"Listen to me, I will respond": A randomized communication trial on health decisions

Pre-Analysis Plan

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We evaluate and formalize the effectiveness of framing health communication campaigns with techniques inspired by motivational interviewing (MI). In the context of health, MI consists of communication techniques used by health professionals to reduce distrust towards preventative healthcare practices. MI uses four core skills (Breckenridge et al., 2021): (1) Open-ended questions: patients freely describe their worries and their experiences; (2) Affirmation: acknowledging the patient's concerns; (3) Reflective listening: expressing empathy and understanding for the feelings verbalized by the patient; (4) Summary: summarizing the conversation to allow clarification of possible misinformation received by patients. A motivational interviewer avoids discrepancy and conflict with patients and recognizes their feelings in a non-judgmental way.

To test them and to provide implementable and cost-effective policy recommendations that can be readily included in existing communication campaigns, we will conduct a Randomized Controlled Trial where the treatment consists of a framed video covering the safety of the flu vaccine and the dangers of not getting vaccinated.

1 Setting

This study will be conducted in Italy focusing on the over-40 population, the main target of screening and vaccination policies. This setting is ideal because:

- Italy is the European country with the oldest population, and the highest share of the old population, a trend foreseen for the entire European continent (Eurostat, 2022). The over-50 age class is particularly targeted by online vaccine misinformation and contains a large number of vaccine-hesitant people. Moreover, it is the target of influenza vaccinations and several cancer screening campaigns, including mammography for women to prevent breast cancer, and urological visits for men to prevent prostate cancer.

- Communications in Italy over Covid-19 vaccines in the last 2 years have been characterized by: (i) A few, very well-known virologists and medical doctors monopolizing TV shows, radio interviews, and social media discussions. These are often criticized by the vaccine-hesitant for their "patronizing" tone; (ii) The choice to appoint an army corps general as the national vaccination campaign manager, General Figliuolo, who

adopted a directing style of communication. This decision was interpreted by public opinion as part of the government's communication strategy on vaccines.

Participants will be recruited among panelists by Bilendi & Respondi, which has profiled sufficient over-40 respondents and specializes in surveys on health matters. They will be interviewed via digital surveys (self-administered on PCs or other personal devices) as well as face-to-face interviews based on the same survey, for those age categories that are hard to reach via computer or other digital devices.

Respondents will be stratified by age, education and geographic origin to resemble the overall characteristics of the over-40 Italian population (according to the last available census).

2 Treatments

As detailed below, we conduct two surveys in a factorial design where respondents are stratified by gender and gender concordance. The first survey will contain a video where the framing is randomly assigned and varies along three separate dimensions:

1. Communication approach.
    - Under Motivational Interviewing (MI), the video shows a dialogue between an over-50 citizen and a professional who acts as an informant. The citizen expresses doubts on either vaccines or screenings that consistently come up in previous survey evidence; the informant listens and answers according to MI techniques.
    - Under DS, a single actor is recorded while giving the same information to the camera in a direct and paternalistic tone that mimics existing video campaigns on vaccines in Italy.
2. Gender of the informant in the video. Thanks to the stratification of respondents by gender in the experimental design, we are able to identify the effects of both informant's gender and gender accordance.
3. Medical image. The informant in the video (in practice, they wear a doctor's coat or not and are filmed with typical medical instruments around them or not).

The script used in the videos will be evaluated by a team of specialized psychologists to assess their adherence (or distance) from Motivational Interviewing techniques, using validated evaluation scales.

3 Outcomes

Our primary outcomes are:

1. Intentions to vaccinate against the flu (measured right after exposing subjects to the video in the first survey).
2. Self-reported vaccination against the flu (measured in the second survey approximately 3 months after the first one, i.e. after the vaccination campaign has taken place).

Secondary outcomes are:

1. Agreement with common misconceptions around vaccines. These are measured with direct questions and by asking to judge a situation that concerns a hypothetical third person.
2. Trust in science and scientists.
3. Spillovers on other forms of preventative medicine, including frequency of doctor visits, yearly check-ups, perceived health status

We will use correct our p-values for multiple hypotheses.

4 Design

Let us redefine the three treatments (varying at the individual level, denoted by i) as the following binary variables:

- $A = 1$ if the video/survey shows a MI dialogue, and 0 otherwise;
- $D = 1$ if the informant in the video/survey is identified as a medical doctor, 0 otherwise;
- $FV_i = 1$ if the informant in the video/survey is a woman, 0 otherwise.

Let Y (indexed by i) denote the vector of outcomes. Define average potential outcomes as $Y(A, D, F) := E_i[Y_i(A_i, D_i, F_i)]$, which is the average outcome that would be observed if subjects were exposed to given levels of treatments A, D, and F. For instance, the average uptake of vaccination in the case of MI-based treatment, with a male, doctor informant is denoted as $Y1(1, 0, 1)$, since vaccination uptake is the first element of vector Y. Finally, denote the gender of each subject with the binary variable F, equal to 1 for women and 0 otherwise.

We adopt a stratified 2x2x2, between-subject single-blind design that allows identifying separately for men and women:

(i) the effect of FV (the unconditional effect of the informant's gender);

(ii) the effect of FV conditional on F. Namely, the effect of gender accordance (the correspondence between the subject's value of F and the informant's gender measured by FV). For the MI framing of the video, the citizen being informed is of the same gender as the subject.

The stratification by subjects' gender is such that both these effects can be estimated separately for men and women. By design, the cell-by-cell observed average potential outcomes look as follows:

Figure 1: $2 \times 2 \times 2$ design and observed potential outcomes

		A=0 (Uni-directional message)	**A=1 (Active listening)**	**Medical doctor (D)**
Gender accordance	**Female subjects**	Y(A=0, D=0, FV=1 | F=1)	Y(A=1, D=0, FV=1 | F=1)	**0**
		Y(A=0, D=1, FV=1 | F=1)	Y(A=1, D=1, FV=1 | F=1)	**1**
	Male subjects	Y(A=0, D=0, FV=0 | F=0)	Y(A=1, D=0, FV=0 | F=0)	**0**
		Y(A=0, D=1, FV=0 | F=0)	Y(A=1, D=1, FV=0 | F=0)	**1**
Gender discordance	**Female subjects**	Y(A=0, D=0, FV=1 | F=0)	Y(A=1, D=0, FV=1 | F=0)	**0**
		Y(A=0, D=1, FV=1 | F=0)	Y(A=1, D=1, FV=1 | F=0)	**1**
	Male subjects	Y(A=0, D=0, FV=0 | F=1)	Y(A=1, D=0, FV=0 | F=1)	**0**
		Y(A=0, D=1, FV=0 | F=1)	Y(A=1, D=1, FV=0 | F=1)	**1**

We aim to have 500 subjects in each of the 16 cells after taking into account the dropout from the first to the second survey. Therefore, we will invite 12000 subjects (stratified by demographic characteristics that resemble the Italian population) expecting to be left with 8000 in the second survey.

More details are given in the preliminary power analysis below.

5 Analysis

The above design allows computing, separately for men and women, the conditional and unconditional effect of each treatment, conditioning on any possible combination of the remaining two treatments, using up to triple interaction

terms in ANCOVA regressions. These regressions control for baseline covariates, including baseline values of the outcomes, in order to increase statistical power.

This is equivalent to restricting the sample to cells that correspond to the desired conditioning and then estimating an ANCOVA model with a single treatment regressor. For instance, suppose you want to estimate among women ($F = 1$), the causal effect of representing a gender-concordant informant ($FV = 1$) like a doctor ($D = 1$), versus a gender-concordant informant that is not identified as a doctor ($D = 0$), conditional on an MI-framed treatment ($A = 1$).

You can restrict to cells denoted by $Y(A = 1, D = 0, FV = 1|F = 1)$ and $Y(A = 1, D = 1, FV = 1|F = 1)$ (the two top-right cells), and estimate:

$$Y_i = a + tD_i + X_i'b + \epsilon_i,$$

where X_i' is a vector of baseline covariates including the pre-treatment value of outcome Y. The desired causal parameter is estimated by t. This estimate will be directly comparable to the same parameter estimated on males, i.e., restricting the sample to cells denoted by $Y(A = 1, D = 0, FV = 0|F = 0)$ and $Y(A = 1, D = 1, FV = 0|F = 0)$.

If you restrict to the first 4 rows of the second column altogether, you can assess the comparison between men and women by estimating directly

$$Y_i = a + tD_i + gF_i + d(D_i \times F_i) + X_i'b + \epsilon_i,$$

where the statistical significance of the comparison between men and women can be assessed by making inference on coefficient d.

6 Preliminary Power Analysis

We use survey data that we collected for exploratory analysis focused on Covid vaccines. We have a sample of 267 respondents (150 older than 30, 86 older than 50), and we obtain the residual variance by running the regression:

$$V_i = a + Z_i'b + \epsilon_i$$

and computing the standard deviation of ϵ. V is a binary indicator of whether the respondent has received any anti-Covid vaccine. Z is a vector of covariates including age, gender, self-reported income and income change during the pandemic, education level, trust in institutions and in health professionals, whether a close friend or relative is a health professional, and a baseline indicator of willingness to discuss vaccine doubts with a doctor.

An ANCOVA mean comparison controlling for these covariates yields a statistical power of 0.88 when the sample size equals 500 and the minimum detectable effect is 0.049, or a conventional 0.8 power with the same sample size, for an MDE of 0.044. Note The sample size of 500 corresponds to the most conditioned tests (i.e., to measure the effect of one treatment keeping the other two fixed), whereas most tests with less conditioning variables will be run on larger samples, ensuring a higher power.

We believe that an MDE of 0.05 (a 5 p.p. increase in uptake) is the minimum relevant increase from a policy perspective. However, due to the higher number of covariates in the actual study, including baseline values of the outcomes, we can reasonably expect a higher power for the same sample size, or the same power for a smaller MDE.

7 Heteroegeneity analysis

We will evaluate heterogeneity in more than one manuscript and will investigate all dimensions measured in the attached surveys. Different teams will use different techniques, possibly including parametric and non-parametric regression analysis, causal forests and Bayesian imputation of missing potential outcomes.

8 Mechanisms

We will investigate mechanisms by exploring heterogeneity in the causal effects of treatments across different dimensions measured by the survey, and by providing a theoretical framework on the mechanisms of action of MI (the latter possibly in a separate manuscript).

We will focus on attention which is measured with direct questions in the first survey and with an ML-based analysis that uses eye-tracking software during the vision of the framed videos.