Time Perspective and Motivation to Protective behaviours against Covid-19 in Italian young people

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Abstract

Introduction

Health Psychology highlights the complexity of factors that influences the individual decision to adopt one, or more, protective behaviours for avoiding diseases and adverse health outcomes. One of the most relevant theory is the Protection Motivation Theory (Rogers, 1975), which has been adopted for identifying the psychological factors involved in many protection behaviours. Another relevant construct for healthy behaviours is represented by the Time Perspective (Zimbardo & Boyd, 1999).

This study analysed the relationships between the Protection Motivation Theory applied on Covid-19 and Time Perspective in Italian young people.

Method

A group of 130 young people (m. age 26.4; 40 males and 90 females) participated in the study, filling in the Swedish Zimbardo Time Perspective Inventory and the Motivation to Protect against Covid-19 Questionnaire. Three single items furthermore explored the prevailingly sources of information for Covid-19 (social media such as Facebook; traditional media such as TV; specialistic magazines such as Le Scienze) used and a single item tested the level of mistrust in Political Institutions and mass-media and its association with protection motivation, beliefs and perceived vulnerability to Covid-19.

Results. Perceived vulnerability to Covid-19 and use of protections and perceived efficacy of protections, show positive correlations with Future Positive; beliefs on Covid-19 vaccine resulted as negatively correlated with Present Fatalistic; a positive correlation between mistrust in political institutions

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and Present Fatalistic has been found. Social media (such as Facebook, Instagram) and traditional mass media (such as TV) as preferred systems of information are both positively correlated with beliefs on Covid-19 vaccine, perceived vulnerability and use of protections, highlighting the role of new forms of circulation of information, but also the relevance of traditional ones for young people. Perceived vulnerability to Covid-19, perceived efficacy of protections give a positive contribution to the intention to get vaccinated; mistrust in political institutions and media on the contrary reduces the intention to take the vaccine.

Conclusions. Results are discussed in relations to preventive interventions on the young population for the improvement of self-awareness of persistence of this virus and consequently the necessity of adopting self-protection, with special attention to vaccination. The relevance of time perspective dimensions for protection suggests to include it in the programs devoted to reduce the risk of contagion.

Keywords: time perspective; Covid-19; motivation to protect; young people; vaccine

Introduction

The Protection Motivation Theory and its role in Coronavirus disease protection

For several decades, Health Psychology had, among its theoretical research's objectives, the development of effective models for modifying behaviours that can cause damage to health, emphasizing the importance of primary prevention to promote the health of everyone. These theoretical models form the basis on which to develop intervention projects for the population at an individual, group or social level (Gremigni, 2013).

The SARS-CoV-2 (from here on in the text: Covid-19 and in some cases, when indicating the planetary diffusion of it, Covid-19 pandemic; but, for the complex question of denomination of this virus and this critical event, see Agnelli & Capua, 2022) has brought to the forefront, due to its dramatic spread worldwide and the serious or potentially fatal complications for the most fragile population, the theme of primary prevention, or in any case the theme of protection from infection or from its most serious consequences. Among the models used by international research in this regard, the Protection Motivation Theory (PTM, Rogers, 1975) represents one of the most widely used models, due to its

predictive efficacy demonstrated for the reduction of health risks such as cigarette smoking (Milne et al., 2006; Yan et al., 2014), the lack of physical activity, (Plotnikoff et al., 2009), risk driving (Harbek et al., 2018).

PTM assumes that adopting a protective behaviour against health threats is related to personal motivation for self-protection and that this is explained by threat and coping appraisal. On the basis of PTM assumptions, individuals will be incentivized and motivated to protect their health if the following factors are satisfied. The first factor concerns personal beliefs on the severity of the problem (perceived severity of the problem); after, the personal estimation of the chance of being affected by the disease (perceived vulnerability), the perceived efficacy of the protective actions/behaviours and, the personal beliefs in own capability of utilizing it and the personal estimation of their costs and efforts in Coping appraisal. Coping appraisal involves personal evaluation of the efficacy of the protective behaviour, personal belief in own capability of utilizing it, personal estimation of costs (eg. money, time, energy..) and efforts to perform the protective behaviour.

Fear-based models, such as the PTM, identify in fear the mediator between perceived severity, perceived vulnerability and threat appraisal. If an individual feels vulnerable to a serious health threat (in this case the Covid-19) the level of fear is expected to increase; than also the motivation to avoid this threat and consequently the willingness to adopt the protective behaviours.

PTM has been already utilized for investigating the protective behaviours against H1H1 Influenzae epidemic (Sharifirad et al., 2014), confirming its predicting value.

In the Covid-19 pandemic context, PTM has been utilized by researchers for identifying the factors involved in the motivation to protect against it through protective behaviours such as use of facial masks, sanitizing hand gel, social distancing and vaccines.

AL-Raasheed (2020) evaluated the intention to adopt behaviours against Covid-19 in 679 Kuwaitian subjects, and its association with the constructs of PTM, self-reported assessment of trust in informations coming from the government.

Results confirm that participants who reported high severity perception of infection and perceived vulnerability were more likely to protect themselves through recommended behaviours (mask, gel, social distancing). Also trusting in government for information has been associated with the adoption of protective behaviours.

Ezati et al., (2021) have utilized the PTM for predicting protective behaviours in the city of Hormozogan, Iran, with a sample of 2032 subjects. The study shows significant positive correlations between the perceived vulnerability and the preventive behaviours. On the contrary, the perceived costs of adopting these behaviours are negatively associated with their adoption.

In European countries PTM has also been used for Covid-19 prevention research.

Gallmaister et al., (2021) tested the predictive power of PTM for vaccination in a sample of 133 Dutch adult people. They found that vaccine skepticism is causally related to a lower level of intention to get vaccinated, while the response efficacy partially mediates this link between skepticism and intention. Also, people believing in conspiracy theories do not have higher threat appraisal than people who do not possess these beliefs.

Another study (Eberdartd & Ling, 2021) evaluates, in a sample of 382 people of the United Kingdom, the predicting power of PTM on the intention to get vaccinated, and the relevance of conspiracy beliefs for vaccination. Results confirm that the higher perceived severity of Covid-19 and individuals' perceived susceptibility to the disease, the higher their intention was to get vaccinated. Also the presence of high level of conspiracy beliefs negatively predict the intention to be vaccinated. In this study, the younger show higher intention to be vaccinated, confronted with the older respondents.

Zambianchi (2022) in a pilot-study that involved 126 young people and aimed at testing a questionnaire on the motivation to protect against Covid-19, found that the perception of vulnerability to it was associated positively with the use of protective behaviours such as facial mask, social distancing and vaccines. In this study it has also been explored the association between sources of information on the pandemic and the PTM factors. This study confirms the interconnection among the factors of PTM theory taken into account in this study: the beliefs on severity of the pandemic; the perceived vulnerability to it; the perceived efficacy of protective behaviours: facial masks, gel, social distancing, vaccinations. The questionnaire revealed, through Factor Analysis, a specific, autonomous factor which collects items about the vaccine. This result seems to indicate that the vaccine is represented as a different type of protection, perhaps perceived as an inner protection, outside of personal control, due to the fact that the vaccine is inside the blood, and we cannot perceive the impact on the immune system.

Another Italian study (Zanin & Zambianchi, 2022) that evaluates the predicting power of PTM factors on protection behaviours against Covid-19 in a group of 133 old people, found the relevance of perceived severity of the pandemic and the perceived vulnerability to it as strongly connected to the adoption of protective behaviours and to the intention to get vaccinated again in the future if sanitary situation will request it. The traditional mass-media such as newspapers and TV resulted in association with a positive evaluation of protection. Lower level of mistrust in political institutions and mass-media for information on the pandemic has been found to be associated with higher protection and higher willingness to get vaccinated again in the future. The model has been tested also in its association with Time Perspective Theory (Zimbardo & Boyd, 1999; Carelli et al., 2011), finding a positive correlation between Present Fatalistic and positive beliefs on Covid-19 vaccination. This unexpected result (considering the international literature highlighting Present Fatalistic as negatively associated with protection behaviours, eg. Zimbardo & Boyd, 1999; Zimbardo, Keough & Boyd, 1997) allows us to hypothesize that old people perceive the spread of Covid-19 as out of personal, individual control, and for this reason identifying in mass vaccination the only effective route for beating Covid-19 and for reducing its dramatic effects.

Grano, Solorzano & Di Pucchio (2021), evaluating in a longitudinal design the predictive power of PTM for the adoption of protection against Covid-19 in 352 Italian people, found that perceived severity has a strong impact on the intention to adopt protective behaviours, recommending the construction of preventive health programs based also on PTM model.

The international literature on this topic highlights the relevance of gender for the adoption of protective behaviours. As other previous research on health protection and prevention have already shown (Finucane et al., 2000; Duncan et al., 2009), men are less concerned about their susceptibility to diseases, and evaluate risk for health outcomes as less relevant for their life.

A recent review (Lewis & Duch, 2021) examined 16 studies on risk beliefs and behaviours aimed at protecting against Covid-19 in men and women, finding consistent differences: men indeed resulted in having less concern for contagion and its health consequences than women. Another study (Zambianchi, 2020) on a group of more than 300 old people has highlighted a substantial difference between men and women on fear and anxiety related to Covid-19 and travelling for tourism. Women perceive more risk for adverse health outcomes than men during tourism travel.

Tàn et al. (2022) evaluated, in a sample of 1990 Taiwanese participants, using as theoretical models the Protection Motivation Theory (Rogers, 1975) and the Planned Behavior Theory (Ajzen, 1991), the differences for gender in the perception of pandemic and health, protective behaviours. Female gender was positively associated with health protective factors. But, in this research, being female was negatively associated with intention to receive vaccines. Another study, involving 8 Countries, among which Italy (Galasso et al., 2020) in a multicentric perspective, highlighted that women were more compliant with protective measures against contagion and spread of Covid-19.

Ottenbring & Festila (2022) investigated the gender differences in compliance with preventive health behaviours about Covid-19, introducing personality traits as potential mediators. They found women to score higher than men on agreeableness and conscientiousness, personality traits that mediate, in this study, the gender compliance link. Researches hypothesized that woman's greater compliance with protective behaviours could be, in part, attributed to these dimensions.

Gender differences have also been emerged, in international literature, for adherence to vaccine, were, on the contrary respect to other protective behaviours such as gel, facial mask, women appear to be less compliant to get vaccinated. Ishimaru et al. (2021) in a study on gender differences for vaccination found that women were less willing to take the vaccine than men and that higher levels of school education corresponds in women to lower intention to take the vaccine. This result emerged also in other research. Toshkov (2023), hypothesized that women are less willing to take vaccine because they consider it too much quickly developed to be safe, with not well clear long-term effects.

The relevance of suspicious representations about vaccine and/or the mistrust in institutions for the intention to get vaccinated have been demonstrated by several research (Bieper et al., 2021; Murphy et al., 2021). High level of suspiciousness or paranoid ideation about the outbreak of Coronavirus (born in a Wuhan lab, or due to the 5G digital technologies with human implantations of devices for controlling behaviours and thinks of vaccine adopters) has to be traced to personality characteristics or disorders (Simione et al., 2021) and contribute to vaccine refusal. These results can be linked also to the central and strategic role played by mass-media and social media in communicating the development, the trend and the scientific discoveries about the Covid-19 pandemic. As Anwar et al. (2020) highlights, mass-media such as TV, newspapers, and social media such as Facebook, Twitter, become crucial in spreading new information, but also the so called "fake news"

(Riva, 2017), and, for these reasons, they contribute in creating or shaping the beliefs about the severity of this new virus in individuals, age-cohorts, groups and communities.

The beliefs and the evaluation of severity of Covid-19 for health are fundamental, as PTM claims, for the subsequent adoption of protective behaviours. Previous studies examined the role of media during the other epidemic of H1N1 in 2009 and MERS in 2012, reporting the positive influence on the adoption of prevention measures (Sharifirad et al., 2014; Jiang et al., 2009). On the other hand, the growing diffusion of social media such as Facebook, Twitter, Instagram creates new challenges, among which the difficulty in reducing the circulation of non rigorous scientific information and fake news about the virus and the efficacy of medicine, with the emergence of websites and social groups which are in clear opposition to it, being the vaccine a system of protection with groups historically contrary to its inoculation (Tognotti, 2020). The beliefs and the evaluation of severity of this virus for health are fundamental, as PTM claims, for the subsequent adoption of protective behaviours, but as stated Moscovici (2000), mass-media play a central role in shaping beliefs and attitudes towards anxious or threatening situations, contributing in the diffusion of social representations of them among specific social groups.

The centrality of motivations for the adoption of a protective behaviour against contagion has been recognized in other research. Moore et al., (2022) explored, in a sample of 1475 adult persons the motivations to vaccinate among the hesitant adopters of the Covid-19 vaccine. They found two specific categories of motivations: extrinsic and intrinsic. The most relevant extrinsic motivation to get vaccinated were the desire to protect the community, the protection of the family and friends; the most relevant intrinsic motivations was the desire to protect themselves, especially from the complications due to the infection. Among the structural motivators have been found the desire to travel and work.

As noted above, nowadays, the relevance of time perspective in protection motivation and intention for reducing the risk of contagion and adverse health outcome due to Covid-19 disease is understudied. Very few studies indeed have approached the issue of safety and health protection taking into consideration the perception and representation of time, although time perspective has been widely studied in its relationships with other risk behaviours.

Time perspective and protective behaviours. Can Time perspective contribute to the knowledge of the protecting factors against Covid-19?

We can trace back to Frank (1939) the first definition of Time Perspective, which was configured as "a lived temporal dimension, in which an individual inserts his behaviour, the extension of his representation of the past or future events of his existence". The time perspective becomes one of the determining factors in the energy mobilized towards a purpose, both in the direction of the future and in the direction of the past. Inserting themselves in the wake of the Lewinian tradition, Zimbardo & Boyd (1999) proposed a conceptualization of the time perspective conceived as a basic process in the functioning of the individual and society. Time perspective is seen by the authors as a process, often unconscious, through which personal and social experiences "are placed in certain categories, or temporal frames that help to assign order, coherence and meaning to events themselves" (p. 1271). Time Perspective is conceptualized by Zimbardo & Boyd (1999) as constituted by five temporal dimensions: Past Positive, Past Negative, Present Hedonistic, Present Fatalistic, Future. The Positive Past reflects a positive emotional attitude towards the past and experiences of nostalgia. This time is perceived as a time that bears traditional values, which the individual looks to as a point of reference for the construction of his/her current life. The Past Negative, on the other hand, reflects a painful vision of the past, in which unprocessed traumatic events build up a very critical and problematic temporal dimension with the implementation of non-functional ego-defensive strategies by the individual. The Present Hedonistic contains a double attitude: on the one hand there is the search for strong emotions with the implementation of potentially harmful behaviours and activities for oneself and for others, on the other it indicates the ability to enjoy emotional and social relationships. Present Fatalistic is characterized by the belief that the present time escapes the control of individuals, for whom there is no possibility of making plans due to events or situations that can break into the life of the individual, distorting its course. The Future reflects an orientation towards objectives, desires and important goals placed in the future with the use of strategies, plans and intermediate objectives in order to achieve these important goals. A further dimension of the future has recently been added, the Future Negative, which is defined as empty or threatening time, and therefore anxiogenic (Carelli et al., 2011).

Several research have deepened the association between time perspective dimensions and healthy or risk behaviours.

Zimbardo, Keough & Boyd (1997) found positive associations between Present Hedonistic and risky driving, while Future dimension highlighted a positive influence, reducing the risk of involvement in it. Henson et al., (2006) studied health behaviours such as alcohol, drug, tobacco, and seat belt use, sex behaviours, and exercise in their association with time perspective dimensions in young people. Future time perspective was related to increased protective and decreased risky health behaviours, whereas hedonism exhibited an opposite pattern though was a stronger predictor; fatalism was related only to health-destructive behaviours.

Zambianchi, Ricci Bitti & Gremigni (2010) found that present orientation improves the involvement in risk behaviours such as cigarette smoking, drug assumption, reckless driving, while future orientation reduces the involvement and the exposure to such risks.

Przepjorka & Blachnio (2015) found that Internet Addiction is positively predicted by Past Negative and Present Fatalistic, while Future constitutes a negative predictor of this maladaptive use of ICTs.

Laghi et al. (2012) examined the relationship between binge drinking and eating, Time Perspective and psychological functioning on a sample of 1350 adolescents. Findings suggested that adolescents engaged in both binge eating and binge drinking behaviours reported negative experiences in the past, and they showed a lower future orientation and a greater inclination to present fatalistic than did the other students.

Zancu et al., (2022) in a longitudinal study on a sample of 844 students found that the Past Negative, Past Positive and Future Negative time dimensions are positively associated with preventive behaviours against COVID-19 at Time 1, confirming the idea that people who worry more for future and anticipate adverse outcomes may adopt more preventive behaviours to avoid future detrimental consequences.

Considering the international research attesting the relevance of Time Perspective for risk and protective behaviours it is reasonable to expand studies evaluating the role that Time Perspective may play in the willingness to protect against the Covid-19 disease, or, on the contrary, a role in adopting risks behaviours such as gatherings, refusal of vaccination. For these reasons, research that take into account the issue of Time Perspective could give a contribution to the crucial challenge of reducing the contagion of Covid-19 and safeguarding health, or in some cases, the life itself.

Objectives and hypotheses

The first objective of the study was to evaluate the relationships between PTM factors for the protection against Covid-19, Time Perspective, mistrust in political Institutions and media, sources of information on the evolution of the pandemic.

A second objective was to evaluate the gender differences and age differences for the factors of PTM, Time Perspective, sources of information on Covid-19 and mistrust in political Institutions and media.

A third objective was to explore the contribution offered by PTM dimensions, Time Perspective, together with the evaluation of the role exerted by mistrust in political institutions on the intention to get vaccinated in the future, being this latter among the most important variable for reducing the spread of Covid-19 and for reducing the most adverse health outcomes. Structural variable gender and age has been also evaluated for their contribution to protective behaviours and future vaccination.

On the basis of previous literature discussed above, the following hypotheses has been posed:

H1. Negative correlations are expected between Present Fatalistic, Present Hedonistic, Future Negative and the components of PTM protective behaviours and perceived vulnerability, beliefs on Covid-19 vaccine, use of protection. Positive correlations are expected between Future Positive and the components of PTM protective behaviours and perceived vulnerability, beliefs on Covid-19 vaccine, use of protections. Positive correlations are expected between risk behaviours involvement and Present Fatalistic.

H2. Social media and traditional mass-media as systems for information about the evolution of the pandemic are expected to correlate significantly with the factors of PTM questionnaire and with the mistrust in political Institutions and mass-media for the Covid-19 pandemic. More specifically, mistrust in political Institutions and media is expected to correlate negatively with all factors of PTM; social media are expected to correlate positively with mistrust in political institutions and mass-media; traditional mass-media are expected to correlate positively with PTM factors.

H3. Gender is supposed to influence the perception of vulnerability and the use of protection; females are expected to have higher scores on vulnerability and on the protection use than males. Age is supposed to influence the involvement in risk behaviours for contagion: as age increases, the involvement is expected to decrease.

H 4 . Perceived vulnerability to Covid-19, perceived efficacy of protective behaviours are expected to give a positive contribution to the PTM factor positive beliefs about the vaccine; Present Fatalistic and mistrust in political institutions and mass-media on the contrary are expected to give a negative contribution to it.

Method

Participants

130 young people (m. age: 26.4, S.D. = 3.16; 40 males and 90 females; 1 with Middle School Diploma; 46 with High School Diploma; 82 with Degree; 1 with PhD) took part in this cross-sectional study. They were recruited through personal contacts and through social media such as Facebook and Instagram. Data were collected during the year 2022, after the first acute phase of the Covid-19 pandemic, and when medical resources such as vaccine were available to the population. They were informed about the main aim of the study and of its anonymity, in compliance to the Italian privacy law. The questionnaire was filled out exclusively online, and it was not possible, precisely because of its unique recruitment system, to trace the persons who filled it out. These information were posited at the top of the online Questionnaire. After these informations, they can continue filling in it or close the application.

Measure

The following self-report instruments have been utilized:

- *Questionnaire on Motivation to Protect Against Covid*-19 (Zambianchi, 2022). This Questionnaire is based on the Motivation Protection Theory (Rogers, 1975) and is composed of three factors and 13 items. The first factor is related to the perceived vulnerability to Covid-19 and the use of protections (facial mask, social distancing), with an acceptable reliability (Cronbach Alpha = 0.77) (eg. of item:" Covid-19 scares me and I feel vulnerable to it"). The second factor is related to the beliefs on Covid-19 vaccine. This is composed of four items: the belief that vaccines are effective; the belief that vaccines are dangerous, with reverse coding; the already done vaccination; the intention to vaccine in the future, if necessary, the last added to the original questionnaire due to the update

availability of vaccine), with good Alpha reliability (Cronbach Alpha = 0.84) (eg. of item: "The vaccine is effective against Covid-19"). The third factor is related to the perceived efficacy of protection measures (facial mask, sanitizing gel, social distance), with a good Alpha reliability (Cronbach Alpha = 0. 82) (eg. of item: "Sanitizing hand gel is effective against Covid-19"). Two risk behaviours, crowding and the non use of facial masks when necessary resulted with positive intercorrelation ($r = 0.49$; $p < 0.001$) (eg. of item: "Outdoor I do not use facial mask"). Having these two items a positive intercorrelation, a global risk index was calculated adding their scores. The scale is a 5-point Likert (1 = *not at all true*; 5 = *completely true*).

- *Svedish Zimbardo Inventory on Time Perspective* (Zimbardo & Boyd, 1999; S-ZTPI, Carelli et al., 2011). This Questionnaire is composed of six dimensions: Past Negative; Past Positive; Present Hedonistic; Present Fatalistic; Future Positive; Future Negative. For this study four time dimensions have been utilized: Present Fatalistic: the perceived lack of personal control over events (eg. of item: "Fate determines much in my life"; Cronbach Alpha = 0.60); Present Hedonistic: the ability to enjoy the present but also the sensation seeking for risk (eg. of item:"I believe that getting together with one's friends to party is one of life's important pleasure"; Cronbach Alpha = 0.82); Future Positive: the presence of plans and skills to accomplish them (eg of item "When I want to achieve something, I set goals and consider specific means for reaching those goals", Cronbach Alpha = 0. 69); Future Negative: the perception of threats and anxiety related to the future (eg. of item: "The future contains too many boring decisions that I do not want to think about", Cronbach Alpha = 0.79). The scale is a five-point Likers (1 = *very false*; 5 = *very true*). The dimensions of Present and Future were chosen due to the relevance of the present for adopting protective behaviours against spread and contagion of Sars-Cov-2 and future intentions toward them in case of sanitary problems for its circulation.

- *Three items* evaluated the sources of information for the Pandemic: The Social media (eg. Facebook, Twitter, Instagram, Tik Tok); the Traditional mass-media (eg. newspapers, TV, Google news..); specialistic scientific Journals (eg. New England Journal of Medicine, The Lancet). e.g. of item: "I keep myself informed about the Pandemic through mass-media" (eg. TV, Newspapers). The rating scale is a 5-point Likert (1 = *not at all true*; 5 = *completely true*).

- A *single item* tested the level of mistrust on Political institutions and mass-media for the information about the pandemic. ("The Pandemic is a less serious problem than mass-media and political Institutions lead us to believe") The scale is a 5-point Likert (1 = *not at all true*; 5 = *completely true*).

Statistical analyses

First, Means, SD, Skewness and Kurtosis of the variables and factors have been calculated. After, correlation matrices (Pearson r) have been run; subsequently, MANOVAs models and Univariate Anovas were run in order to evaluate the influence of gender and age on the study variables. Finally, a Hierarchical Regression Model tested the contribution offered by study variables on the beliefs about Covid-19 vaccine.

Results

Descriptive statistics of study variables

Tab. 1 - *Descriptive statistics of study variables: Questionnaire on Motivation to Protect against Covid-19, mistrust in Political Institutions and mass-media, Time perspective Inventory, sources of information about the pandemic*

Variable	M	SD	Min	Max	Skewness	Kurtosis
Perceived vulnerability and use of protections	3.27	0.70	1.28	4.85	-0.29	-0.05
Perceived efficacy of protection systems	3.86	0.82	1.66	5.00	-0.32	-0.48
Risk behaviors for contagion	2.85	1.09	1.00	5.00	0.31	-0.69
Beliefs on Covid-19 vaccine	4.11	0.88	1.25	5.00	-1.13	0.74
Mistrust in political Institutions and mass-media	2.64	1.01	1.00	5.00	0.40	-0.14
Present Hedonistic	3.37	0.58	1.85	4.92	0.03	0.05
Present Fatalistic	2.53	0.56	1.28	4.28	0.16	-0.09
Future Positive	3.76	0.49	2.33	4.88	-0.31	0.08
Future Negative	3.29	0.63	1.60	4.80	-0.18	-0.14
Social media as sources of information	2.54	1.12	1.00	5.00	0.16	-0.90
Traditional mass-media as sources of information	3.11	1.06	1.00	5.00	0.12	0.49
Scientific journals as sources of information	1.86	0.97	1.00	5.00	1.13	1.03

- Zero order correlations between PTM factors, Mistrust in political institutions and media and S-ZTPI dimensions

The correlation matrix shows that Future Positive is positively correlated with the perceived vulnerability and use of protections and perceived efficacy of protections; risk behaviours are negatively correlated with Future Positive. Future Negative resulted as positively associated with the perceived vulnerability and use of protections and negatively with risk behaviours and mistrust in political institutions and media. The beliefs on Covid-19 vaccine are negatively correlated with Present Fatalistic. (see Table 3).

Tab 3 - *Correlations between PTM factors, Mistrust in political institutions and media and S-ZTPI*

Variable	Present Hedonistic	Present Fatalistic	Future Positive	Future Negative
Beliefs on Covid-19 vaccine	0.12	-0.16*	0.05	-0.01
Perceived vulnerability and protections use	-0.11	-0.06	0.31***	0.16*
Perceived efficacy of protections	-0.18*	-0.24**	0.31***	0.06
Risk behaviours	0.31***	-0.02	-0.24**	-0.21*
Mistrust in political inst. and media	-0.01	-0.16*	-0.10	-0.18*

* p <0.05; ** p< 0.01; *** p< 0.001

- Zero order correlations between PTM factors and sources of informations for Pandemic evolution

Only the beliefs on Covid-19 vaccine and the perceived vulnerability to the pandemic appear to be positively correlated both with social media and traditional mass-media, while the perceived efficacy of protections are positively correlated only with traditional media. The risk behaviours for contagion are negatively correlated only with traditional mass-media. Mistrust in political institutions and media appear to be negatively correlated both with social media and traditional mass-media. (see Table 4).

Tab 4 - *Correlations between PTM factors and sources of informations for Pandemic evolution*

Variable	Social media as sources of information	Traditional media as sources of information	Scientific Journals as sources of information
Beliefs on Covid-19 vaccine	0.30***	0.23**	0.07
Perceived vulnerability and use of protections	0.22**	0.32***	0.07
Perceived efficacy of protections	0.00	0.32***	0.08
Risk behaviours	-0.11	-0.25***	-0.11
Mistrust in political institutions and media	-0.21**	-0.39***	-0.00

** p< 0.01; *** p< 0.001

- Gender difference for PTM factors

A set of Anova Models was run, with gender as grouping variable and PTM Questionnaire's factors. The models resulted as statistically significant for perceived vulnerability and for the risk behaviours involvement (Wilk's Lambda = 0.82; F (4,122) = 6.44; p< 0.001).

Results highlight that female perceive themselves as more vulnerable to the Covid-19 and use more than males the recommended protections (F = 1,127)= 14.21; p< 0.001), η = 0.10: Female = 3.43 (SD = 0.63) Male = 2.91 (SD = 0.75). Females get involved less than males in risk behaviours (F = 18.45; p < 0.001): Female = 2.60 (SD = 0.96); Male = 3.43 (SD = 1.15), η = 0.11

- Gender differences for S-ZTPI.

A Manova model was run in order to evaluate the relevance of gender for the Time Perspective dimensions. The overall model resulted as significant (Wilk's lambda = 0.90; F (4,120) = 3.05; p < 0.01). Subsequent Anovas evidenced that females have higher scores on Future Negative than males (F = 7.84; p < 001): Female = 3.40 (SD = 0.60); Male = 3.05 (SD = 0.63), η = 0.05

Differences for gender on Mistrust in political Institutions and mass-media

The Anova Model highlights a significant difference ($F = 5.31$; $p < 0.05$) with lower scores for females than males: Female = 2.51 (SD = 0.98); Male = 2.95 (SD= 1.03). $\eta = 0.03$

Differences for gender on sources of information for the evolution of the pandemic

The Manova model resulted as significant (Wilk's Lambda = 0.94; $F =(3, 126) = 2.57$; $p < 0.05$).

The subsequent Anova highlights that female use more frequently traditional mass-media than males as sources of information: Female= 3.23 (SD= 1.03) Male = 2.85 (SD = 1.07) ($F = 3.68$, $p < 0.05$). $\eta = 0.03$

Not age difference were found for the study variables.

The Hierarchical Regression Model: the contributors to the positive beliefs on Covid-19 vaccine.

The Hierarchical Regression model having the PTM Questionnaire factor "beliefs on Covid-19 vaccine" as dependent variable was developed in three steps. In the first step the structural variables age and gender entered in the equation. None of them resulted as significant ($F = (2, 124) = 0.88$; $p = 0.44$; $R^2 = 0.01$). Adding, in the second step, the Time Perspective dimensions, age and gender remain as not significant. Present Hedonistic appears as a significant, positive predictor, while Present Fatalistic as a negative predictor. The explained variance slightly improved ($F = (6,116) = 1.48$, $p = 0.18$, $R^2 = 0.02$) but it does not reach the significance. In the third step the PTM factors perceived vulnerability and use of protections, the perceived efficacy of protections and risk behaviours and the item about mistrust in Political institutions and media were added to the equation. Also in the third step the structural variables resulted as not significant. Present Hedonistic reduces its relevance, while Present Fatalistic becomes not significant, highlighting an interaction with PTM factors. Mistrust in political institutions and media, perceived vulnerability and use of protections, perceived efficacy on protections resulted as significant contributors/predictors to the beliefs on Covid-19 vaccine, improving substantially the explained variance of the model ($F = (10,110) = 8.23$; $p < 0.001$; $R^2 = 0.37$). (see table 6).

Tab 6 - *The predictors /contributors to the beliefs on Covid-19 vaccine*

Variable	Beta	p value	*Standard error* of *Beta*
First step			
Age	- 0.03	≥ 0.66	-0.09
Gender	. 103	≥ 0.19	0.09 Multiple R = 0.11; R^2= 0.01; Adj. R^2 = ---- F (2,124) = 0.88; p=0.41
Second step			
Age	-0.01	≥ 0.84	0.09
Gender	0.07	≥ 0.32	0.09
Present Hedonistic	0.190	<0.05	0.09
Present Fatalistic	-0.262	<0.05	0.11
Future Positive	0.01	≥ 0.98	0.09
Future Negative	0.07	≥ 0.50	0.10 Multiple R = 0.26; R^2 = 0.07; adj. R^2 = 0.02 F (6,116) = 1.48; p= 0.18
Third step			
Age	-0.06	≥ 0.30	0.07
Gender	0.01	≥ 0.88	0.08
Present Hedonistic	0 .142	≥ 0.15	0.08
Present Fatalistic	-0.03	≥ 0.56	0.09
Future Positive	-0.07	≥ 0.24	0.08
Future Negative	-106	≥ 0.23	0.08
Mistrust in political institutions and media	-0.405	<0.001	0.08
Perceived vulnerability and use of protections	0.234	<0.05	0.11
Perceived efficacy of protections	0.266	<0.01	0.08
Risk behaviors for contagion	0. 140	≥ 0.15	0.10
			Multiple R = 0.65; R^2= 0.42; Adj. R^2= 0.37; F (10,110) = 8.23; p < 0.001

Discussion

The study has evaluated, in a sample of 130 Italian young people, the relationships between the PTM theory adapted to Covid-19 disease (Rogers, 1975, Zambianchi, 2022) and four dimensions of Time Perspective (Zimbardo & Boyd, 1999; Carelli et al., 2011): Present Hedonistic, Present Fatalistic, Future Positive and Future Negative. The type of information sources for the pandemic and the level of mistrust in political institutions and mass-media, that is close to the construct of conspiracy have also been analysed in their relationships with PTM factors and Time Perspective. Additionally, the influence of age and gender were explored.

Young people possess positive beliefs about Covid-19 vaccination and about the perceived efficacy of the other protective systems such as facial mask, hand gel and social distancing. They perceive themselves as heaving a medium level of vulnerability to the infection and for the utilization of protections. At the same time, there are some of them that declare to adopt risk behaviours such as not using facial masks when necessary (17%) and crowds (12%), when or where it is forbidden. The time perspective appears to be mainly positive future oriented and with the tendency to enjoy the present with friends and seeking positive and intense emotions. Gender emerges as relevant variable for protection and for mistrust in political institutions and mass-media. Our study indeed has found, as previous ones (Lewis & Duch, 2021; Galasso et al., 2020; Tàn et al., 2022), significant gender differences for the perceived vulnerability to Covid-19, with women more concerned than men about their susceptibility to the infection and health adverse outcomes. Different possible explanations have been posed for this result, that is in line with the tendency by women to me more compliant with health behaviours and with the adoption of protections for safeguarding health. The role of women in caring others in family or outside is the most relevant explanation, but this study, and other previous (eg. Zambianchi, 2020; Zambianchi & Volpe 2023) were conducted on young people, mostly students, finding the same results; this stage of life, the youth, cannot be associated to the caring for other people, in particular for old people, so, it may be that other attempt for explaining this outcome have to be done. It may be that personality traits, as the study by Otterbring & Festila (2022) has demonstrated, can give a substantial contribution to the explanation of this result. This study indeed shows significant differences on conscientiousness, a personality trait associated, as a large body of international literature has demonstrated, to less involvement in risk behaviours (Bogg & Roberts, 2004).

These findings have to be taken into account, for example, in planning media campaigns, where, as suggested by Lewis & Duch (2021), communication have to be more tailored on the targets, and in this case, on specific gender, in order to obtain more compliance to the prevention behaviours. Women show also a more pronounced negative future than men. The differences for gender on future is a question difficult to disentangle, as other research found (Mello & Worrell, 2006), since in several cases women and men present similar scores, but, in other cases, women appear to be more positive-future oriented than men (Zambianchi, 2019).

In this area of research, concerning health, the more pronounced future negative of women, if confirmed by other, broader research, have to be taken into account for interventions and health communication about Covid-19 protection.

Age, contrary to the hypotheses, does not influence the level of involvement in risk behaviours for the spread of the virus. Perhaps differences can emerge in the comparison between age groups, such as adolescence and adulthood.

PTM factors, adapted for Covid-19 in a specific questionnaire (Zambianchi, 2022), appear to be significantly intercorrelated, as expected by theory (Rogers, 1975; Rippetoe & Rogers, 1987). As previous research conducted with this questionnaire, the perceived vulnerability to the disease is strictly interwoven to the use of protections in the young, while in the oldest population the perceived vulnerability is interwoven with the perception of severity of this disease (Zanin & Zambianchi, 2022). This data can be related to the information that has been circulating for a long time about the health consequences of the infection for different age cohorts. Young people are indeed presented through mass-media as not impacted from the most severe forms of Covid-19 disease, while old people are defined as the most fragile age group (Belelli et al., 2021). These representations circulate among people and give life to different perceptions about Covid-19, with relevant impact on the tendency and intention to adopt the protections. For young people the perception of severity does not constitute, perhaps, a crucial question for their health status; they do not perceive their health as threatened; only the perception of vulnerability seems to induce them to adopt the protections against contagion, contrary to the oldest. For this reason, the young could be a risk group for the diffusion of Covid-19, since they tend to underestimate its health impact on other age groups or also on peers with health frailty, due to their perception of invulnerability. Effective communication messages are, for this reason, difficult to develop, on the basis of this theoretical model, for encouraging the

young to adopt protections. It maybe that the motivation to protect other people could be reinforced through the inclusion of the theme of empathy, or through moral dilemmas (Kholberg, 1989).

The correlations of PTM factors with Time Perspective partially confirms the hypotheses that have been posed. The positive value of a future positive orientation for the efficacy of protective factors, perceived vulnerability and use of protections represents a well-established result, having it being found in other studies on protective and risk behaviours for health (Zimbardo & Boyd, 1999). Those people who possess a positive envisioning of the future tend to reduce the situations that can threaten health, since the deterioration of health can compromise activities and projects. Present Fatalistic, on the contrary, is negatively related to the perceived efficacy of protection systems, while being Present-Hedonistic centred, that means act impulsively and enjoying present without taking into consideration the future consequences encourages risk behaviours for contagion as established by previous research on other risk behaviours and other health compromising actions (eg. Enson et al., 2006; Zimbardo, 2009). The pandemic requests caution and use of protections for the containment of the virus; its spread or new variants circulating could provoke a new intervention by Ministry of Health in order to reduce it through specific laws, reducing the freedom of people, or taking other legal provisions.

The positive beliefs on Covid-19 vaccine appear to be negatively associated with a fatalistic view of the present. Considering that Present Fatalistic denotes the perception to be out of control for events that can happen, that is closely related to a low level of self-efficacy (Bandura, 2000), strengthening the self-efficacy for the control of this pandemic through vaccination can be viewed as another interesting route for improving the compliance to vaccination. It may be done through media communication campaigns or in other contexts such as Universities, workplaces, voluntary associations. This data is quite different from that which emerged in a previous research with old people (Zanin & Zambianchi, 2022), where Present Fatalistic constitutes a positive predictor/contributor to the positive beliefs on vaccine. Bearing in mind that present Fatalistic indicates the perception of being not in control of events, and for this reason, a pronounced external locus of control (Rotter, 1966), and a low level of personal self-efficacy (Bandura, 1997), the attempt to increase personal self-efficacy can leads to positive attitudes toward vaccines. The differences emerged from old age can be explained, perhaps, by the reason that old people perceive that only with vaccination as a collective, mass- action, the Covid-19 pandemic can be reduced.

The sources of information about Covid-19 reveal a complex picture. Young people seem to form their beliefs on Covid-19 vaccine and perceived vulnerability to pandemic based on both social media and traditional media exposure. Differences between vaccines and other protections emerge also in this case, being perceived the efficacy of protections and risk behaviours for contagion only related to traditional media exposure. This data seems to contradict those who consider the young people only a digital generation: it may be that they are of course on social networks, but also "rediscover" the more traditional media, as also the Italian Institutes of Statistics (CENSIS, 2021) reveals. The international literature on the role of social networks on anti-vaccination ideology and conspiracy beliefs is well established (Murphy et al., 2021; Bieber et al. 2021), and this data is central for the future communication campaigns aimed at improving self-protection in this age cohort.

As indeed stated by Riva (2019), social media offer an extraordinary showcase for the diffusion of fake news. During the pandemic, the vaccine- resistant and vaccine- hesitant people utilized social media such as Facebook, for the diffusion of conspiracy representations and for disconfirming the scientific knowledge (Bucciarelli, 2021). Their great diffusion among population, and the less digital literacy owned by a large part of it exposed people to the risk of create a false representation of the Covid-19 disease and of its biomedical characteristics.

The Social Representation Theory indeed poses the translation of the scientific language (*reified universes of knowledge*) into common language (*consensual universes of knowledge*) as one of the most important and difficult question for a correct and authoritative diffusion of qualified information (Moscovici, 2000; Galli, 2012; Smith et al., 2015), with relevant repercussions on attitudes and behaviours of groups and individuals.

The specific factor of the PTM Questionnaire "beliefs on Covid-19 vaccine" could suggest that the vaccine is perceived as a specific type of protection, different from the others protections such as facial mask and sanitizing gel. It can be perceived as an internal protection, which, one inoculated, is completely removed from any personal control. For this reason people with contamination anxiety, distrust or suspiciousness toward the society or social institutions can refuse it believing it a noxious and harmful drug and not a protection against contagion or death (Murphy et al., 2021). The perception of the vaccine as different form of health protection may request careful attention for the construction of persuasive messages aimed at improving the compliance of the

population for it, as other research claim (Bokemper et al., 2022), taking into consideration, perhaps, its perceived specificity compared to other protections systems.

As other research highlighted, the conspiracy beliefs, that is to say "the attempts to explain the ultimate causes of significant social and political events and circumstances with claims of secret plots by two or more powerful actors" (Douglas et al., 2019, p. 4) play an important role in protection issue. Our study has inserted only a single item (the mistrust in political Institutions and media) for evaluating this thinking style and not a specific, validated instrument, as other research has done (Hughes & Machan, 2021). But, despite the use of a single item, it reveals an important influence on all the PTM factors. Young people who present a high mistrust toward the political institutions and mass-media are less favourable and available to adopt the protection for safeguarding their health, believing that Covid-19 is less serious than the institutions and media led us to believe. Taking actions for a more rigorous and scientific information from institutions could have a beneficial impact on representations and emotions towards the Covid-19, bearing in mind the difficulty in translating the scientific language into a more clear and authoritative message for "common people", as Social Representation Theory indicates (De Rosa & Mannarini, 2020).

The Hierarchical Regression Model that posed the factor "beliefs on Covid-19 vaccine" as a dependent variable, highlights the importance of the mistrust in political institutions and media, the perceived vulnerability to the pandemic and the use of the other protections and their efficacy are relevant, significant contributors/predictors. The distrust in Institutions emerged as a critical factor for the adoption of this effective behaviour against the spread of Covid-19, as other research has highlighted (eg. Bieper et al., 2021, Zanin & Zambianchi, 2022). The utilization of the other protections and the perception of themselves as vulnerable contributes significantly and positively, on the contrary, to the vaccination of the young people. This data is in line with the prediction of PTM, i.e. that the vulnerability to the disease and the perceived efficacy of the protections contribute to the utilization of the vaccine (Eberhardt & Ling, 2021). These results could give suggestions for the health communication (interpersonal and through social and mass-media systems) to the young people in order to sustain future vaccination campaigns, if they will be necessary. Summarizing, PTM emerges as a relevant theoretical model for contrasting the spread of Covid-19, together with the dimensions of time perspective.

Perspectives for interventions

The elimination of stringent laws about Covid-19 protections from Health Ministry in Italy and other Countries during the 2022 year configures a situation which emphasizes the need to bring the protective norms from hetero-directed to self-directed and therefore based on the awareness of one's own risks and that of others. This passage requests the presence of ethical maturity because the sacrifice to utilize, eg. masks, or keep social distance, or get vaccinated with another booster, or for the first time in case of vaccine- hesitant, is related not only to the preservation of personal health, but also to the preservation of others' health condition.

Young people are interested in the spread of Coronavirus disease, but, in most cases, they are not at risk for life, as biomedical research attests (Bophal et al., 2021). But people older, or with specific frailties also in young age, request more attention and the ethical responsibility to young people to not spread the virus through lack of protective behaviors. PTM, as other research claim (eg. Ezati et al., 2021; Al-Rasheed et al., 2021; Grano et al., 2022; Zanin & Zambianchi, 2022), could be utilized for the construction of persuasive social messages for improving the protective behaviors of individuals (Volpe & Zambianchi, 2022), and also for interventions on groups for the prevention of contagion. Again, the results could be of potential interest for promoting future vaccination campaigns, with specific targeting of population, being vaccine one of the most effective ways of protection (Seeatongo et al., 2022). The relevance of Time Perspective for the Covid-19 prevention, if other future research will confirm it, can be an added value for the prevention messages and also for the prevention projects in various contexts such as work, universities, cultural centers, touristic destinations and other social situations.

Limits of the study

The first limitation of this study is the small sample of young people, that does not allow us to trace back rigorous, extendable information from results to the entire young population. The second limitation is the presence of a vast majority of individuals with high level of school education. Future studies have to broaden the sample including young people with lower level of school education, in order to evaluate potential differences on the study variables. The use of a single item for the evaluation of mistrust in political institutions and media constitutes another precise limit of this study. Also, the questionnaire based on PTM

theory doesn't take into consideration the perceived costs of the protective behaviours, so it is not possible to establish its role in the intentions to utilize them.

Finally, the study is a correlational, cross-sectional design. For this reason, also the predictors of positive beliefs on Covid-19 vaccine can be assumed as causally connected to the predictors only through a longitudinal design.

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