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Are Modern Health Worries associated with Medical Conspiracy Theories ?

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Abstract

This study was concerned with whether Medical Conspiracy Theories (MCTs), along with other variables (demographics, ideology and health perceptions) are associated with Modern Health Worries (MHWs). MCTs were significantly associated with MHWs over and above all other variables. Older individuals, with more religious and right-wing beliefs had higher MHWs. In addition, those who used Complementary and Alternative Medicine (CAM) and individuals who perceived their mental health as worse than their peers were also more likely to display higher MHWs. Implications for helping health professions understand their patients' health-related beliefs and choices were discussed.

Introduction

Modern Health Worries (MHWs) are defined as "*perceived risk to personal health from technological changes and features of modern life*" (Petrie et al., 2005, pp. 778). Petrie et al., (2001) developed the MHWs scale to measure these concerns which comprised of four factors: Toxic Interventions, Environmental Pollution, Tainted Food and Radiation. The MHWs scale has shown strong internal reliability ($\alpha = .94$) (Petrie et al., 2001) and many studies have found the scale to be a reliable measure of MHWs having been used in many countries (e.g. Turkey, UK, Hungary) and groups (e.g. patients, medical students, general public) (Anderson & Jenson, 2012; Furnham, Strait, & Hughes, 2012; Köteles, Szemerszky, Freyler, & Bardos, 2011; Kaptein et al, 2005; Ozakinci, Boratav, & Mora, 2011).

The growing body of research into MHWs has explored assocations between it and variables such as individual differences, ideology (Anderson & Jenson, 2012; Furnham, 2007), health perception (Baliastas, van Kamp, Hooiveld, Lebret, & Yzermans, 2015; Bailer, Witthöft, & Rist 2008), thinking styles (Koteles et al., 2016). in attempt to better understand why some people, more than others are highly concerned that features of their environments may damage their health.

This study is primarily concerned with the relationship between MHW and Medical Conspiracy theories as well as the uses of Complementary and Alternative Medicine, Trust in Doctors and Personal Ideology.

Medical Conspiracy Theories (MCT) often depict medical, science or technology-related issues as under the control of secretive and sinister organisations and that harm or danger to health will result from their usage. An example is the theory that water fluoridation is being used to hide the presence of chemical products being dumped into our water systems (Oliver & Wood, 2014). This perception of harm befalling one's health as a result of our environment mirrors MHWs (Oliver & Wood, 2014).

MCTs directly contradict evidence-based scientific research, such as the theory that vaccinations cause psychological disorders, such as autism. Consequently, belief in MCTs suggests a sceptic attitude towards modern medicine, which is a characteristic that individuals with high MHWs are also more likely to possess (Furnham, 2007). Attitudes and perceptions of science and medicine influence health choices (Furnham 2007) and both high MHWs and MCTs have been associated with similar health behaviours such as increased avoidance of

conventional medicine in favour of complementary and/or alternative medicine (CAM) and increased preference of organic or natural foods over synthetic foods (Devcich, Pedersen, & Petrie, 2006; Petrie et al., 2001; Oliver & Wood, 2014).

MHWs, perceiving that aspects of modern life are a risk to your personal health, are well-suited to the world-view of MCTs, and vice versa. This study will focus on Medical Conspiracy theory belief as a primary predictor of higher MHWs and will utilise incremental validity (H_3) to demonstrate MCTs best predicts MHWs over and above demographical, ideological and health perception variables.

Various studies have highlighted a connection between subjective physical symptoms or physical health and MHWs (Kaptein, 2005; Petrie et al., 2005) but mental health remains unexplored. For this reason, this study will also examine both perceived personal mental as well as physical health in association with MHWs.

Furnham (2007), illustrated a relationship between CAM usage and higher MHWs which this study also aims to explore. Scepticism towards modern medicine can mean a scepticism towards doctors which may be reflected as diminished trust in physicians. Thus, this study will investigate associations between MHWs and trust in physicians. (Bachinger, Kolk, & Smets 2009; Dong et al., 2014).

Previous research has identified a relationship between high MHWs and religiousness with the suggestion that it is a by-product of a more spiritual or religious outlook of the world (Furnham et al., 2012; Köteles & Simor, 2013). This study hypothesises a replication of these findings and also investigates a previously unexamined association; between MHWs and political ideology.

In a recent study, highly relevant to, this Koteles et al. (2016) compared Hungarian people interested in skepticism, astrology and a community sample on their information processing style, spitituality and MHW. They found that Astrologers showed higher, and skeptics, lower levels of spirituality, intuitive-experiential thinking, and MHW than individuals from the community sample. They also noted that the connection between MHWs and experiential thinking style was mediated by spirituality. "Individuals with higher levels of spirituality are particularly vulnerable to overgeneralized messages on health related risks. Official communication of potential risks based on rational scientific reasoning is not appropriate to

persuade them as it has no impact on the intuitive-experiential system" p313. Indeed Swami et al. demonstrated that rational thinking is directly related to disbelief in MCTs.

This study set out to test various hypotheses: that MHWs comprises multiple factors (H_1); that individuals with high MHWs will believe in MCTs (H_{2A}); report more religious and left-wing beliefs (Ideology) (H_{2B}); use CAM, show greater distrust of physicians and display poorer perceived self-physical and mental health (Health perception) (H_{2C}). The study also hypotheses that incremental validity will reveal MCT to be the best predictor of MHWs over all other measures used (H_3).

Method

Participants

In total, 335 participants completed the questionnaire (66% females, age range: 12 to 71 years, M_{age}= 31.6 years, SD_{age}= 13.5). Participants who left an incomplete questionnaire or completed it unsually rapidly online (under 160 seconds) were excluded from the sample (44 individuals).

Half the participants were recruited via several social networking platforms (WhatsApp, Facebook, Snapchat). The remaining participants were obtained through an online recruiting system (AmazonTurk) whereby it was requested that a sample of participants whom are representative of the British public (in age, sex, ethnicity, etc) complete the survey. There was no difference in the attitudes from samples from different souces.

Materials & Procedure

1. MHW. The MHWs scale is a 28-item five-point scale. Items (e.g. Food additives, Air Pollution, etc) are rated from "No Concern at all" to "Extreme Concern" that the item will affect one's personal health. Certain words in the item list, such as 'cell phone' were exchanged for 'mobile phone' to better suit the language of British participants. Further, based on earlier research that attempted to update the 15 year old original 25 item measure three items were added: "Mad Cow Disease", "Bio-Terrorism" and "Nuclear Radiation".

2. MCT. This questionnaire was obtainted from Oliver and Wood in 2014. Some words was altered to tailor to British participants and simplified to less specialised terms ('innoculation' was changed to 'vaccination' and 'dissemination' to 'spread'). Each theory is rated as 'Yes', having heard of the theory before, or 'No', having not, or 'Not

sure'. Then each theory is rated as 'Agree', 'Disagree' or 'Neither agree nor disagree' with that Medical Conspiracy theory. The Alpha for this scale .84.

3. Trust in Doctors.The questions were adapted from the Wake Forest Physician Trust Scale (WFPTS) (Hall et al., 2002) and its abbreviated version (Dugan et al., 2005). All 11 statements from the original questionnaire were used, with two additional statements.,

4. CAM. questions to determine perceptions of health were included: a question on usage of alternative and/or complementary medicine (CAM) and questions to measure perception of one's own mental as well as physical health compared to their peers (people of the same age and sex), from 'optimal health' to 'poorest health' on a 7-point scale.

5. Demographical questions (age, sex, education) as well as questions exploring ideology (politics and level of religiousness) were included. A 5-point scale was used to measure the level of religiousness from 'Not Religious at all' to 'Very Religious' and a 7-point scale for political positioning from 'Strongly Right Wing' to 'Strongly Left Wing'.

Ethical permission was sought and received from the UCL Ethics committee. The entire questionnaire was administered online. The order of the questions in the different blocks (MHWs scale, Medical Conspiracy theory belief, Trust in Physicians, Health Perceptions, Demographics and Ideology) were randomised so that each participant was presented with the questions in a different order.

Results

All analysis was done using the latest SPSS software.

(1) Factor Analysis

Because of various differences in previous studies a factor analysis was completed. A varimax-rotated factor analysis on the Modern Health Worries scale revealed five factors labelled: 1). Dissemination & Contamination, 2) Environmental Pollution, 3) Tainted Food, 4) Phone-related Radiation and 5) Bacteria & Medicine. The MHWs was highly internally consistent, with a Cronbach's Alpha value of 0.96. Moreover, all 5 factors of MHWs also reported high internal reliability (α=.92, .91, .92, .84, .82). This, in conjunction with the replicability of the factors; apparent from previous research

Insert Tables 2 and 3 here

(2) Correlational Analysis

The five MHWs factors as well as the general MHWs factor scores were then correlated with all other variables.

Insert Table 4 here

Table 4 shows age, religiousness, politics, perceived mental health, CAM and Medical Conspiracy belief correlated significantly with the general MHWs factor ($p<0.01$) as well as across most of the five MHWs factors.

MHWs correlated most strongly with MCTs over other variables. This was apparent across all factors (except 5) including general MHWs factor ($r = .34$ to $.49$, $p<0.01$) indicating that belief in MCTs are associated with higher MHWs. MCTs was most strongly correlated with general MHWs factor ($r = .49$, $p<0.01$) and factor 1, Dissemination & Contamination ($r = .49$, $p<0.01$) over the other MHWs factors (2,3,4 and 5) suggesting that individuals who believe in MCTs are more likely to be particularly concerned about types of MHWs that involve the spreading of contaminants in the environment.

There were significant negative correlations between perceived personal mental health and MHWs (for all five MHWs factors as well as the General MHWs factor) ($r = -.15$ to $-.25$, $p<0.01$). This suggests that individuals who perceive their own mental health as poorer than their peers are more likely to display higher MHWs.

There were significant correlations between the use of CAM and MHWs (factors 1-4 and general factor) illustrating that those who use CAM are more likely to have higher concerns about modernity affecting their health. ($r = .12$ to $.27$, $p<0.01$).This supports the hypotheses concerning Health Perceptions (H_{2C}); that poorer self-perceived mental health and use of CAM would be significantly associated with greater MHWs.

Religiousness and all five factors of MHWs (and general factor) correlated positively ($r = .13$ to $.27$, $p<0.01$) suggesting, as predicted, an association between high MHWs and greater religiousness (H2b). Political ideology correlated significantly with MHWs (factors 1-4 and general factor) revealing a connection between more right wing beliefs and higher MHWs ($r = -.11$ to $-.24$, $p<0.01$).

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 MHWs (factors 1-4 and general factor) significantly correlated with age; suggesting that older individuals are associated with more MHWs (r = .15 to .24, p<0.01).

Perceived physical health correlated significantly only with Factor 3, Tainted Foods (r = -.12, p<0.05) and Trust in physicians correlated only with Factor 5, Bacteria and Medication (r = .11, p<0.05). Factor 5 (Bacteria & Medication) showed few significant correlations with the independent variables. However, Factors 1 through 4 correlated significantly and with the same variables as did the general MHWs factor (age, religiousness, politics, perceived personal mental health, use of CAM and medical conspiracy theory belief).

   (3) <u>Regression Analysis</u>

To test the hypothesis that MCTs is the best predictor of MHW (over Demographics, Ideology, other Health Perception variables) a hierarchical regression was performed. As seen in Table 5 predictor variables: age, sex and education were placed together in one step, named Demographics. Politics and Religiousness were assigned to step two, named: Ideology. Step three, Health Perceptions, comprised of: perceptions of one's personal physical and mental health, use of CAM and trust in physicians. Step four consisted only of Medical Conspiracy theory belief.

We had a specific reason for putting the variables in this order: First we put in demography (sex, age, education) because it is most stable over time. Next we put in ideology (general religious and politcal beliefs) to determine whether these very general factors could account for variance. Next, we added the four "heath" variables and thereafter MCT because we were specifically interested in the extent to which the latter added incremental variance

Insert Table 5 and 6 here.

Overall, the regression was significant (Adj R^2= .30, F(10,316)= 14.77, p<0.001). Although all the variables, (demographics, ideology, health perceptions and medical conspiracy theory belief) did significantly predict general MHWs; MCTs were the strongest predictor. From step three to step four, there was a significant increase in the variance accounted for, from 14% to 30%, more than doubling in account.

Five subsequent hierarchical regressions were performed with the five factors of MHWs. This was done with the aim of determining the predictor that accounts for the most variance in each MHWs factor and through this the best predictor of each MHWs factor. Factor 5 (Bacteria &

Medication) showed little significant increase in the amount of variance accounted for by the model when any variables were added (maximum variance accounted for by the model was 3%).

However all four remaining MHWs factors, presented an overall significant regression.Factor 1's (Dissemination & Contamination) overall regression was significant, (Adj R^2= .31, F(10,316)=15.36, p<0.001). The proportion of variance in Factor 1 explained by Medical Conspiracy theory belief is 31%, an increase of 16%. Factor 2's (Environmental Pollution) overall regression was significant (Adj R^2= .14, F(10,316)= 6.07, p<0.001). Adj R^2 significantly increased by 10% when Medical Conspiracy theory belief was added to the model. Factor 3's (Tainted Food) overall regression was also significant (Adj R^2= .29, F(10,316)= 14.08, p<0.001). It presented a significant increase from 16% to 29% in variance accounted for by medical conspiracy theory belief. Factor 4's (Phone-related Radiation) overall regression was significant. (Adj R^2= .25, F(10,316)= 11.88, p<0.001). Adj R^2 more than doubled when MCT was added; a significant increase by 12% in the variance accounted for, to 25%. .

In Step 2 (general MHWs factor), when ideological variables are added, there was a significant increase in Adj R^2 from 3% (demographics alone) to 11%. This increase, although large and demonstrates the strength of ideology as a predictor of general MHWs factor (and Factor 1) is not as large as the increase demonstrated by MCTs belief. This further supports the hypothesis that MCT best predicts MHWs over and above the other variables assessed.

It suggests that belief in MCT particularly those about the harmfulness of pharmaceuticals and modern medicine, can influence the choice to use CAM and in this way CAM mediates the connection between MHWs and conspiracy belief.

Insert Figure 1

In addition, a model whereby MCTs mediates the the association between religiousness and MHWs was suggested by this study. Studies into conspiracy theory belief highlight that religious individuals are more likely to believe in conspiracy theories (Oliver & Wood, 2014) and consequently, this study proposes, become more concerned about their environment. Indeed Figure one shows that MCT mediate the relastionship between religious beliefs and MHW.

Discussion

This study revealed, as hypothesised (H[1]), that MHWs is a multi-factoral construct. The factor analysis on MHWs revealed five factors which is also in line with Furnham et al. (2012). In addition, the cluster of items that constitute each factor (particularly Factors 1 through 3) overlap with those defined in previous studies increasing the validity of the findings of this study.

As predicted, the correlations between MCTs and MHWs (general factor and factors 1-4) were highly significant (p<0.01) and of a similar magnitude (r = .34 to r = .49). These correlations between MCTs and MHWs, is statistically much stronger than correlations between MHWs and the other variables in this study as well as variables in previous research; usually within the range of r = .15 to .35. This further highlights the significance and strength of the association between higher MHWs and MCTs.

Multiple hierarchical regressions with MHWs and its factors reflected that MCTs offered significant additional predictive power, over other variables, for MHWs (and its factors). Through the use of incremental validity (H[3]), this study demonstrated that MCTs strongly predicts higher MHWs over and above other variables.

In line with previous studies that suggests that MHWs influences the choice to use CAM over conventional modern medicine (Petrie et al., 2001); a statistically significant positive relationship between the use of CAM and MHWs was found in this study. Those who use CAM are more likely to display higher MHWs as observed by Koteles et al. (2016).

This study found that individuals who perceive their own mental health to be worse than their peers (people of the same age and sex) showed significantly higher MHWs. However, unlike perceived mental health, perceived physical health yielded little significant results for an association with MHWs; suggesting that belief in MHW is indeed a mental health issue.

As was found in Furnham et al., (2012), this study also demonstrated a statistically significant relationship between more religious individuals and higher MHWs. This suggests that greater MHWs fit well with individuals who share a more spiritual or religious world-view (Köteles & Simor, 2013; Koteles et al., 2016).

Further older individuals had higher MHWs. Previous findings related to age (Anderson & Jensen, 2012; Baliastas et al., 2015) have also identified this connection and have found a

similar correlational magnitude to those found in this study (this study: r= .15 to r=.24, p<0.01, and in Baliastas et al., (2015), r= .26, p<0.001).

Having certain medical conditions, for instance, a mental health disorder that increases paranoia or a physical ailment like immunodeficiency, may influence perception of MHWs and incline an individual to be more concerned about MHWs. This confounding variable was not accounted for in this study. The use of recorded medical histories from GP surgeries might be able to account for this and is worth investigating in further research.

In addition, past medical experiences, in particular unpleasant ones, may influence perceptions of health, e.g. increase distrust towards doctors or push individuals away from conventional medicine towards CAM. This was not accounted for in this study and may have been a confouding variable that influenced results.

This study assessed the use of CAM but did not assess frequency of use. Consequently, the data categorises participants who might have used CAM on a single occasion a long time ago as the same as people who use it regularly. This may reduce the validity of the conclusions drawn from the relationship between MHWs and CAM usage. More comprehensive questions, like those used by Furnham (2007), would be a better measure of CAM usage.

Trust in physicians did not yield statistically significant associations with MHWs. This may be due to a lack of association between the two or it could be as a result of the changes made to the WFPTs scale in this study (such as making all the statements positive). A re-test of trust in physicians against MHWs using the original scale alongside other validated scales that measure trust in physicians could reveal more truth to this..

Belief in MCTs has been shown to affect health behaviours and choices, e.g. the choice to avoid vaccinating or use CAM. (Oliver & Wood, 2014). Having this information would help doctors and health professionals better understand their patient's beliefs and views about modern medicine so they can present more patient-tailored information and advice.This in turn may increase patient satisfaction as well as compliance or adherence to medical advice.

Uncovering the prevalence of beliefs in MCTs can also influence public health campaigns, such as 'myth-busting' commonly accepted yet wrong information about health (such as the fear that vaccinations cause autism). This may in turn reduce belief in inaccurate MCTs as well as perhaps reduce MHWs.

Although this study demonstrated that MCTs belief predicts greater MHWs, causal relationship should not be assumed, particularly since the data was obtained through self-report. A longitudinal investigation into predictive power and temporal precedence of the association between MHWs and MCTs would make this relationship clearer but this study proposes a model to explain this relationship.

As predicted, this study found a significant association between CAM usage and higher MHWs, which confirmed findings from previous research (Furnham, 2007) and the current study suggests a model whereby CAM mediates the positive correlation between MCTs and MHWs. It suggests that belief in Medical Conspiracy theories, particularly those about the harmfulness of pharmaceuticals and modern medicine, can influence the choice to use CAM and in this way CAM mediates the connection between MHWs and conspiracy belief. Future research into the relationships between these three variables should be explored.

In addition, a model whereby MCTs mediates the the association between religiousness and MHWs is suggested by this study. Studies into conspiracy theory belief highlight that religious individuals are more likely to believe in conspiracy theories (Oliver & Wood, 2014) and consequently, this study proposes, become more concerned about their environment. Future investigation into this relationship will help comprehend the relationship between these variables.

In many ways this study compliments that of Koteles who demonstrated that rational thinking style was negatively and experiential thinking style positively related to MHWs. They argue that MHWs are "over-valued" ideas: strongly beld preoccupations that are unreasonable given our scientific evidence. They provide "pseudo-certainty" in the same way that conspiracy theories might do. Moreover they argue that spirituality is associated with maladaptive emotional and cognitive reactions as well as holistic-spiritual belief systems that ignore the data from the natural sciences

This study had limitations. It was a cross-sectional self-report study meaning both that causation cann not inferred) and that common method variance may inflate the correlations. Further, other Conspiracy theory measures may have been used which are more robust (Swami et al., 2017). However like many other studies in the MHW area it provided some additional light on who and why people have MHWs.

References

Anderson, J. H. & Jensen, J. C. (2012). Modern health worries and visits to the general practioner in a general population sample: An 18 month follow-up study. *Journal of Psychosomatic Research, 73,* 264-267.

Bachinger, S. M., Kolk, A. M., & Smets, E. (2009). Patients' trust in their physician-Psychometric properties of the Dutch version of the Wake Forest Physician Trust Scale, *Patient Education and Counseling, 76 (1),* 126-131.

Bailer, J., Witthöft, M., & Rist, F. (2008). Modern health worries and idiopathic environmental intolerance. *Journal of Psychosomatic Research, 51*, 425-433.

Baliatsas, C., van Kamp, I., Hooiveld, M., Lebret, E., & Yzermans, J. (2015). The relationship of modern health worries to non-specific physical symptoms and perceived environmental sensitivity: A study combining self-reported and general practice data. *Journal of Psychosomatic Research, 79,* 355-361.

Chen, F-P., Chen, T-J., Kung, Y-Y., Chen, Y-C., Chou, L-F., Chen, F-J., & Hwang, S-J. (2007). Use frequency of traditional Chinese medicine in Taiwan. *BMC Health Services Research, 7(*26), 1-8.

Devcich, D. A., Pedersen, I. K., & Petrie, K. J. (2006). You eat what you are: Modern health worries and the acceptance of natural and synthetic additives in functional foods. *Appetite, 48,* 333-337.

Dong, E., Liang, Y., Liu, W., Du, X., Bao, Y., Du, Z., & Ma, J. (2014). Construction and validation of preliminary Chinese version of the Wake Forest Physician Trust Scale. *Medical Science Monitor, 20,* 1142-1150.

Dugan, E., Trachtenberg, F., & Hall, M. A. (2005). Development of abbreviated measures to assess patient trust in a physician, a health insurer, and the medical profession. *BMC Health Services Research, 5,* 64.

Furnham, A. (2007). Are modern health worries, personality and attitudes to science associated with the use of complementary and alternative medicine?. *British Journal of Health Psychology, 12,* 229-243.

Furnham, A., Strait, L., & Hughes, D. J. (2012). Modern Health Worries and Personality, *Personality and Mental Health, 6*(3), 242-254.

Hall, M. A., Camacho, F., Dugan, E., & Balkrishnan, R. (2002). Trust in the Medical Profession: Conceptual and Measurement Issues. *HSR: Health Services Research, 37(5),* 1419-1439.

Huang, I-C., Kenzik, K. M., Sanjeev, T. Y., Shearer, P. D., Revicki, D. A., Nackashi, J. A., & Shenkman, E. A. (2010). Quality of life information among families of children with life-limiting conditions. *Patient Related Outcome Measures, 1,* 141-148.

Kaptein, A. A., Helder, D. I., Kleijn, W. Chr., Rief, W., Moss-Morris, R., & Petrie, K. J. (2005). Modern health worries in medical students. *Journal of Psychosomatic Research, 58,* 453-457.

Köteles, F., Szemerszky, R., Freyler, A., & Bardos, G. (2011). Somatosensory amplification as a possible source of subjective symptoms behind modern health worries. *Scandinavian Journal of Psychology, 52*, 174-178.

Köteles, F. & Simor, P. (2011) Modern health worries, somatosensory amplification and subjective symptoms: A longitudinal study. *International Journal of Behavioural Medicine, 20*, 38-41.

Köteles, F., Barany, E., Varsanyi, P., & Bardos, G. (2012). Are modern health worries associated with somatosensory amplification, environmental attribution style, and commitment to complementary and alternative medicine? *Scandinavian Journal of Psychology, 53,* 144-149.

Köteles, F. & Simor, P. (2013). Somatic Symptoms and Holistic Thinking as Major Dimensions Behind Modern Health Worries. *International Journal of Behavioural Medicine, 21,* 869-876.

Köteles, F., Simor, P., Czeto, M., Sarog, N., & Szemerszky, R. (2016). Modern health worries-the dark side of spirituality? *Scandinavian Journal of Psychology, 57,* 313-320.

Oliver, J. E & Wood, T. J. (2014). Medical Conspiracy Theories and Health Behaviours in the United States. *JAMA Internal Medicine, 174*(5*)*, 817-818.

Oliver, J.E & Wood, T. J. (2014). Conspiracy Theories and the Paranoid Style(s) of Mass Opinion. *American Journal of Political Science, 58*(4), 952-966.

Ozakinci, G., Boratav, H. B., & Mora, P. (2011). Modern health worries, health care utilization and symptom reporting: A cross-cultural comparison. *Behavioral Medicine, 37*(2*),* 35-41.

Petrie, K. J., Sivertsen, B., Hysing, M., Broadbent, E., Moss-Morris, R., Eriksen, H. R., & Ursin, H. (2001). Thoroughly modern worries: The relationship of worries about modernity to reported symptoms, health and medical care utilization. *Journal of Psychosomatic Research*, *51,* 395-401.

Petrie, K. J., Broadbent, E. A., Kley, N., Moss-Morris, R., Horne, R., & Rief, W. (2005). Worries about modernity predict symptom complaints after environmental pesticide spraying. *Psychosomatic Medicine, 67(5),* 778-782

Swami, V., Voracek, M., Stieger, S., & Furnham, A. (2014) Rational thinking reduces belief in conspiracy theories. *Cognition, 133,* 572-585.

Swami, V., Barron, D., Weis, L., Voracek, M., Stieger, S., & Furnham, A. (2017). An Examination of the Factorial and Convergent Validity of Four Measures of Conspiracist Ideation, with Recommendations for Researchers. *Plos One*

Table 1: Results of the Varimax Rotated Factor Analysis

	Factor				
	1	2	3	4	5
Contaminated Water Supply	.755				
Mad Cow disease (CJD)	.749				
Bacteria in Air Conditioning systems	.698				
Fluoridation of Water	.690				
Vaccination Programmes	.680				
Bio-Terrorism (e.g. anthrax poisoning)	.679				
Leakage from Microwave Ovens	.621				
Toxic chemicals in household products Amalgam	.607				
Dental fillings	.586				
Medical and dental X rays	.533				
Traffic Fumes		.832			
Other environmental pollution		.823			
Air Pollution		.801			
Depletion of the Ozone Layer		.758			
Pesticide Spray		.614			
Noise Pollution		.537			
Poor Building Ventilation		.518			
Nuclear Radiation		.508			
Hormones in Food			.781		
Antibiotics in Food			.752		
Additives in Food			.741		
Pesticides in Food			.736		
Genetically Modified Food			.619		
Radio or Mobile Phone Towers				.818	
Mobile Phones				.788	
High Tension Power lines				.671	
Overuse of Antibiotics					.855
Drug Resistant Bacteria					.843
Eigen Value	**12.97**	**2.17**	**1.73**	**1.48**	**1.18**
Variance (%)	**46.31**	**7.74**	**6.17**	**5.28**	**4.20**

Table 2. Summary of MHWs factors found in previous MHWs studies. The table is adapted

from a table in Furnham et al., (2012).

	Factor								
	1	2	3	4	5	6	7	8	9
This Study	Dissemination & Contamin.	Environmental Pollution	Tainted Food	Phone-related Radiation	Bacteria & Medication				
Furnham et al (2012)	Contamination	Environmental Pollution	Food contamination	Man-made problems	Medical Problems				
Köteles et al (2011)	Toxic Interventions	Environmental Pollution	Tainted Food	Radiation					
Jeswami & Furnham (2010)	Contamination with food	Disasters and epidemics	Pollution	Harmful rays and air contamination	Radiation	Doctors playing God	Anti-bacterial medication	Drugs and medication	Work Stress
Bailer et al (2008)	Radiation	Environmental pollution	Tainted food	Toxic interventions					
Furnham (2007)	Food contamination	Pollution	Disasters and Epidemics	Harmful rays	Doctors playing God	Radiation	Man-made problems	Safety of health prevention issues	
Kaptein et al (2005)	Toxic Interventions	Environmental Pollution	Tainted Food	Radiation					
Petrie et al (2001)	Toxic Interventions	Environmental Pollution	Tainted Food	Radiation					

Table 3. Correlation matrix with the significant correlations found between the independent

variables and MHWs factors

	Factor 1 (Dissemination & Contamination)	Factor 2 (Environmental Pollution)	Factor 3 (Tainted Food)	Factor 4 (Phone-related Radiation)	Factor 5 (Bacteria & Medication)	General MHWs Factor
Age	.16**	.15**	.23**	.24**	-.01	.20**
Religiousness	.27**	.16**	.24**	.17**	.13*	.26**
Politics	-.24**	-.11*	-.12*	-.23**	-.01	-.19**
Perceived personal Physical Health	-.04	-.05	-.12*	-.00	-.09	-.07
Perceived personal Mental Health	-.21**	-.16**	-.25**	-.16**	-.15**	-.23**
Use of alternative &/or complementary medicine (CAM)	.20**	.12*	.27**	.23**	.10	.22**
Trust in Physicians	.08	.09	-.05	-.05	.11*	.06
MCT	**.49**	**.34**	**.44**	**.46**	**.07**	**.49**

*p< 0.05 ** p< 0.01

Table 4. Hierarchical Regression Analyses

		Factor 1		Factor 2		Factor 3		Factor 4		Factor 5		General MHW	
		β	t	β	t	β	t	β	t	β	t	β	t
Step 1	Sex	-.05	-0.88	-.01	-0.20	.08	1.40	.00	0.03	.06	1.10	.00	0.01
	Age	.16**	2.82	.13*	2.34	.24***	4.28	.24***	4.32	-.01	-0.12	.19**	3.48
	Education	-.09	-1.59	.02	0.35	-.01	-0.13	-.05	-0.98	.03	0.55	-.04	-0.65
Step 2	Sex	-.06	-1.10	-.02	-0.40	.06	1.04	-.00	-0.01	.05	0.87	-.01	-0.26
	Age	.14*	2.50	.13*	2.28	.25***	4.45	.21***	3.86	.00	0.07	.19**	3.36
	Education	-.06	-1.12	.04	0.64	.02	0.31	-.03	-0.63	.04	0.75	-.01	-0.17
	Religiousness	.29***	5.47	.17**	3.06	.26***	4.80	.19***	3.55	.13*	2.32	.27***	5.13
	Politics	-.17**	-3.11	-.05	-0.91	-.03	-.63	-.15**	-2.71	.00	0.07	-.11*	-2.06
Step 3	Sex	-.07	-1.37	-.02	-0.37	.02	0.33	-.03	-0.53	.05	0.84	-.03	-0.60
	Age	.10	1.84	.11	1.93	.20***	3.70	.18**	3.14	-.01	-0.23	.15**	2.67
	Education	-.06	-1.11	.04	0.72	-.01	-0.15	-.04	-0.78	.04	0.74	-.01	-0.28
	Religiousness	.25***	4.63	.14*	2.39	.21***	3.88	.16**	3.02	.09	1.53	.23***	4.20
	Politics	-.15**	-2.67	-.04	-0.64	.01	0.14	-.12*	-2.25	.02	0.41	-.08	-1.53
	Per PhysHea	.05	0.81	.03	0.44	-.02	-0.40	.06	0.98	-.01	-0.21	.03	0.49
	Per Men Hea	-.12	-1.92	-.10	-1.59	-.16**	-2.74	-.10	-1.61	-.12	-1.85	-.14*	-2.38
	CAM Use	.14**	2.66	.07	1.15	.19***	3.52	.14**	2.65	.08	1.39	.15**	2.80
	Trust in Physi	.05	0.96	.09	1.54	-.07	-1.40	-.07	-1.27	.10	1.83	.03	0.61
Step 4	Sex	-.05	-1.00	-.00	-0.03	.04	0.82	-.01	-0.12	.05	0.90	-.01	-0.15
	Age	.09	1.77	.10	1.84	.19**	3.77	.16**	3.16	-.02	-0.26	.14**	2.69
	Education	-.01	-0.17	.08	1.48	.04	0.77	.00	0.09	.05	0.86	.04	0.75
	Religiousness	.12*	2.29	.03	0.60	.09	1.74	.04	0.84	.07	1.15	.09	1.83
	Politics	-.08	-1.58	.02	0.27	.07	1.33	-.06	-1.23	.03	0.56	-.02	-0.32
	Per Phys Heal	.03	0.57	.01	0.24	-.04	-0.72	.04	0.78	-.02	-0.25	.01	0.21
	Per Men Heal	-.09	-1.72	-.08	-1.39	-.14*	-2.60	-.08	-1.38	-.12	-1.80	-.12*	-2.22
	CAM Use	.09	1.89	.03	0.49	.14	2.88	.10	1.94	.07	1.26	.10*	2.05
	Trust in Phys	.13*	2.61	.14**	2.68	-.01	-.12	.00	.02	.11*	1.98	.11*	2.24
	MCT	.44***	8.53	.34***	5.91	.39**	7.49	.40***	7.50	.06	0.99	.44***	8.56

*p< 0.05 level **p<0.01 level ***p< 0.001 level
(CAM: Alternative and/or Complementary Medicine)

Table 5. Hierarchical Regression Summary

	Factor 1 Dissemination & Contamination	Factor 2 Environmental Pollution	Factor 3 Tainted Food	Factor 4 Phone-related Radiation	Factor 5 Bacteria & Medicine	General MHWs
Step 1 Demographic	$F(3,323)=$ 3.82*, *Adj.* R^2=.03	$F(3,323)=$ 2.05, *Adj.* R^2=.01	$F(3,323)=$ 6.29***, *Adj.* R^2=.05	$F(3,323)=$ 6.47***, *Adj.* R^2=.05	$F(3,323)=$ .52, *Adj.* R^2=-.00	$F(3, 323)=4.18$**, *Adj.* R^2=.03
Step 2 + Ideology	$F(5,321)=$ 10.55***, *Adj.* R^2=.13	$F(5,321)=$ 3.31**, *Adj.* R^2=.03	$F(5,321)=$ 8.72***, *Adj.* R^2=.11	$F(5,321)=$ 8.13***, *Adj.* R^2=.10	$F(5,321)=$ 1.39, *Adj.* R^2=.01	$F(5, 321)=8.89$***, *Adj.* R^2=.11
Step 3 + Health Perceptions	$F(9,317)=$ 7.32***, *Adj.* R^2=.15	$F(9,317)=$ 2.58**, *Adj.* R^2=.04	$F(9,317)=$ 8.03***, *Adj.* R^2=.16	$F(9,317)=$ 5.92***, *Adj.* R^2=.12	$F(9,317)=$ 1.98*, *Adj.* R^2=.03	$F(9, 317)=6.74$***, *Adj.* R^2=.14
Step 4 + Medical Conspiracy theory belief	$F(10,316)=$ 15.36***, *Adj.* R^2=.31	$F(10,316)=$ 6.07***, *Adj.* R^2=.14	$F(10,316)=$ 14.08***, *Adj.* R^2=.29	$F(10,316)=$ 11.88***, *Adj.* R^2=.25	$F(10,316)=$ 1.88*, *Adj.* R^2=.03	$F(10, 316)=14.77$***, *Adj.* R^2=.30

*p< 0.05 **p< 0.01 level ***p<0.001

Figure 1 : Results of two mediation analyses