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Short communication

## Time of pandemic: Temporal perspectives related to compliance with public health regulations concerning the COVID-19 pandemic<sup>☆</sup>

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## ABSTRACT

One of the main determinants of the spread of epidemics in human population centres is the degree of compliance with public health regulations. The aim of this study was to investigate the relationships between time perspective and compliance with public health regulations concerning the COVID-19 pandemic. The participants were 500 adults (275 women, 225 men) aged 18 to 82 years. Sociodemographic surveys, surveys concerning knowledge about COVID-19 and compliance with public health regulations, the Polish Short Version of the Zimbardo Time Perspective Inventory, the Present-Fatalistic Scale, the Dark Future Scale, and the Carpe Diem Scale were used. Female gender and Carpe Diem were predictors of compliance with public health regulations. Men complied with public health regulations significantly less often than women. The results of our study suggest that in announcements communicating public health regulations concerning COVID-19 pandemic, emphasis should be placed on stressing the significance of focusing on 'here and now' and the importance of current behaviours for the future.

## 1. Introduction

The global COVID-19 pandemic, caused by SARS-COV2 coronavirus which emerged in Wuhan China in November 2019, has dramatically affected people's well-being. Once recognised by the WHO as a pandemic on March 20, 2020, it has been spreading further in nearly all countries of the world (WHO, 2020). Recent studies on the COVID-19 pandemic outbreak reported increased anxiety and decreased life satisfaction among people (Jovancevic and Milicevic, 2020; Li et al., 2020; Makhanova and Shepherd, 2020; Vandroos, 2020; Wang et al., 2020; Zhou et al., 2020). The global response to the COVID-19 pandemic relies on individual and collective action to slow the spread of the virus, but these strategies can be costly to mental health. They include: self-isolating, social distancing, and wearing masks in public places. They are used to slow down the spread of the virus (Jovancevic and Milicevic, 2020; Makhanova and Shepherd, 2020; Zhou et al., 2020). A great problem in the struggle with the epidemic is the fact that not all members of society comply with the announcements and regulations

concerning the ways to behave (Li et al., 2020; Makhanova and Shepherd, 2020; Wang et al., 2020; Zajenkowski et al., 2020). Many people disparage public health regulations at the early stages, especially that signs of illness are invisible in their immediate environment (Makhanova and Shepherd, 2020).

Improving compliance with health regulations during the epidemic requires knowledge about the psychological determinants of those behaviours (Makhanova and Shepherd, 2020; Zajenkowski et al., 2020). Thanks to that knowledge, it is possible to take proper measures preventing inappropriate behaviours, such as preparing epidemiological announcements and recommendations in such a way as to make sure that they are as convincing as possible for the people who tend to flout these regulations.

Psychological variables have been examined in relation to compliance with public health regulations. Zajenkowski et al. (2020) examined the association of compliance with the restrictions to reduce the spread of COVID-19 with the Big Five personality traits, Dark Triad traits (Machiavellianism, narcissism, psychopathy), and a perception of

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situation. They found that the way participants perceived the situation of the pandemic explained more variance than the Big Five and Dark Triad personality traits. In their study, conscientiousness, perceiving the situation as dutiful, and threat were the predictors of compliance with public health regulations. In the study by [Makhanova and Shepherd \(2020\)](#), trait pathogen avoidance, understood as germ aversion and perceived infectability, was positively correlated with a tendency to engage in preventative behaviours concerning hygiene and social distance. [Jovancevic and Milicevic \(2020\)](#) found that both optimism and pessimism were positively linked with COVID-19-related preventive behaviours.

Another psychological factor that may affect compliance with public health regulations is time perspective. Time perspective ([Zimbardo and Boyd, 1999](#)) is understood as a cognitive style involving a tendency to focus on a particular segment of time: past, present, or future. The following types of time perspective are distinguished in the literature: tendencies to focus on the positively evaluated past and on the negatively evaluated past, fatalistic and hedonistic time perspectives, a tendency to focus on the positively evaluated future ([Zimbardo and Boyd, 1999](#)) and on the negatively evaluated future ([Zaleski et al., 2019](#)), and Carpe Diem perspective, which is a tendency to focus on the present, perceived as important and unique ([Sobol-Kwapinska, 2016](#)). Time perspective influences many areas of human functioning, including health behaviours ([Daugherty and Brase, 2010](#)) and emotional state ([Zimbardo and Boyd, 1999](#)).

The results of previous studies indicate positive relationships between future positive perspective and frequency of pro-health behaviours ([Daugherty and Brase, 2010](#); [Zimbardo and Boyd, 1999](#)). [Jovancevic and Milicevic \(2020\)](#) showed a positive correlation between a positive attitude toward the future and COVID-19-related preventive behaviours. In turn, in previous studies, the Carpe Diem perspective correlated positively with engaging in actions of personal significance and with the sense of being able to do many things ([Sobol-Kwapinska, 2016](#); [Sobol-Kwapinska et al., 2016](#)). The relationship between time perspective and compliance with public health regulations has not been investigated so far.

The aim of this study was to investigate the relationships between time perspectives and compliance with public health regulations concerning the COVID-19 pandemic. It was hypothesized that:

**Hypothesis 1.** (H1): future positive perspective is positively correlated with compliance with public health regulations concerning the COVID-19 pandemic.

**H2.** Carpe Diem perspective is positively correlated with compliance with public health regulations concerning the COVID-19 pandemic.

These hypotheses follow from the reasoning that without reference to the future, public health regulations may seem to be unnecessary impediments to current daily life. Presumably, the belief connected with the Carpe Diem perspective that what one does in the present makes a difference and has an influence on what the situation will be in the future would encourage compliance with public health regulations. Additionally, focusing on the present moment helps with recollection and adherence to the regulations, while inattention may lead to forgetting about the regulations or carelessness in performing the recommended behaviours.

## 2. Method

### 2.1. Participants

The sample consisted of 500 adults (275 women, 225 men) aged 18–82 years ( $M = 45.76$ ,  $SD = 15.69$ ), all of whom were Polish. Most of the respondents had secondary school education (54.6%), and others had university (35.4%) or primary school education (10%). They lived in a village (29.2%), small town (13.4%), medium town (21.8%), big

town (21.8%), or big city (13.8%). Respondents were registered in the ARIADNA database, a nationally representative online panel. They were randomly chosen from this database. This sample was widely comparable with Polish Internet user population characteristics concerning age, gender, place of residence, and education. Participation in the research was voluntary and was rewarded with points in the ARIADNA panel's loyalty program. We determined the necessary sample size using the G\*Power programme ([Erdfelder, 2007](#)), based on the average effect size in individual differences research ( $r \approx 0.20$ ; [Gignac and Szodorai, 2016](#)).

### 2.2. Procedure

The study used the CAWI method (computer-assisted web interview). The study protocol and the procedure received approval from the research ethics committee. The study was conducted in March 2020, six days after the introduction of a state of emergency due to COVID-19 in Poland.

### 2.3. Measures

A sociodemographic survey with questions about age, gender, place of residence, and education was used at the beginning. Then, participants answered the questions testing the knowledge about COVID-19. The compliance with the current public health regulations was measured through nine questions with a three-point Likert-type scale, with three questions concerning hygiene and six questions concerning social distance (see online Appendix). The current public health regulations were specified based on current information about avoiding forbidden behaviours and performing the recommended actions, provided at the Polish government website.

The Polish Short Version of the Zimbardo Time Perspective Inventory (PS-ZTPI; [Przepiora et al., 2016](#)) was used to measure time perspective. It is a short version of the Zimbardo Time Perspective Inventory (ZTPI; [Zimbardo and Boyd, 1999](#)). The PS-ZTPI measures four types of time perspective through four scales (20 items): Past-Negative, measuring the tendency to focus on the negatively evaluated past (5 items, e.g. 'It is hard for me to forget unpleasant images of my youth'); Past-Positive, measuring the tendency to focus on the positively evaluated past (5 items, e.g. 'On balance, there is much more good to recall than bad in my past'); Future, measuring the tendency to focus on the positively evaluated future (5 items, e.g. 'I am able to resist temptations when I know that there is work to be done'); Present-Hedonistic, measuring the tendency to focus on pleasures 'here and now' (5 items, e.g. 'I often follow my heart more than my head'). The response scale was a five-point Likert scale (1 = 'very untrue', 5 = 'very true'). The Present-Fatalistic scale from the ZTPI ([Zimbardo and Boyd, 1999](#)) was used to measure the tendency to be passive, stemming from the belief that the future is predetermined. It consists of nine items (e.g., 'Fate determines much in my life') with a five-point Likert scale (1 = 'very untrue', 5 = 'very true'). The Polish translation was used ([Sobol-Kwapinska et al., 2019](#)).

The Dark Future Scale ([Zaleski et al., 2019](#)) was used to measure anxiety-based focus on the negatively evaluated future. It consists of five items (e.g., 'I am afraid that in the future my life will change for the worse') with a seven-point Likert scale (0 = 'decidedly false', 6 = 'decidedly true'). The Carpe Diem Scale ([Sobol-Kwapinska, 2016](#)) was used to measure open and active focus on the present connected with convictions regarding the importance and uniqueness of every moment of life. It consists of 10 items (e.g., 'What happens in the present is very vital for my life'), with a five-point Likert scale (1 = 'strongly disagree', 5 = 'strongly agree').

## 3. Results

Scores on the PS-ZTPI, Present-Fatalistic Scale, Dark Future Scale,

and Carpe Diem Scale were normally distributed (see online Appendix). There were significant differences between females and males in the Future-Positive, Dark Future Scale, Carpe Diem Scale, and compliance with public health regulations. Females were characterised by higher future positive ( $t = 3.54; p < .001$ ) and Carpe Diem ( $t = 3.13; p < .01$ ) time perspectives and a lower future negative perspective ( $t = 2.81; p < .01$ ), and they were more likely to comply with distance ( $t = 5.01; p < .001$ ) and hygiene ( $t = 4.74; p < .001$ ) regulations than males. The correlations (Table 1) showed that compliance with public health regulations correlated positively with Carpe Diem, future negative, future positive, and past positive perspectives. Moreover, we found inverse correlations between knowledge about COVID-19 and fatalism, hedonism, and future negative perspective.

Hierarchical regression analysis was used to identify types of time perspective that contributed most to compliance with public health regulations. The variables were centred before being entered into the model. Sociodemographic characteristics were added in the first step. In the second step, we added time perspectives. After including time perspectives, female gender remained a predictor of compliance with public health regulations, after adding in predictor variables, of which only Carpe Diem perspective was significant (Table 2).

4. Discussion

The aim of this study was to test the relationships between time perspective and compliance with public health regulations concerning COVID-19 pandemic. The findings were fairly consistent with our hypotheses. The Carpe Diem perspective was a predictor of the compliance with public health regulations (in line with H2). Thus, what is especially important when engaging in behaviours consistent with public health regulations concerning COVID-19 pandemic is the focus on the ‘here and now’ combined with the belief that what one does in the present makes a difference and has an influence on what the situation will be in the future. These results are consistent with the study by Zajenkowski et al. (2020) showing that conscientious focusing on duties is linked with compliance with public health regulations.

Moreover, in our study, there were significant positive associations of future positive perspective (in line with H1) and future negative perspective with compliance with public health regulations. It seems that the awareness of danger combined with an optimistic attitude is important for compliance with public health regulations. Perceiving the future in terms of threat increases caution here and now. Trivialising the possible outcomes of the current situation may lead to ignoring the uncomfortable regulations that introduce restrictions into life (see

Table 2

Hierarchical multiple regression results for the compliance with public health regulations.

Variables	t	β	R <sup>2</sup>	ΔR <sup>2</sup>	ΔF
Model 1			.06		
Step 1				.06	8.56***
Gender (female = 1; male = 2)	-5.75***	-.25			
Age	0.69	.03			
Place of residence	-0.45	-.02			
Education	0.63	.03			
Model 2			.14		
Step 1					
Gender	-4.85***	-.21			
Age	-0.53	-.02			
Place of residence	-0.43	-.02			
Education	0.13	.01			
Step 2				.07	5.74***
Past-Positive	1.69	.08			
Past-Negative	0.29	.02			
Future-Positive	-0.09	.01			
Present-Hedonistic	-1.44	-.07			
Present-Fatalistic	-1.58	-.08			
Dark Future Scale	1.40	.08			
Carpe Diem	3.93***	.20			

\*\*\*p < .001.

Zaleski et al., 2019; Zimbardo, Keough and Boyd, 1997). Similarly, the results obtained by Makhanova and Shepherd (2020) showed that preventive behaviours concerning the COVID-19 pandemic were positively associated with both pessimism and optimism. The results of previous studies on time perspective indicate the positive relationship between a future positive perspective and health behaviours (Daugherty and Brase, 2010; Zimbardo and Boyd, 1999).

What was especially intriguing in our study, we found that men (compared to women), tended to comply significantly less with public health regulations. This has serious implications for public health, particularly in the context of COVID-19 incidence and mortality statistics showing that there are many more men than women among patients with COVID-19 (Guan et al., 2020; Remuzzi and Remuzzi, 2020) and that men die of COVID-19 more often than women (Deng et al., 2020). The results of previous studies also indicate some differences between women and men in attitudes toward regulations of public health. Leung et al. (2005) found that males were less likely to engage in self-protective behaviour than females. Lee et al. (2020) examined the practice and technique of using a face mask amongst adults. They found that males reported low frequency in using a face mask during required

Table 1

Correlations between sociodemographic variables, time perspective, and compliance with public health regulations.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. Age	–													
2. Place of residence	.19***	–												
3. Education	.07	.08	–											
4. Past-Positive	.11*	.01	.02	–										
5. Past-Negative	-.15***	-.07	-.13**	.04	–									
6. Future-Positive	.18***	.01	.08	.41***	.10*	–								
7. Present-Hedonistic	-.07	-.11*	-.08	.14***	.20***	-.04	–							
8. Present-Fatalistic	-.04	-.07	-.13**	.03	.51***	-.04	.36***	–						
9. Dark Future Scale	.002	-.07	-.07	.16***	.50***	.23***	.04	.42***	–					
10. Carpe Diem Scale	.21***	.02	.08	.39***	.05	.42***	.13**	.10*	.30***	–				
11. Knowledge about COVID-19	.03	.03	.02	.001	-.04	.04	-.12**	-.14**	-.10*	-.07	–			
12. Compliance with the regulations	.03	.01	.04	.17***	.02	.17***	-.05	-.04	.15***	.26***	.02	–		
13. Regulations concerning hygiene	.07	.02	.02	.13**	-.01	.15***	-.03	-.07	.10*	.26***	-.06	.69***	–	
14. Regulations concerning isolation	-.01	-.01	.04	.11*	.04	.14**	-.05	-.02	.14***	.21***	.08	.93***	.47***	–
Mean	45.76	–	–	18.24	16.31	18.98	14.72	30.00	25.13	39.91	5.31	23.84	7.88	15.96
Standard deviation	15.69	–	–	3.30	4.08	3.11	3.67	6.76	5.94	5.10	1.12	3.13	1.34	2.27
Reliability (α)	–	–	–	.73	.84	.80	.81	.85	.92	.87	.79	.65	.60	.52

\*p < .05, \*\*p < .01, \*\*\*p < .001.



situations. Park, Cheong, Son, Kim, and Ha (2010) found that female students were more likely to practice more frequent hand washing. A systematic review by Toohar et al. (2013) examining the effectiveness of pandemic plans and community compliance following the H1N1 pandemic in 2009 showed that females more frequently adopted recommended behaviours. Our findings, therefore, are consistent with the idea that males tend to comply less with public health directives, and therefore, this should be an area of concern for public health research in COVID-19.

It is worth noting that gender is one of the most important social determinants of health (Fleming and Agnew-Brune, 2015). For example, risky health behaviours are recognised as expressions of masculinity (Fleming and Agnew-Brune, 2015; Wingood and DiClemente, 2000). Researchers stress that social preferences for hygiene are enforced more for girls than boys (Clough, 2011; Fleming and Agnew-Brune, 2015).

Our results also suggest another possible explanation of differences between women and men in COVID-19 incidence. In our study, females were characterised by higher future positive, higher Carpe Diem and lower future negative perspectives than males. These results are consistent with the results of previous studies on time perspective showing that men score lower on future negative perspective (Zaleski et al., 2017) and future positive perspective (Sobol-Kwapinska and Jankowski, 2016).

It is also worth emphasising the inverse relationship of future negative perspective with knowledge about COVID-19. These results may suggest that people with a high tendency to future anxiety avoid information about the pandemic. These results may indicate that knowledge about COVID-19 decreases anxiety about the future and increases the feeling of control over time, which is consistent with the results of the studies by Li et al. (2020) and Wang et al. (2020) showing that reliable, up-to-date, and accurate health information was related to lower levels of stress, anxiety, and depression.

The results obtained in our study expand the knowledge about the psychological aspects of the COVID-19 pandemic. These results can be useful in preparing announcements communicating public health regulations. The effectiveness of this kind of announcement largely depends on the addressees' psychological characteristics (Zimbardo and Boyd, 1999). The results of our study indicate that emphasis should be placed on the significance of current behaviours for the future and on presenting real dangers as challenges in announcements communicating public health regulations. The findings suggest that future research should focus on testing the effectiveness of health messages through modifying the time perspective in the messages.

Regarding study limitations, the results are based solely on self-report. Future studies could benefit from, for example, using a diary-based design. Moreover, the participants were collected online, which limits the generalizability of our results, because Internet users may be economically advantaged as opposed to the digitally excluded. The results should also be carefully generalised to other cultures. Countries differ in the level of virus spread, recommendations, as well as in the level of compliance with the recommendations, so cross-country research could shed new light on this problem. Furthermore, we conducted the study in the beginning of the pandemic in Poland. For a broader view of the problem, the research should be repeated at subsequent stages of pandemic development.

The results of this study suggest that what is significant for compliance with public health regulations concerning the COVID-19 pandemic is the focus on the 'here and now', combined with the belief about the value of the present and about the influence of current behaviours on the future, plus the awareness of danger combined with an optimistic attitude. Moreover, the gender differences in adherence to public health regulations between men and women suggest that the messages are not getting through to men, indicating that public health requires adjusting campaigns to improve men's health behaviours.

## Declaration of competing interest

Authors declare that they have no conflict of interest.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.socscimed.2020.113408>.

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