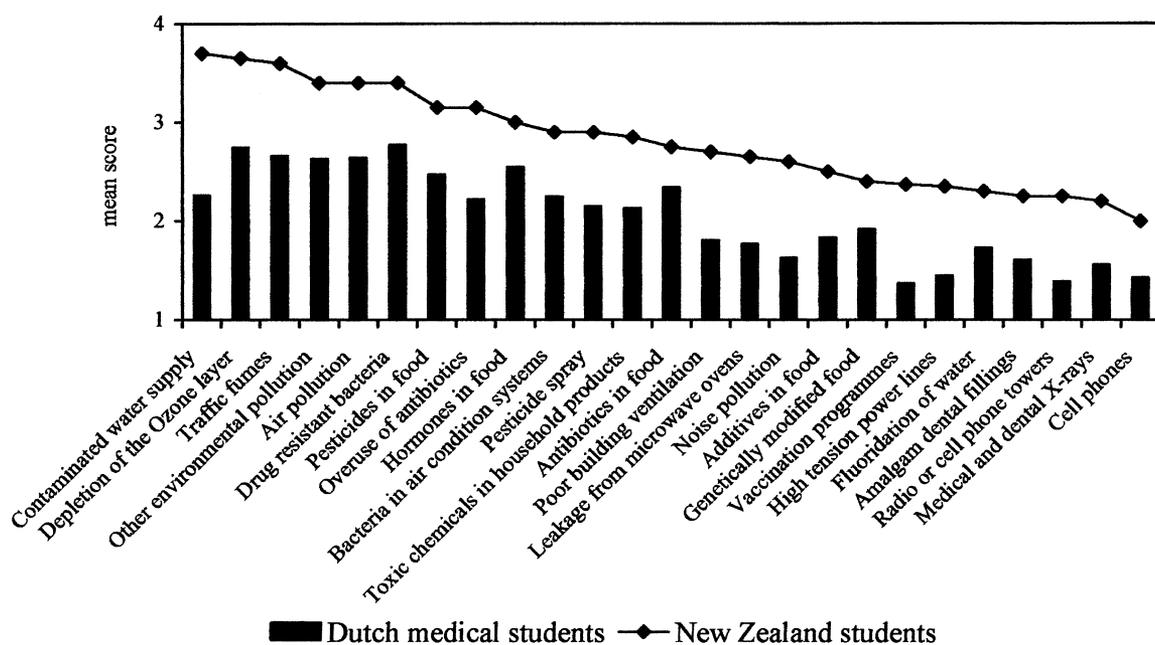


Fig. 1. Mean scores on Modern Health Worries scale items (1=no concern; 5=extreme concern). Items are ordered as in Petrie et al. [1].

Table 2

Series of hierarchical regressions investigating the relationship between modern health worries, subjective health complaints, and use of health care services

Step and variable	$R^2$	$\Delta R^2$	$F$ for $\Delta R^2$	$\beta^a$
<i>Regression 1</i>				
Criterion: SHC total score				
1. Control (PANAS negative affect)	.10	.10	24.38***	.29***
2. MHW total score	.16	.06	17.13***	.25***
<i>Regression 2</i>				
Criterion: use of health care services				
1. Control (PANAS negative affect)	.05	.05	12.84***	.13*
2. SHC total score	.15	.10	27.38***	.33***
<i>Regression 3</i>				
Criterion: use of health care services				
1. Control (PANAS negative affect)	.05	.05	12.84***	.22**
2. MHW total score	.08	.03	6.01*	.16*
<i>Regression 4</i>				
Criterion: use of health care services				
1. Control (PANAS negative affect)	.05	.05	12.84***	.13*
2. SHC total score	.15	.10	25.38***	.30***
3. MHW total score	.16	.01	1.58	.08

<sup>a</sup>  $\beta$  as computed at the final step in the regressions.

\*  $P < .05$ .

\*\*  $P < .01$ .

\*\*\*  $P < .001$ .

### The role of gender

Using simple comparison of means (analysis of variance), we found that female students expressed significantly more concern about “tainted food” on the MHW scale, reported significantly more subjective health complaints on the SHC, and made significantly more use of health care services, when compared with male students.

### Relationships between worries, complaints, affect, and use of health care

Simple correlational analyses revealed significant positive relationships between MHW, as assessed by the MHW scale, and students’ subjective health complaints (assessed by the SHC). In addition, MHW were significantly positively related to students’ use of health care services; subjective health complaints were significantly positively related to NA and to the use of health care services.

### Explaining medical students’ use of health care services

A series of four multiple regression analyses tested the hypothesis that SHC mediates the relationship between MHW and students’ use of health care services. These analyses revealed that, after controlling for NA, (1) MHW total score contributed significantly to the explanation of SHC total score ( $\beta = .25$ ;  $P < .001$ ); (2) SHC total score contributed significantly to the explanation of students’ use of health care services ( $\beta = .33$ ;  $P < .001$ ); (3) MHW total score

contributed significantly to the explanation of students’ use of health care services ( $\beta = .16$ ;  $P < .05$ ); and (4) the contribution of MHW total score to the explanation of students’ use of health care services became insignificant ( $\beta = .08$ ;  $P = .21$ ) when controlling for the contribution of SHC total score (the mediator variable; see Table 2). The conditions for a variable to be considered a mediator were thus met [21].

### Discussion

The major results of this study are (1) the factor structure of the MHW scale was remarkably similar in both samples, (2) New Zealand students reported significantly more MHW than did the Dutch medical students, (3) female students in both the New Zealand and Dutch samples reported more MHW and higher use of health care services, (4) MHW are related to the use of health care services, and this relationship is mediated by subjective health complaints.

Other studies on concerns about health have also reported a factor structure similar to the original MHW scale [22–24], corroborating the ecological validity of the concept. The greater prominence of health and environmental issues in New Zealand may explain the consistently higher scores of New Zealand participants compared with that of the current sample. Our finding on female participants reporting higher health worries, subjective complaints, and use of health services is consistent with related research [25–27].

Perhaps, the most interesting result was the empirical support for the suggested mediational model: Worries about modernity and feelings of vulnerability to ‘outside’ health threatening influences result in higher levels of subjective health complaints, which, in turn, increases the use of health care services. This suggests that MHW may act as a schema through which somatic information is processed ([5], see also Refs. [28–30]). If you are concerned that the environment may make you ill, you may be vigilant to somatic information and more inclined to interpret somatic information as signs of illness and take measures to combat this illness. Future studies might focus on identifying and challenging MHW, similar to recent research on changing illness perceptions in patients with chronic somatic disorders (e.g., Ref. [31]). Patients, physicians, and patient organizations might be challenged to examine their ‘MHW’ to see whether changing MHW might benefit them [32,33]. Of course, our study has limitations: Medical students are a distinct group of research participants [15,16]. Future studies could focus on participants with ‘lay views’ on health and illness or on distinct patient categories [34,35].

### Acknowledgments

We thank J. Brosschot and B. Sivertsen for providing questionnaires (SHC and MHW, respectively), and Marije van der Heijden for technical help.

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