

# CAN HISTORY OF PARASITIC DISEASES INCREASE SOCIAL CONSERVATISM? TESTING BEHAVIOURAL IMMUNE SYSTEM THEORY

WIKTORIA JĘDRYCZKA

Institute of Psychology, University of Wrocław  
Dawida 1, 50-527 Wrocław, Poland

E-mail address: [wiktoria.jedryczka@gmail.com](mailto:wiktoria.jedryczka@gmail.com)

ORCID: <https://orcid.org/0000-0002-6901-3251>

## ABSTRACT

**Aim.** Using available data from previously published study the hypothesis that individuals with broader disease history are more conservative than those, who were infected less often in the past was tested.

**Methods.** Publicly available database containing data regarding perceived vulnerability to disease, social conservatism and participant's history of parasitic diseases was accessed. History of parasitic diseases, self-declared, consisted of nine commonly occurring in tropical areas parasitic diseases. In the study 9409 cases from 43 countries were analysed.

**Results.** When controlling for participant's age, sex, education level, wealth and perceived infectability, it was found, that broader disease history was a significant predictor of social conservatism. Additionally, it was found, that wealth and age were negative predictors of social conservatism. All obtained effects were relatively small, but significant. The results are discussed in the light of previous research.

**Conclusions.** Individuals, who were in the past infected with parasitic diseases more often, were observed to be more conservative than people, who had suffered from these diseases less often.

**Keywords:** Perceived infectability, parasites, social conservatism, behavioural immune system

## INTRODUCTION

Life-threats are integral parts of human life. We can be hurt by wild animals, food shortage, disasters and, among many others, pathogens. These microorganisms may cause life-threatening diseases, often able to spread among people, infecting and affecting more and more individuals, what recent coronavirus pandemics demonstrated – among others, observed can be avoidant behaviours and changed attitudes (Kowal et al., 2020; Sorokowski et al., 2020; Weiss & Nawas Martin, 2005).



Beyond the immune system, that can partially or completely protect individual from gaining a disease (Delves & Roitt, 2000) organisms developed different mechanism - the behavioural immune system (BIS) (Schaller & Duncan, 2007), that expresses in pathogen avoidance behaviours, e.g., avoiding contaminated water, foreign body secretions, observed signs of illness, or rejecting stale and suspicious-looking food. It is probably the first line defence against pathogenic and parasitic diseases (Schaller, 2006). BIS consists of a collection of emotions, cognitions and behaviours, that working together, may prevent life-threatening illness. Perception of specific stimuli (e.g., signs of illness) activates specific emotions (e.g., disgust) and then facilitates functional behavioural reactions of avoidance (e.g., social exclusion). Therefore, activation of this system promotes preservation of health and longevity (Ackerman et al., 2018).

Interesting are BIS's correlates on the social level. For instance, it was suggested that BIS is positively related to social conservatism (Terrizzi et al., 2013). Social conservatism, defined as sociocultural value system, promotes strict adherence to existing social norms, sympathy to social conventions and traditions, which then strengthens in-group cohesion (Altemayer, 1988). Adhering to norms (e.g., avoidance of outgroups, new eating habits or risky sexual behaviours) lowers the risk of gaining a disease from these potential sources, by strong aversive responses triggered in the presence of potential pathogens (Schaller & Duncan, 2016).

Research suggest, that social conservatism could be related to parasite stress. For instance on national level parasite stress may be related to traditionalism, autocracy or women's sexual restrictiveness (Thornhill et al., 2009; Tybur et al., 2016). Additionally meta-analysis on BIS revealed, that the action of the behavioural immune system may be positively related to right-wing authoritarianism and political conservatism (Terrizzi et al., 2013).

Therefore, preserving social norms and following the status quo could potentially protect individuals from getting infected. In fact, conservatism is positively associated with disgust sensitivity, but negatively with actual disease avoiding behaviours (Kempthorne & Terrizzi Jr., 2021).

The indirect, but strong evidence for a link between activation of BIS and preferences for social conservatism can be found in recent research. Coronavirus pandemic created real-life, objective, life-threatening environment in which some natural observations could be done (e.g., activation of BIS may be provoked by internet searches about ongoing pandemics) (Ma & Ye, 2022). Among others, the spread of coronavirus coincided with presidential elections in United States and Poland.

Karwowski's et al. (2020) study demonstrated, that people who feel threatened react with the emotion of anxiety, tend to seek greater structure in their environment, and, because of that, may shift toward social conservatism. This sequence may then increase support for conservative presidential candidates.

Moreover, studies indicate, that disease related threats make people show more negative attitudes toward foreigners (Sorokowski et al., 2020) and motivation to stay away from them (Reny & Barreto, 2022), what also could be an evidence to support the hypothesis that social conservatism increases alongside with perceived threat to life.

Previous research focuses on relation between conservatism and threat of infection or own perceived infectability, however there is no research on objective threat to life – the actual disease history.

In this study I test whether general perceived vulnerability to disease (Duncan & Schaller, 2009), and/or broad history of disease can predict social conservatism among participants (Henningham, 1996). Based on scientific reports indicated above, I assume that individuals with greater perceived infectability (subjective threat to live) and/or broader disease history (objective threat to life) will adopt more conservative beliefs.

## METHODOLOGY

### Participants

In this study, I accessed and re-analysed data published with Sorokowski's et al. (2021) research on romantic love, that also contained specific and detailed data on history of participant's parasitic diseases. Published with an article database included 11422 participants from 45 countries (see Conroy-Beam et al., 2019a; Conroy-Beam et al., 2019b; Kowal et al., 2020; Sorokowska et al., 2021; Sorokowski et al., 2021; Walter et al., 2020; Walter et al., 2021). After exclusion of participants, who did not provide essential information (e.g., missing data within questionnaires), the sample used in present article consisted of  $N = 9409$  participants (54.09% women), from 43 countries, aged from 15 to 99,  $M = 29.6$ ;  $SD = 11$ . 0.2% participants had no formal education, 1.3% was primary educated, 13.3% had secondary education, 30.1% was after high school and 55.1% had a degree. Self-assessed economic situation of 2.9% was much lower than the average, of 12.9% was lower than the average, of 54.9% was average, of 25.8% was higher than the average and of 3.4% was much higher than the average.

General sample consisted of following countries samples: Algeria ( $n = 323$ , 54% women), Australia ( $n = 263$ , 55% women), Austria ( $n = 140$ , 79% women), Belgium (242, 52% women), Brazil ( $n = 207$ , 52% women), Chile ( $n = 138$ , 58% women), China ( $n = 315$ , 61% women), Colombia (103, 51% women), Costa Rica ( $n = 109$ , 50% women), Croatia ( $n = 215$ , 61% women), Cuba ( $n = 185$ , 51% women), El Salvador ( $n = 49$ , 67% women), Estonia ( $n = 166$ , 54% women), Georgia ( $n = 130$ , 49% women), Germany ( $n = 76$ , 64% women), Greece ( $n = 145$ , 65% women), Hungary ( $n = 826$ , 50% women), India ( $n = 248$ , 52% women), Indonesia ( $n = 74$ , 51% women), Iran ( $n = 70$ , 49% women), Italy ( $n = 269$ , 66% women), Jordan ( $n = 191$ , 48% women), Lithuania ( $n = 176$ , 52% women), Malaysia ( $n = 75$ , 69% women),

Mexico (n = 92, 53% women), Netherlands (n = 170, 58% women), Nigeria (n = 216, 50% women), Norway (n = 108, 53% women), Pakistan (n = 479, 55% women), Peru (n = 170, 67% women), Poland (n = 389, 45% women), Portugal (n = 147, 48% women), Romania (n = 152, 49% women), Russia (n = 160, 58% women), Serbia (n = 353, 54% women), Slovakia (119, 57% women), Slovenia (508, 51% women), South Korea (n = 169, 46% women), Spain (250, 62% women), Sweden (n = 211, 51% women), Turkey (n = 685, 55% women), Uganda (n = 191, 40% women), United States of America (105, 53% women).

### Methods

**Data.** Database was accessed at Figshare (see: References). Database consisted of data concerning love and relationships, that was used originally, but was not included in this study. Data I used for re-analysis can be found at Open Science Framework (see: References). In this study I used following measures:

**Perceived infectability.** Perceived infectability was measured using sub-scale „Perceived Infectability” of Perceived Vulnerability to Disease Questionnaire (PVD) (Duncan & Schaller, 2009). The scale consists of 7 statements (e.g., „If an illness is ‘going around’, I will get it”), three reverse coded (e.g., „My immune system protects me from most illnesses that other people get”), responded on 7-point scale from „strongly disagree” to „strongly agree”. The score is obtained by averaging recoded answers. Reliability was tested with Cronbach’s alpha and was satisfactory,  $\alpha = 0.8$ .

**Social conservatism.** Political identity was measured using 12-item Social Conservatism Scale (Henningham, 1996). Two items were not included considering cultural differences of participants: „Bible truth” and „Condom vending machines”. Each of included items was answered „yes” or „no” depending on participants attitude toward this item. Then the answers were recoded according to the key (for part of the items, a „yes” was conservative answer, e.g., „Death Penalty”, and for the others conservative answer was a „no”, e.g., „Multiculturalism”). Each conservative answer was coded as 1, and liberal as 0. Recoded answers were summed up. Fully liberal participant would score 0, while fully conservative participant would score 10. Additionally, only 8 questions were asked in Iran, where missing two („Gay Rights” and „Legal Prostitution”) were, according to local researchers, problematic to ask in the view of legal circumstances of a country, unethical and offensive for Iranian participants, therefore the answers for this items in Iran were automatically assumed as a „no”. Reliability tested with Cronbach’s alpha was relatively low, but acceptable,  $\alpha = 0.62$ .

**History of parasitic diseases.** Participants were asked whether they suffered from any of nine below-listed parasitic diseases, and if yes, how many times were they infected. The answers originally were coded 1 for never having disease, 2 for having it once, and 3 for having it more than once. Minimal possible score was 9, and maximal was 27. In this study, after

adding up a score for each participant, 9 was subtracted from each result to simplify the interpretation. Ultimately, the lowest possible score was 0 (when participant had never have any of listed diseases) and the highest was 18 (when participant had been suffering from every listed disease more than once). Missing-data cases were carefully analysed, and assumed as „never having a disease“, if participant provided an answer to any other disease-related question. As it could be due to misunderstanding the coding instructions, we assume, that by leaving blanks participants meant „never“ to certain diseases. Only participants, who did not provide answer to any of disease history-related questions were excluded from the sample.

Database contained data concerning the following diseases:

- **Dengue.** Mosquito-borne disease, caused by dengue virus that occurs in tropical regions. Infection with one type of the virus usually gives lifetime immunity for this specific type, but only short-term immunity to other types (World’s Health Organization [WHO], 2022). Infection can be transmitted not only by mosquitos, but also via infected blood or organ donations (Wider-Smith et.al., 2009).
- **Filaria.** Arthropod-borne disease, caused by parasitic worms, that infect lymphatic system, spread by variety of mosquito vector species, occurring in tropical regions (Melrose, 2002). From person-to-person filaria can spread by mosquito bites (Center for Disease Control and Prevention [CDC], 2020).
- **Leishmania.** Parasitic disease that spreads through the bite of sandflies occurring in tropical regions of Africa, the Americas, Asia and southern Europe. Infection can be transmitted from one person to another via sandfly bites (WHO, 2022).
- **Leprosy.** Mycobacterial, long-term, low contagiousness infection, spread among people via extensive contact with an infected individual, through their cough or nose fluids (CDC, 2017).
- **Malaria.** Mosquito-borne infectious disease that is spread by the bites of parasite-carrying mosquitos. Typically occurs in tropical and subtropical regions of Africa, Asia and the Americas (WHO, 2014).
- **Schistosoma.** Caused by parasitic flatworms, released to the water by freshwater snails. Infection follows skin contact with infested water. Person-to-person transition is the result of contamination of freshwater sources with infected-person’s excreta. Schistosoma occurs in tropical and subtropical regions, especially in poor communities with difficult access to safe drinking water (WHO, 2022).
- **Trypanosoma.** Vector-borne parasitic disease, transmitted by infected tsetse flies in sub-Saharan Africa. Besides tsetse flies, from person-to-person transmission occurs via infected blood contact, mother-to-child transmission (protozoans from mother can infect the foetus through placenta), or lately reported sexual intercourse (WHO, 2022)
- **Tuberculosis.** Infectious disease caused by pathogenic mycobacteria, spread through the air with infected person’s cough, spit, speak or

sneeze. Prolonged, frequent or close contact with infected individual enhances the risk of becoming infected (WHO, 2021).

- **Typhus.** Caused by specific type of bacterial infection, transmitted from one person to another via exposure on infested body lice, not only through close personal contact, but also through presence in crowded communities (CDC, 2020).

**Economic situation.** Participants were asked to self-assess their economic situation, according to the key: 1 - much lower than the average, 2 - lower than the average, 3 - average, 4 - higher than the average, 5 - much higher than the average.

**Education.** Participants determined their education according to the key: 1 - no formal education, 2 - primary education, 3 - secondary education, 4 - high school and 5 - degree.

## RESULTS

Average perceived infectability in the sample was  $M = 3.29$ ;  $SD = 1.14$ ; average conservatism was  $M = 4.01$ ;  $SD = 2.26$  and average history of parasitic diseases in the past was  $M = 0.25$ ;  $SD = 0.82$ . According to the law of large numbers, there was no need to logarithmize any variables (Sobczyk, 2007) and it hasn't been done.

Correlations among main factors are presented in Table 1.

Table 1  
*Correlations among factors*

	Education	Economic situation	Perceived infectability	Parasites	Age
Economic situation	0.15***				
Perceived infectability	-0.021*	-0.019			
Parasites	0.023*	0.038***	0.077***		
Age	-0.016	0.073***	-0.013	0.005	
Conservatism	-0.019	-0.027**	0.03**	0.163***	-0.027**

Note: \*\*\* =  $p < 0,001$ ; \*\* =  $p < 0,01$ ; \* =  $p < 0,05$

Source: own research.

Since expected correlations between perceived infectability, conservatism and parasite history appeared, two separate regression models were prepared. Apart from the main variables (meaning perceived infectability, social conservatism and history of disease), the following predictors were included in each model: age, education, economic situation and sex.



The model was built with social conservatism as dependent variable, and fit data well ( $F = 45.5$ ;  $p < 0.001$ ). History of parasitic diseases was a significant predictor of social conservatism ( $\beta = 0.45$ ;  $p < 0.001$ ), unlike was perceived infectability. It means, that people who had broader disease history, but not necessarily those, who feared infection more, were more likely to be conservative. Significant in this model were also age ( $\beta = -0.005$ ;  $p = 0.01$ ) and economic situation ( $\beta = -0.08$ ;  $p < 0.01$ ), what suggest, that more likely to be socially conservative were participants who were younger and in worse economic situation. The model explained nearly 3% of variation ( $R^2 = 0.029$ ).

## DISCUSSION AND CONCLUSION

In this study I tested hypothesis regarding the relation between social conservatism, disease history and perceived infectability. According to hypothesis, individuals with broader disease history and higher perceived infectability should adopt more conservative attitudes.

Obtained effect was relatively small and explained around 3% of variance in dependent variable. It is understood, as social conservatism and history of disease depend on many different factors, that could not possibly be captured in one study. For instance, social conservatism, among many others, comes with religiosity and religious worldview (Terrizi et al., 2012), the emotion of disgust (Terrizi et al., 2010) or right-wing authoritarianism (Harnish et al., 2018). In case of disease history many factors as well are involved: individual's living region, healthcare, migrations or preventive measures. The size effect of presented model is not big, nevertheless it is significant, and can be supported by theory.

My hypothesis was partially confirmed. Although the model did not explain much of the variance, it was significant. History of a disease was a significant, positive predictor of socially conservative beliefs. People, who have had broader history of parasitic diseases were more likely to present conservative attitudes, than people who have had less diseases in the past. This result is consistent with hypothesis, and previous studies (Terrizi et al., 2013, Tornhill et al., 2009; Tybur et al., 2016). Perceived infectability was not a significant predictor of such attitude – people who perceived themselves as more vulnerable to disease were less likely to be conservative. In fact, some studies before as well found no relation among these two factors, even though it is counterintuitive and not consistent with the theoretical construct of BIS (Tybur et al., 2010), sometimes conservative values correlate with behaviors opposite to expected – anti-vaccination or anti-mask attitudes, so behaviors that increase, instead of decrease, the risk of gaining an infection (Kemptorne, Terrizzi, 2021; Hornsey et al., 2020). One of the reasons why perceived infectability was not a significant predictor of social conservatism could be that, the political attitudes as a factor are very com-

plex, so perceived infectability may not be crucial or the effect could be indirect. Two more significant (and negative) predictors were participant's age and economic situation. People in worse material situation were more likely to be conservative, maybe because social conservatism strengthens in-group cohesion (Altemayer, 1988) which is safer and more careful attitude than letting outgroups to restricted resources. It is quite unusual, that age predicted conservatism negatively (more socially conservative are expected to be older, rather than younger people (Campbell & Strate, 1981; Peterson et al., 2020). Although, none of these predictors were especially strong, they were both significant.

Unusual directions of predictors in regression model could be explained for instance with a great variety of societies and cultures from outside the WEIRD world (Western Educated Industrialized Rich and Democratic countries) (Henrich et al., 2010) in database, that are not often investigated in psychological research (e.g., data from Costa Rica or Uganda). This could be responsible for unexpected and surprising relation of age and social conservatism in presented regression model. Therefore, for obtaining the most reliable results, psychological studies in general should be performed worldwide - in a great variety of cultures and customs, and not only the WEIRD countries. Fortunately, it is becoming a trend in social science and more studies appear to be testing large, diverse samples (Bago et al., 2022; Legate et al., 2022; Kowal et al., 2020; Wang et al., 2021). My model, despite it explained only a fracture of variance of social conservatism (and its predictor - disease history) among participants, it was accordant with described above trend considering sample size and diversity.

Considering, that psychology currently experiences replication crisis, and quite a few hypotheses have troubles being confirmed (Maxwell et al., 2015), there certainly always is a need for replications or re-analyses. The data I used is publicly available and can be accessed online. It could be, what I highly encourage, used for the performance of more sophisticated statistical models, e.g., mediations or moderations, which may reveal additional information. In this study hypothesis were only partially confirmed and results explained a little fracture of an issue, therefore future investigations may shed a broader light on it.

### ACKNOWLEDGEMENT

The study was made possible by funding from the IDN Being Human Lab, University of Wroclaw, Poland.



## REFERENCES

- [1] Ackerman, J. M., Hill, S. E., & Murray, D. R. (2018). The behavioral immune system: Current concerns and future directions. *Social and Personality Psychology Compass*, 12(2). <https://doi.org/10.1111/spc3.12371>
- [2] Altemeyer, B. (1988). *Enemies of freedom: Understanding right-wing authoritarianism*. Jossey-Bass.
- [3] Bago, B., Kovacs, M., Protzko, J., Nagy, T., Kekecs, Z., Palfi, B., Adamkovic, M., Adamus, S., Albalooshi, S., Albayrak-Aydemir, N., Alfian, I. N., Alper, S., Alvarez-Solas, S., Alves, S., Amaya, S., Andersen, P. K., Anjum, G., Ansari, D., Arriaga, P., ... & Balazs A. (2022). Situational factors shape moral judgements in the trolley dilemma in Eastern, Southern and Western countries in a culturally diverse sample. *Nature human behaviour*, 6, 880-895. <https://doi.org/10.1038/s41562-022-01319-5>
- [4] Campbell, J. C., & Strate, J. (1981). Are old people conservative? *The gerontologist*, 21(6), 580-591. <https://doi.org/10.1093/geront/21.6.580>
- [5] Centers for Disease Control and Prevention. (2020). *Parasites – Lymphatic Filariasis*. [https://www.cdc.gov/parasites/lymphaticfilariasis/gen\\_info/faqs.html](https://www.cdc.gov/parasites/lymphaticfilariasis/gen_info/faqs.html)
- [6] Centers for Disease Control and Prevention. (2020). *Typhus Fevers*. <https://www.cdc.gov/typhus/epidemic/index.html>
- [7] Centers for Disease Control and Prevention. (2017). *Hansen's Disease (Leprosy) Transmission*. <https://www.cdc.gov/leprosy/transmission/>
- [8] Conroy-Beam, D., Buss, D. M., Asao, K., Sorokowska, A., Sorokowski, P., Aavik, T., Akello, G., Alhabahba, M. M., Alm, C., Amjad, N., Anjum, A., Atama, C. S., Duyar, D. A., Ayebare, R., Batres, C., Bendixen, M., Bensafia, A., Bizumic, B., Boussena, M., ... & Zupančič, M. (2019a). Contrasting computational models of mate preference integration across 45 countries. *Scientific reports*, 9. <https://doi.org/10.1038/s41598-019-52748-8>
- [9] Conroy-Beam, D., Roney, J. R., Lukaszewski, A. W., Buss, D. M., Asao, K., Sorokowska, A., Sorokowski, P., Aavik, T., Akello, G., Alhabahba, M. M., Alm, C., Amjad, N., Anjum, A., Atama, C. S., Duyar, D. A., Ayebare, R., Batres, C., Bendixen, M., Bensafia, A., ... & Zupančič, M. (2019b). Assortative mating and the evolution of desirability covariation. *Evolution and Human Behavior*, 40(5), 479-491. <https://doi.org/10.1016/j.evolhumbehav.2019.06.003>
- [10] Delves, P. J., & Roitt, I. M. (2000). The immune system. *New England Journal of Medicine*, 343(1), 37-49. <https://doi.org/10.1056/NEJM200007063430107>
- [11] Duncan, L. A., Schaller, M., & Park, J. H. (2009). Perceived vulnerability to disease: Development and validation of a 15-item self-report instrument. *Personality and Individual Differences*, 47(6), 541-546. <https://doi.org/10.1016/j.paid.2009.05.001>
- [12] Harnish, R. J., Bridges, K. R., & Gump, J. T. (2018). Predicting economic, social, and foreign policy conservatism: The role of right-wing authoritarianism, social dominance orientation, moral foundations orientation, and religious fundamentalism. *Current Psychology*, 37(3), 668-679. <https://doi.org/10.1007/s12144-016-9552-x>
- [13] Henningham, J. P. (1996). A 12-item scale of social conservatism. *Personality and Individual Differences*, 20(4), 517-519. [https://doi.org/10.1016/0191-8869\(95\)00192-1](https://doi.org/10.1016/0191-8869(95)00192-1)
- [14] Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and brain sciences*, 33(2-3), 61-83.
- [15] Hornsey, M. J., Finlayson, M., Chatwood, G., & Begeny, C. T. (2020). Donald Trump and vaccination: The effect of political identity, conspiracist ideation and presidential tweets on vaccine hesitancy. *Journal of Experimental Social Psychology*, 88, 103947. <https://doi.org/10.1016/j.jesp.2019.103947>
- [16] Karwowski, M., Kowal, M., Groyecka-Bernard, A., Białek, M., Lebuda, I., Sorokowska, A., & Sorokowski, P. (2020). When in danger, turn right: Does Covid-19 threat promote social conservatism and right-wing presidential candidates? Preprint. <https://psyarxiv.com/pjfh5/>
- [17] Kempthorne, J. C., & Terrizzi Jr, J. A. (2021). The behavioral immune system and conservatism as predictors of disease-avoidant attitudes during the COVID-19 pandemic. *Personality and Individual Differences*, 178, 110857. <https://doi.org/10.1016/j.paid.2021.110857>

- [18] Kowal, M., Sorokowski, P., Sorokowska, A., Dobrowolska, M., Pisanski, K., Oleszkiewicz, A., Aavik, T., Akello, G., Alm, C., Amjad, N., Anjum, A., Asao, K., Atama, C. S., Duyar, D. A., Ayebare, R., Bendixen, M., Bensafia, A., Bizumic, B., Boussena, M., ... & Zupančič, M. (2020). Reasons for Facebook usage: Data from 46 countries. *Frontiers in Psychology, 11*, 711. <https://doi.org/10.3389/fpsyg.2020.00711>
- [19] Kowal, M., Sorokowski, P., Sorokowska, A., Lebuda, I., Groyecka-Bernard, A., Bialek, M., Kowalska, K., Wojtycka, L., Karwowski, M., Olszewska, A. (2020). Dread in Academia—how COVID-19 affects science and scientists. *Anthropological Review, 83*(4), 387-394. <https://doi.org/10.2478/anre-2020-0028>
- [20] Legate, N., Ngyuen, T. V., Weinstein, N., Moller, A., Legault, L., Vally, Z., Tajchman, Z., Zsido, A., Zrimsek, M., Chen, Z., Ziano, I., Gialitaki, Z., Ceary, C. D., Jang, Y., Lin, Y., Kunisato, Y., Yamada, Y., Xiao, Q., Jiang, X., ... & Primbs, M. (2022). A global experiment on motivating social distancing during the COVID-19 pandemic. *Proceedings of the National Academy of Sciences, 119*(22). <https://doi.org/10.1073/pnas.2111091119>
- [21] Ma, M. Z., & Ye, S. (2022). Coronavirus-related searches on the Internet predict COVID-19 vaccination rates in the real world: A behavioral immune system perspective. *Social Psychological and Personality Science*. <https://doi.org/10.1177/19485506221106012>
- [22] Maxwell, S. E., Lau, M. Y., & Howard, G. S. (2015). Is psychology suffering from a replication crisis? What does „failure to replicate“ really mean? *American Psychologist, 70*(6), 487-498. <https://doi.org/10.1037/a0039400>
- [23] Melrose, W. D. (2002). Lymphatic filariasis: new insights into an old disease. *International Journal for Parasitology, 32*(8), 947-960. [https://doi.org/10.1016/S0020-7519\(02\)00062-0](https://doi.org/10.1016/S0020-7519(02)00062-0)
- [24] Open Science Framework. (2022). *BIS and parasites*. <https://osf.io/jwufv>
- [25] Peterson, J. C., Smith, K. B., & Hibbing, J. R. (2020). Do people really become more conservative as they age? *The Journal of Politics, 82*(2), 600-611.
- [26] Reny, T. T., & Barreto, M. A. (2022). Xenophobia in the time of pandemic: othering, anti-Asian attitudes, and COVID-19. *Politics, Groups, and Identities, 10*(2), 209-232. <https://doi.org/10.1080/21565503.2020.1769693>
- [27] Schaller, M. (2006). Parasites, behavioral defenses, and the social psychological mechanisms through which cultures are evoked. *Psychological Inquiry, 17*(2), 96-101.
- [28] Schaller, M., & Duncan, L. A. (2007). The behavioral immune system: Its evolution and social psychological implications. In J. P. Forgas, M. G. Haselton, & W. von Hippel (Eds.), *Evolution and the social mind: Evolutionary psychology and social cognition* (pp. 293-307). Routledge Taylor & Francis Group.
- [29] Schaller, M., & Duncan, L. A. (2016). The behavioral immune system. In D. M. Buss (Ed.), *The handbook of evolutionary psychology: Foundations* (pp. 206-224). John Wiley & Sons, Inc.
- [30] Sobczyk, M. (2007). *Statystyka [Statistics]* (5th ed.). Wydawnictwo Naukowe PWN.
- [31] Sorokowska, A., Saluja, S., Sorokowski, P., Frąckowiak, T., Karwowski, M., Aavik, T., Akello, G., Alm, C., Amjad, N., Anjum, A., Asao, K., Atama, C. S., Duyar, D. A., Ayebare, R., Batres, C., Bendixen, M., Bensafia, A., Bizumic, B., Boussena, M., ... & Croy, I. (2021). Affective interpersonal touch in close relationships: a cross-cultural perspective. *Personality and Social Psychology Bulletin, 47*(12), 1705-1721. <https://doi.org/10.1177/0146167220988373>
- [32] Sorokowski, P., Groyecka, A., Kowal, M., Sorokowska, A., Bialek, M., Lebuda, I., Dobrowolska, M., Zdybek, P., & Karwowski, M. (2020). Can information about pandemics increase negative attitudes toward foreign groups? A case of COVID-19 outbreak. *Sustainability, 12*(12), 4912. <https://doi.org/10.3390/su12124912>
- [33] Sorokowski, P., Sorokowska, A., Karwowski, M., Groyecka, A., Aavik, T., Akello, G., Alm, C., Amjad, N., Anjum, A., Asao, K., Atama, C. S., Duyar, D. A., Ayebare, R., Bartes, C., Bendixen, M., Bensafia, A., Bizumic, B., Boussena, M., Buss, D. M., ... & Sternberg, R. J. (2021). Universality of the triangular theory of love: adaptation and psychometric properties of the triangular love scale in 25 countries. *The Journal of Sex Research, 58*(1), 106-115. <https://doi.org/10.1080/00224499.2020.1787318>
- [34] Sorokowski, P., Sorokowska, A., Karwowski, M., Groyecka, A., Aavik, T., Akello, G., Alm, C., Amjad, N., Anjum, A., Asao, K., Atama, C. S., Duyar, D. A., Ayebare, R., Bartes, C., Bendixen, M., Bensafia, A., Bizumic, B., Boussena, M., Buss, D. M., ... & Sternberg, R. J.

- (2021). Universality of the triangular theory of love: adaptation and psychometric properties of the triangular love scale in 25 countries. *The Journal of Sex Research*, 58(1), 106-115. Figshare. Retrieved February, 25, 2022, from [https://figshare.com/articles/dataset/Love\\_parasites\\_and\\_conservatism\\_The\\_Journal\\_of\\_Sex\\_Research\\_58\\_106-115\\_/19114478](https://figshare.com/articles/dataset/Love_parasites_and_conservatism_The_Journal_of_Sex_Research_58_106-115_/19114478)
- [35] Terrizzi Jr, J. A., Shook, N. J., & McDaniel, M. A. (2013). The behavioral immune system and social conservatism: A meta-analysis. *Evolution and Human Behavior*, 34(2), 99-108. <https://doi.org/10.1016/j.evolhumbehav.2012.10.003>
- [36] Terrizzi Jr, J. A., Shook, N. J., & Ventis, W. L. (2010). Disgust: A predictor of social conservatism and prejudicial attitudes toward homosexuals. *Personality and Individual Differences*, 49(6), 587-592. <https://doi.org/10.1016/j.paid.2010.05.024>
- [37] Terrizzi Jr, J. A., Shook, N. J., & Ventis, W. L. (2012). Religious conservatism: an evolutionarily evoked disease-avoidance strategy. *Religion, Brain & Behavior*, 2(2), 105-120. <https://doi.org/10.1080/2153599X.2012.695514>
- [38] Thornhill, R., Fincher, C. L., & Aran, D. (2009). Parasites, democratization, and the liberalization of values across contemporary countries. *Biological Reviews*, 84(1), 113-131. <https://doi.org/10.1111/j.1469-185X.2008.00062.x>
- [39] Tybur, J. M., Inbar, Y., Aarøe, L., Barclay, P., Barlow, F. K., De Barra, M., Becker, V. D., Borovoi, L., Choi, I., Consedine, N. S., Conway, A., Conway, J. R., Conway, P., Adoric, V. C., Demirci, D. E., Fernández, A. M., Ferrerira, D. C. S., Ishii, K., Jakšić, I., ... & Žeželj, I. (2016). Parasite stress and pathogen avoidance relate to distinct dimensions of political ideology across 30 nations. *Proceedings of the National Academy of Sciences*, 113(44), 12408-12413. <https://doi.org/10.1073/pnas.1607398113>
- [40] Tybur, J. M., Merriman, L. A., Hooper, A. E. C., McDonald, M. M., & Navarrete, C. D. (2010). Extending the behavioral immune system to political psychology: Are political conservatism and disgust sensitivity really related? *Evolutionary Psychology*, 8(4). <https://doi.org/10.1177/147470491000800406>
- [41] Walter, K. V., Conroy-Beam, D., Buss, D. M., Asao, K., Sorokowska, A., Sorokowski, P., Aavik, T., Akello, G., Alhababha, M. M., Alm, C., Amjad, N., Anjum, A., Atama, C. S., Duyar, D. A., Ayebare, R., Bartes, C., Bendixen, M., Bensafia, A., Bizumic, B., ... & Zupančič, M. (2020). Sex differences in mate preferences across 45 countries: A large-scale replication. *Psychological Science*, 31(4), 408-423. <https://doi.org/10.1177/0956797620904154>
- [42] Walter, K. V., Conroy-Beam, D., Buss, D. M., Asao, K., Sorokowska, A., Sorokowski, P., Aavik, T., Akello, G., Alhababha, M. M., Alm, C., Amjad, N., Anjum, A., Atama, C. S., Duyar, D. A., Ayebare, R., Bartes, C., Bendixen, M., Bensafia, A., Bizumic, B., ... & Zupančič, M. (2021). Sex differences in human mate preferences vary across sex ratios. *Proceedings of the Royal Society B*, 288(1955), 20211115. <https://doi.org/10.1098/rspb.2021.1115>
- [43] Wang, K., Goldenberg, A., Dorison, C. A., Miller, J. K., Uusberg, A., Lerner, J. S., Gross, J. J., Agesin, B. B., Bernardo, M., Campos, O., Eudave, L., Grzech, K., Ozery, D. H., Jackson, E. A., Garcia, E. O. L., Drexler, S. M., Jurković, A. P., Rana, K., Wilson, J. P., ... & Moshontz, H. (2021). A multi-country test of brief reappraisal interventions on emotions during the COVID-19 pandemic. *Nature Human Behaviour*, 5(8), 1089-1110. <https://doi.org/10.1038/s41562-021-01173-x>
- [44] Weiss, S. R., & Navas-Martin, S. (2005). Coronavirus pathogenesis and the emerging pathogen severe acute respiratory syndrome coronavirus. *Microbiology and Molecular Biology Reviews*, 69(4), 635-664. <https://doi.org/10.1128/MMBR.69.4.635-664.2005>
- [45] Wilder-Smith, A., Chen, L. H., Massad, E., & Wilson, M. E. (2009). Threat of dengue to blood safety in dengue-endemic countries. *Emerging Infectious Diseases*, 15(1), 8-11. <https://doi.org/10.3201/eid1501.071097>
- [46] World's Health Organization. (2022). *Dengue and severe dengue*. <https://www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue>
- [47] World Health Organization. (2022). *Leishmaniasis - Fact sheet N°375*. <https://www.who.int/en/news-room/fact-sheets/detail/leishmaniasis>
- [48] World Health Organization. (2022). *Schistosomiasis - Fact Sheet N°115*. <https://www.who.int/en/news-room/fact-sheets/detail/schistosomiasis>
- [49] World Health Organization. (2022). *Trypanosomiasis*. [https://www.who.int/news-room/fact-sheets/detail/trypanosomiasis-human-african-\(sleeping-sickness\)](https://www.who.int/news-room/fact-sheets/detail/trypanosomiasis-human-african-(sleeping-sickness))

[50] World Health Organization. (2021). *Tuberculosis*. <https://www.who.int/news-room/fact-sheets/detail/tuberculosis>

[51] World Health Organization. (2014). *Malaria - Fact sheet N°94*. <https://web.archive.org/web/20140903002027/http://www.who.int/mediacentre/factsheets/fs094/en/>