Compliance with recommendations for pandemic influenza H1N1 2009: the role of trust and personal beliefs

Gabriele Prati*, Luca Pietrantoni and Bruna Zani
Department of Education, University of Bologna, via Filippo Re, 6 - 40126 Bologna, Italy
*Correspondence to: G. Prati. E-mail: gabriele.prati@unibo.it
Received on June 12, 2010; accepted on March 30, 2011

Abstract

Background. To investigate the relationship between risk perception, worry, control, trust, exposure to an educational campaign, media exaggeration with recommendations for pandemic influenza H1N1 2009. Methods. Cross sectional telephone survey using random digit dialing. A total of 1010 adult Italians were interviewed by telephone between 16 and 19 February 2010. The survey instrument included demographic data, measures on risk perception, worry, trust and compliance with recommendations for pandemic influenza H1N1 2009. Results. Controlling for socio-demographic variables, compliance with all the recommended behaviors was associated with media trust, trust in the Ministry of Health, worry and perceived severity of illness. Perceptions that the risk of catching pandemic influenza H1N1 2009 is high, that the authorities are acting in the public’s best interest in dealing with it, that the media had exaggerated the risks of catching it and that people can control their risk of catching it were associated with compliance with some recommended behaviors even after considering effects of socio-demographic characteristics. Conclusion. The results underscore the importance of building public trust and to consider the influence of risk perception and affective response in promoting compliance with recommended behaviors.

Introduction

On 11 June 2009, World Health Organization (WHO) declared a Phase 6 influenza pandemic alert. According to WHO, as of 7 March 2010 cases of pandemic influenza H1N1 2009 caused at least 16 713 deaths worldwide. In that period in Europe, there was limited or no laboratory-confirmed case(s) of influenza except for Italy and Austria where the geographical spread (number and distribution of sites reporting influenza activity) was limited (appearing in multiple but <50% of the administrative units of the country) [1]. The Italian Ministry of Health (2010) estimated 4 522 000 cases of pandemic influenza H1N1 2009 which lead to 228 deaths [2].

Community prevention interventions in Italy for pandemic influenza H1N1 2009 have included social campaigns aimed at educating the public. Recommended behaviors included using tissues when sneezing, washing hands regularly with soap and water, cleaning or disinfecting objects that one might touch, social distancing and vaccine acceptance [2]. The purpose of this study was to determine the rate of compliance with recommended behaviors in Italy and the influence of a set of psychosocial factors selected by a review of the literature.

Previous studies have shown inconsistencies in their findings about the compliance with official advice in Hong Kong [3], Great Britain [4], Saudi Arabia [5] and in Udaipur (India) [6]. Misconceptions and unconfirmed beliefs regarding pandemic influenza H1N1 2009 were prevalent [3, 7] and probably may explain these inconsistencies.
Previous research reported that perceptions or beliefs about a specific risk may be important in determining compliance with official advice [8–12]. For example, perceived risk from influenza was identified as having the most salience for decision-making about vaccine acceptance [13]. A recent meta-analysis showed a consistent relationship between cognitive dimensions of risk perception (e.g. risk likelihood, risk severity) and vaccine acceptance [14]. To date several studies provided evidence of the influences of perceptions or beliefs about pandemic influenza H1N1 2009 on compliance with official advice. More specifically, the literature on pandemic influenza H1N1 2009 suggests that people may be more likely to comply with health related recommendations if they perceive to be at risk of catching influenza [4], they perceive pandemic influenza H1N1 2009 as a severe illness [15], they think that the outbreak has not been exaggerated [4] and they feel they can control their risk of catching this illness [4, 15]. Although the influence of cognitive factors related to the perception of risk related to influenza (severity of illness and likelihood of infection) was extensively investigated, the influence of affective response to this risk was less studied. Previous studies showed that perceived risk phrased in terms of feelings rather than as a purely cognitive probability judgment predicted better seasonal influenza vaccine acceptance [16, 17]. Moreover, levels of anxiety or worry about pandemic influenza H1N1 2009 were related to compliance with official advice [4, 15]. Our hypothesis is that affective response may be as important as cognitive factors in predicting compliance with official advice.

In addition, the attitudes toward community prevention measures (i.e. confidence in the government’s ability to control the spread) have been found to be related to health related recommendations against Severe Acute Respiratory Syndrome (SARS) [9]. Rubin et al. [4] showed that people with higher trust in the government and the responding agencies in handling pandemic influenza H1N1 2009 were more likely to follow their recommendations.

A previous study showed that influenza campaign may be successful in increasing influenza awareness and immunization rates [18]. Another study aimed at evaluating an Ontario Ministry of Health cold/flu self-care public education campaign showed an increase in knowledge but no changes in beliefs, attitudes, acquisition of new health practices [19]. Rubin et al. [4] found that the government’s pandemic influenza H1N1 2009 leaflet did not influence compliance with health related recommendations. It is likely that the leaflet had no effects because it was assessed during a period of relatively low influenza transmission in the United Kingdom or, alternatively, because the specific effects of the leaflet were drowned out by the accompanying flood of media coverage and other forms of government advertising. Given these explanations, we hypothesized that exposure to media campaigns is related to recommended behaviors during wintertime. In Italy, a major educational campaign was started by the Ministry of Health during winter to provide the public with information and advice. Topo Gigio, the lead character of a children’s puppet show on Italian television (translated as ‘Louie Mouse’), endorsed this campaign [2]. This campaign showed, among other things, what individuals could do to protect themselves and others.

The study had two aims, first to determine the rates of recommended behaviors adopted by a sample representative of adult Italians and second to assess the associations between risk perception, worry, trust, control, media exaggeration, exposure to an educational campaign about pandemic influenza H1N1 2009 and recommended behaviors. Based on past related literature, it was expected that trust in the institutions, exposure to ‘Topo Gigio’ media campaign, worry and personal beliefs such as, perceived severity of illness, likelihood of infection, control and media exaggeration of the risk, were significant predictors of recommended behaviors after controlling for socio-demographic variables.

### Materials and methods

#### Study sample

This study was conducted between 16 and 19 February 2010 when cases of pandemic influenza H1N1 2009 (swine flu) in Italy were 4 522 000 and caused at least 228 deaths. The data collection actually occurred after the pandemic had run its course in Italy but
during a period in which the Minister of Health expected a second peak of pandemic influenza H1N1 2009 activity.

Demetra s.a.s (a company specialized in collecting data) carried out a telephone survey of 1010 residents of Italy, using random digit dialing. Data were collected using computer-assisted telephone interviewing. Proportional quota sampling was used to ensure that respondents were demographically representative of the general population, with quotas based, as indicated above, on age group, sex and region. To reduce selection bias, participants were initially informed that the survey related to ‘issues currently under debate in Italy’ and were only informed that the real issue was pandemic influenza H1N1 2009 after obtaining their verbal consent to proceed. Participants were required to be 18 years or older. Each interview lasted about 15 min. During the interview, lists of items within sections were sequenced randomly to balance for possible order effects. If respondents had no opinion or if they did not know what to answer regarding a specific item, they were given the opportunity to select ‘don’t know/no opinion’ as a response (coded as 0).

Of the total 5859 phone numbers dialed, 66 were fax machine, 48 were answer machine, 452 were not valid, 61 were busy, 833 were unanswered, 1070 were not eligible (e.g. company or private firm telephone number or respondents were underage), 4469 resulted in a refusal, 322 required a call-back and 133 were addressed to individuals with demographic characteristics of quotas already met. A total of 1010 (17.3%) interviews was completed and the response Rate 2, as defined by American Association for Public Opinion Research [20], was 24.58%. More specifically, the response Rate 2 is the percentage of interviews completed and the total possible interviews meeting the study scope.

It should be noted that the response rate may be not really accurate when it comes to quota samples as they are not as good an indication of non-response bias as they are in ‘purer’ probability samples. Moreover, it was found that telephone survey using market research quota sampling can provide more accurate data than a postal survey of a random sample of the general population in terms of representativeness even if it was obtained a low response rate [21].

Table I. Sample demographics

<table>
<thead>
<tr>
<th>Variable and variable levels</th>
<th>Number (%) of participants</th>
<th>Census data 2009 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>641 (54.6)</td>
<td>52.04</td>
</tr>
<tr>
<td>Men</td>
<td>459 (45.4)</td>
<td>47.96</td>
</tr>
<tr>
<td>Age group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18–29</td>
<td>168 (16.6)</td>
<td>15.76</td>
</tr>
<tr>
<td>30–44</td>
<td>266 (26.3)</td>
<td>28.30</td>
</tr>
<tr>
<td>45–54</td>
<td>173 (17.1)</td>
<td>16.90</td>
</tr>
<tr>
<td>55–64</td>
<td>167 (16.5)</td>
<td>14.89</td>
</tr>
<tr>
<td>≥65</td>
<td>236 (23.4)</td>
<td>24.16</td>
</tr>
<tr>
<td>Region</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North-east</td>
<td>218 (21.6)</td>
<td>19.45</td>
</tr>
<tr>
<td>North-west</td>
<td>245 (24.3)</td>
<td>26.79</td>
</tr>
<tr>
<td>Center</td>
<td>196 (19.4)</td>
<td>19.84</td>
</tr>
<tr>
<td>South</td>
<td>246 (24.4)</td>
<td>22.94</td>
</tr>
<tr>
<td>Islands</td>
<td>105 (10.4)</td>
<td>10.99</td>
</tr>
</tbody>
</table>

A sample of 1010 Italians of at least 18 years of age took part in the survey. The sample was stratified by region (North, Center, South and Islands) as well as age group (18–29 years, 30–44 years, 45–54 years, 55–64 years and 65 or over) and gender according to 2009 Istat (the Italian National Institute of Statistics) data. Table I shows socio-demographic characteristics of the sample.
adequate internal consistency (Cronbach’s alpha of 0.79).

Likelihood of infection. One item assessed likelihood of infection: ‘Do you think you are at risk of catching swine flu?’.

Worry. Feelings of worry about pandemic influenza H1N1 2009 were assessed with two questions: ‘To what extent do you currently worry about pandemic influenza H1N1 2009?’ and ‘Do you feel scared about pandemic influenza H1N1 2009?’. The correlation between these two items was high (Pearson’s $r = 0.65$, $P < 0.001$).

Trust in the institutional response to the outbreak. Participants were asked to respond to the following questions: ‘Do you think the authorities are doing a good job of dealing with the Swine flu outbreak?’, ‘Do you think the authorities have enough resources to cope with the Swine flu outbreak’, ‘How much do you think the authorities are prepared for the Swine flu outbreak?’, ‘How much do you think the local authorities are prepared for the Swine flu outbreak?’. An index of trust in the authorities was computed by summing over respondents’ ratings. Factor analysis revealed the presence of one factor. The scale demonstrated adequate internal consistency (Cronbach’s alpha of 0.75).

Social trust. We measured general trust in media, medical science and Ministry of Health asking respondents to rate the trustworthiness of those specific entities.

Exaggeration of the risk. Two items were used to assess exaggeration of the risk: ‘Do you think that the media had exaggerated the risks of catching swine flu?’ and ‘Do you think that media have exaggerated the risks in the same way as during avian flu or SARS outbreak?’. The Pearson correlation between these two items was $r = 0.49$, $P < 0.001$.

Exposure to Topo Gigio campaign. Participants were asked to report if they remember Topo Gigio informative campaign about pandemic influenza H1N1 2009. Permitted responses were ‘yes’ (1) or ‘no’ (0).

**Recommended behaviors**

Individual behavioral responses to the threat of A/H1N1 virus were assessed with the question ‘Over the past month, what have you done to avoid A/H1N1 virus infection?’ This was followed by a list of five behaviors recommended by the Italian Ministry of Health (see Table II). Permitted responses for each question were ‘yes’ (1) or ‘no’ (0).

**Demographics**

Respondents were also asked about their sex, age, parental status, work status and economic hardship (In general, how do your finances usually work out at the end of the month?). Gender was coded as 1 for men and 2 for women. Responses regarding economic hardship ranged from ‘a lot of money leftover’ (1) to ‘not enough to make ends meet’ (4). Parental status was coded as 0 if they were childless and 1 if participants reported one or more children. Work status was coded as 0 for not working and 1 for working full or part time.

**Results**

Demographics characteristics of participants are shown in Table I. Table II summarizes rates of recommended behaviors among respondents. The majority of the respondents (62.5%) reported that

<table>
<thead>
<tr>
<th>Recommended behaviors</th>
<th>Positive responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>To clean or disinfect objects that one touch more often than usual</td>
<td>322 31.9</td>
</tr>
<tr>
<td>To wash my hands with soap and water more often than usual</td>
<td>631 62.5</td>
</tr>
<tr>
<td>To use tissues when sneezing more than before</td>
<td>428 42.4</td>
</tr>
<tr>
<td>Social distancing</td>
<td>339 33.6</td>
</tr>
<tr>
<td>Vaccine acceptance</td>
<td>28 2.8</td>
</tr>
</tbody>
</table>
they washed their hands with soap and water more often than usual. The other recommended behaviors were reported by about one-third of the participants with the exclusion of vaccine acceptance. Overall, 2.8% of the respondents reported that they were vaccinated against A/H1N1 virus.

Table III shows the results of bivariate logistic regression analyses between socio-demographic variables and recommended behaviors. Respondents who were women, and who had economic hardship were more likely to clean objects, to wash hands and to use tissues when sneezing. Respondents who were parents were more likely to clean objects and to wash hands. Finally, working full or part time respondents were more likely to wash hands. None of the socio-demographic variables was related to vaccine acceptance.

Table IV shows the results of multivariate logistic regression analyses with each of the psychosocial factors described above tested as an independent variable and with recommended behaviors as the dependent variables controlling for socio-demographic variables. Recommended behaviors such as cleaning objects, social distancing and washing hands were related to all the psychosocial factors except for trust in the institutional response to the outbreak and trust in medical science (this last was significantly associated with

### Table III. The association (Odds ratio 95% confidence interval) between socio-demographic variables and stated willingness to comply with recommended behaviors (N = 1010)

<table>
<thead>
<tr>
<th>Factors</th>
<th>To clean objects</th>
<th>To wash hands</th>
<th>To use tissues when sneezing</th>
<th>Social distancing</th>
<th>Vaccine acceptance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gendera</td>
<td>1.5 (1.2–2.0)*</td>
<td>1.6 (1.3–2.1)*</td>
<td>1.3 (1.0–1.7)*</td>
<td>1.1 (0.9–1.5)</td>
<td>0.5 (0.3–1.1)</td>
</tr>
<tr>
<td>Age</td>
<td>1.0 (1.0–1.0)</td>
<td>1.0 (1.0–1.0)</td>
<td>1.0 (1.0–1.0)</td>
<td>1.0 (1.0–1.0)</td>
<td>1.0 (1.0–1.1)</td>
</tr>
<tr>
<td>Economic hardshipb</td>
<td>1.2 (1.0–1.5)*</td>
<td>1.3 (1.1–1.5)*</td>
<td>1.2 (1.0–1.4)*</td>
<td>1.1 (0.9–1.4)</td>
<td>0.8 (0.5–1.4)</td>
</tr>
<tr>
<td>Parental statusc</td>
<td>1.4 (1.0–1.8)*</td>
<td>1.3 (1.0–1.7)*</td>
<td>1.0 (0.8–1.3)</td>
<td>0.9 (0.7–1.2)</td>
<td>0.9 (0.4–2.0)</td>
</tr>
<tr>
<td>Work statusd</td>
<td>0.8 (0.6–1.1)</td>
<td>0.6 (0.5–0.8)*</td>
<td>0.8 (0.6–1.0)</td>
<td>0.9 (0.7–1.1)</td>
<td>1.3 (0.6–2.8)</td>
</tr>
</tbody>
</table>

*Gender was coded as 1 for men and 2 for women.

**Economic hardship was coded as 1 ‘a lot of money leftover’ to 4 ‘not enough to make ends meet’.

Parental status was coded as 0 if they were childless and 1 if participants reported one or more children.

Work status was coded as 0 for not working and 1 for working full or part time. *P < 0.05.

### Table IV. The association (Adjusted odds ratio 95% confidence interval) between psychosocial factors and stated willingness to comply with recommended behaviors controlling for socio-demographic variables (N = 1010)

<table>
<thead>
<tr>
<th>Factors</th>
<th>To clean objects</th>
<th>To wash hands</th>
<th>To use tissues when sneezing</th>
<th>Social distancing</th>
<th>Vaccine acceptance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trust in the institutional response to the outbreak</td>
<td>1.0 (0.9–1.1)</td>
<td>1.0 (0.9–1.1)</td>
<td>1.1 (1.0–1.2)*</td>
<td>1.0 (0.9–1.1)</td>
<td>1.4 (1.1–1.8)*</td>
</tr>
<tr>
<td>Media trust</td>
<td>1.2 (1.1–1.3)*</td>
<td>1.2 (1.1–1.2)*</td>
<td>1.1 (1.1–1.2)*</td>
<td>1.1 (1.1–1.2)</td>
<td>1.3 (1.1–1.5)*</td>
</tr>
<tr>
<td>Trust in the Ministry of Health</td>
<td>1.1 (1.1–1.2)*</td>
<td>1.1 (1.1–1.2)*</td>
<td>1.1 (1.0–1.1)</td>
<td>1.1 (1.0–1.1)</td>
<td>1.4 (1.1–1.6)*</td>
</tr>
<tr>
<td>Trust in medical science</td>
<td>1.1 (1.0–1.2)*</td>
<td>1.0 (0.9–1.1)</td>
<td>1.0 (0.9–1.1)</td>
<td>1.0 (0.9–1.1)</td>
<td>1.3 (1.0–1.6)*</td>
</tr>
<tr>
<td>Exaggeration</td>
<td>0.9 (0.9–1.0)*</td>
<td>0.9 (0.9–1.0)*</td>
<td>0.9 (0.9–1.0)*</td>
<td>1.0 (0.9–1.0)</td>
<td>0.9 (0.8–1.1)</td>
</tr>
<tr>
<td>Worry</td>
<td>1.2 (1.2–1.3)*</td>
<td>1.2 (1.1–1.2)*</td>
<td>1.2 (1.1–1.2)*</td>
<td>1.2 (1.1–1.2)</td>
<td>1.3 (1.1–1.5)*</td>
</tr>
<tr>
<td>Severity of illness</td>
<td>1.3 (1.2–1.4)*</td>
<td>1.2 (1.1–1.3)*</td>
<td>1.3 (1.2–1.3)*</td>
<td>1.2 (1.1–1.2)</td>
<td>1.2 (1.0–1.5)*</td>
</tr>
<tr>
<td>Likelihood of infection</td>
<td>1.1 (1.1–1.2)*</td>
<td>1.1 (1.0–1.2)*</td>
<td>1.1 (1.0–1.2)*</td>
<td>1.1 (1.0–1.1)</td>
<td>1.0 (0.9–1.2)</td>
</tr>
<tr>
<td>Control</td>
<td>1.1 (1.0–1.2)*</td>
<td>1.1 (1.1–1.2)*</td>
<td>1.1 (0.9–1.1)</td>
<td>1.1 (1.0–1.1)*</td>
<td>1.1 (0.9–1.3)</td>
</tr>
<tr>
<td>Exposure to Topo Gigio media campaign</td>
<td>1.2 (0.8–2.0)</td>
<td>1.4 (0.9–2.2)</td>
<td>1.7 (1.1–2.7)*</td>
<td>1.4 (0.9–2.2)</td>
<td>0.8 (0.3–2.6)</td>
</tr>
</tbody>
</table>

The odds ratios were adjusted for sex, age, work status, economic hardship and parental status.

*P < 0.05.
cleaning objects). A belief that the risk from the pandemic had been exaggerated was not associated with keeping your distance from others.

To use tissues when sneezing was predicted by all the psychosocial factors, except for trust in medical science and control. All the measures of trust, along with worry and perceived severity of illness, significantly predicted vaccine acceptance.

These results showed that media trust, trust in the Ministry of Health (regardless of what was done to reduce this risk), worry and perceived severity of illness predicted all the recommended behaviors. Exposure to the Topo Gigio campaign did have a limited influence on complying with health related recommendations but only with regard the use of tissues when sneezing.

**Discussion**

The aims of this study were to determine the rates of recommended behaviors adopted by an adult Italian sample and to assess the associations between risk perception, worry, trust, control, media exaggeration, exposure to an educational campaign about pandemic influenza H1N1 2009 and recommended behaviors.

**Rates of recommended behaviors**

The percentage of the respondents (62.5%) who reported that they washed their hands with soap and water more often than usual is in line with findings from Arabia [5] and in Udaipur (India) [6]. However, this percentage was a bit lower than that obtained in Hong Kong (78.6%) [3] and much higher than that obtained in Great Britain (28.1%) [4]. About 4 of 10 participants reported covering their nose and mouth with a tissue when coughing or sneezing, a finding similar to that obtained in Arabia [5]. About one-third of the participants reported cleaning or disinfecting objects that one might touch; this finding is similar to that obtained in Udaipur (India) [6] and much higher than that obtained in Great Britain [4]. The percentage of the respondents who reported that they were vaccinated against A/H1N1 virus was very low (2.8%) compared with United States where vaccination coverage as of the end of January among adults aged ≥18 years was 20.1% [22]. This percentage is very low given the Italian policy regarding vaccination. Indeed, the vaccine was recommended (but not mandatory) and was offered freely to everyone.

**The relationship of socio-demographic variables to recommended behaviors**

We found that sex, parental status, work status and socio-economic status were associated with at least one recommended behavior. Similar effects to those reported here have been observed for sex, parental status, work status and socio-economic status [4]. In contrast with other studies [4–6], age was not related to any of the recommended behaviors.

**The relationship of psychosocial factors to recommended behaviors**

Results showed that media trust and trust in the Ministry of Health were related to all recommended behaviors. The results for trust are in line with Tang and Wong’s study [8] concerning SARS and Rubin et al. study [4] concerning pandemic influenza H1N1 2009. However, this study showed that participants who complied with recommended behaviors had higher trust in media and health ministry regardless of what they did concerning this risk. In other words, there have been participants who perceived that the media had exaggerated the risks and that health ministry is not doing a good job of dealing with this risk, still they complied with recommended behaviors because of their trust in media and health ministry. These results may suggest that it is important to build trust and commitment in advance of a pandemic outbreak. This is especially true during emerging health threats when people may be concerned about sensationalism and may feel distrust toward the government [23].

In contrast with a previous study [4], we found an effect of the Topo Gigio campaign, however, this effect was limited in line with another study of evaluation of a cold/flu self-care public education campaign [19, 24]. This limited evidence calls for renewed strategies that will significantly increase stated compliance with the official recommendations.
in a timely and massive scale. It should be noted that a recently published study showed that exposure to media reporting or advertising coverage was associated with recommended behaviors through the mediation of perceived knowledge about swine flu and perceived efficacy of hygiene strategies [25]. While these results suggest that media campaign may have an influence on stated compliance with the official recommendations, the results of the present study indicate that trust is an essential element of the communication strategy. According to Earle and Cvetkovich’s perspective, social trust may be increased by telling stories expressing salient values that are similar to the receivers [26, 27]. More specifically, according to this perspective, people do not infer trustworthiness from direct evidence rather from value-bearing narratives. Thus, social trust depends on salient value similarity, in other words, the shared sense between the institution and the public of what are the important goals and/or processes that should be followed in a specific situation.

Affective reaction to risks such as worry was found to be as important in predicting recommended behaviors as cognitive dimensions of risk perception. Whereas several models of health behavior recognized as key determinants of protective or preventative behavior cognitive factors (e.g. risk perception) [14, 15], this study provides further evidence for the role of emotions [4, 8, 11, 15–17].

In line with the literature [4, 15], we found that people who believed that there is currently a high risk of catching influenza (likelihood of infection), that it is possible to control their risk of catching this illness (control) and that did not think that the media had exaggerated the risks of catching influenza tended to comply with recommended behaviors. These findings endorse the policy of providing the public with clear consistent information, which report the risks, focuses on the practical things that people can do to reduce their risk and emphasizes the efficacy of recommended behaviors. A challenge for public health authorities is to deliver a communication aimed at increasing the perceived likelihood of infection without exaggerating the risk.

Our study had several limitations that deserve comments. First, although the sample was consistent with the census data, there may be concerns about the representativeness of the sample. This study failed to include individuals who were without home telephone lines or not at home during the surveyed period. Moreover, it should be noted that the response rate obtained is similar or higher than the one obtained in previous studies [4, 25]. Second, given the correlational design of this study, it is not possible to ascertain cause–effect relations. Third, we relied on retrospective self-reports of respondents without external verification, and results might be subject to social desirability and recall bias. This is not true, however, for the measure of vaccine acceptance since the self-report of influenza vaccine acceptance is actually fairly reliable [28]. It should be noted that no dose exposure to Topo Gigio campaign (how much exposure over how much time) has been collected, in line with a previous study on pandemic influenza H1N1 2009 [4]. Finally, our study was conducted after the pandemic had run its course in Italy and presumably a large proportion of respondents had already had the illness and considered themselves no longer at risk. It should be noted, however, that the total number of admissions to a hospital in Italy due to this infection was 1049 [2]. The vast majority of people that were infected by pandemic influenza H1N1 2009 might actually be not aware of it. Indeed, symptoms of pandemic influenza H1N1 2009 are similar to those of the influenza season. Since it was not clear in February that pandemic influenza H1N1 2009 had run its course in Italy, people were still worried about it. Moreover, the Italian surveillance system for influenza reported two deaths due to pandemic influenza H1N1 2009 in the week the study was conducted [29]. It is true, however, that if the survey were conducted earlier, the means of likelihood of infection, worry and severity of illness might be higher.

Conclusions

Despite these limitations, this study demonstrated a relationship between risk perception, worry, trust and stated willingness to comply with recommen-
dations for pandemic influenza H1N1 2009. More specifically, it was found that psychosocial factors such as trust and cognitive and emotional aspects of risk perception are related to an increase in all the five recommended behaviors. Findings have significant implications in identifying ways of promoting compliance with recommended behaviors during the early stages of any future outbreak of infectious disease.

**Funding**


**Conflict of interest statement**

None declared.

**References**
