Supplementary materials

Several additional analyses not reported in the main article were conducted.

First, description of missing data is provided.

Second, several techniques to identify inattentive responding was used – attention checks, longstring index, even-odd consistency, psychometric synonyms, Mahalanobis distance, IRT person fit indices (zh/lz), and total response time. Respondents, who failed both attention checks, were excluded from the study. Furthermore, 43 respondents failed at least one attention check. Followingly, we conducted a closer investigation of these participants' responses. Participants, who were flagged by four (including attention check) techniques mentioned above as potential outliers/inattentive respondents, were also excluded from the study. In addition, we made an exception in three cases and excluded respondents who were flagged three times, however, these participants unlike the others exceeded a threshold in techniques indicating inconsistency in responding (even-odd consistency indicator, or psychometric synonyms). In total, we identified 7 respondents who very likely engaged in careless and insufficient effort responding (C/IER) and thus were eliminated from the study.

Second, we employed several techniques to assess the discriminant validity of the used measurements. Based on the recommendations of Rönkkö and Cho (2022), we categorized the extent of the lack of discriminant validity based on the assessment of the upper 95% confidence interval (lower 95% CI in instances of negative correlations) of the latent correlation between two measures. The authors proposed four categories:

a. If the absolute value of the upper (lower) 95% CI is < .8, measures are distinct
b. If the absolute value of the upper (lower) 95% CI is > .8 and <.9 -> marginal discriminant issue
c. If the absolute value of the upper (lower) 95% CI is > .9 and < 1 -> moderate discriminant issue
d. If the absolute value of the upper (lower) 95% CI is > 1 -> severe discriminant issue

Furthermore, in cases where the absolute value of upper (lower) 95% CI was >.8, we proceed to investigate discriminant validity with another technique preferred by Rönkkö and Cho (2022) – the nested model chi-square test, comparing the model with freely estimated latent correlation between measures with the model with fixed correlations to the upper value of the cutoff from the category that is one level above the category based on the initial categorization from the first CI approach. In the case of statistical difference, the initial level of categorization is assumed. Finally, we also used heterotrait-monotrait ratio of correlations (HTMT; Henseler et al., 2015).

The following R packages were used: for structural equation modeling *lavaan* (Rosseel, 2012), *semTools* (Jorgensen et al., 2022), *dynamics* (McNeish, 2023), and flexplavaan (Fife et al., 2023); for missing values *mice*

(Buuren & Groothuis-Oudshoorn, 2011), *miceafter* (Heymans, 2022), *miceadds* (Robitzsch & Grund, 2023); for tables *apaTables* (Stanley, 2021); for visualization *GGally* (Schloerke et al., 2024).

Supplementary Material A

Missing data

The percentage of missing data in the sample of adolescent ranged from 2.28 (social distance items) to 15.30 % (gender), respectively 3.25% (threat) to 21.95% (gender) in the sample of young adults.

When testing discriminatory validity using CI_{CFA} approach full information maximum likelihood (FIML) procedure was used to handle missing data.

Figures 1 and 2 display the number of missing points for each indicator in the sample of adolescents, respectively young adults. Both samples have noticeably high percentage of missing data regarding gender and age of the participants. However, it is worth saying, that both items asking about this demographic information were placed completely at the end of the survey, thus this high number of missing data stemmed from participants not completing the whole survey. In fact, only 14 respondents in the adolescent sample refused to provide data regarding gender.

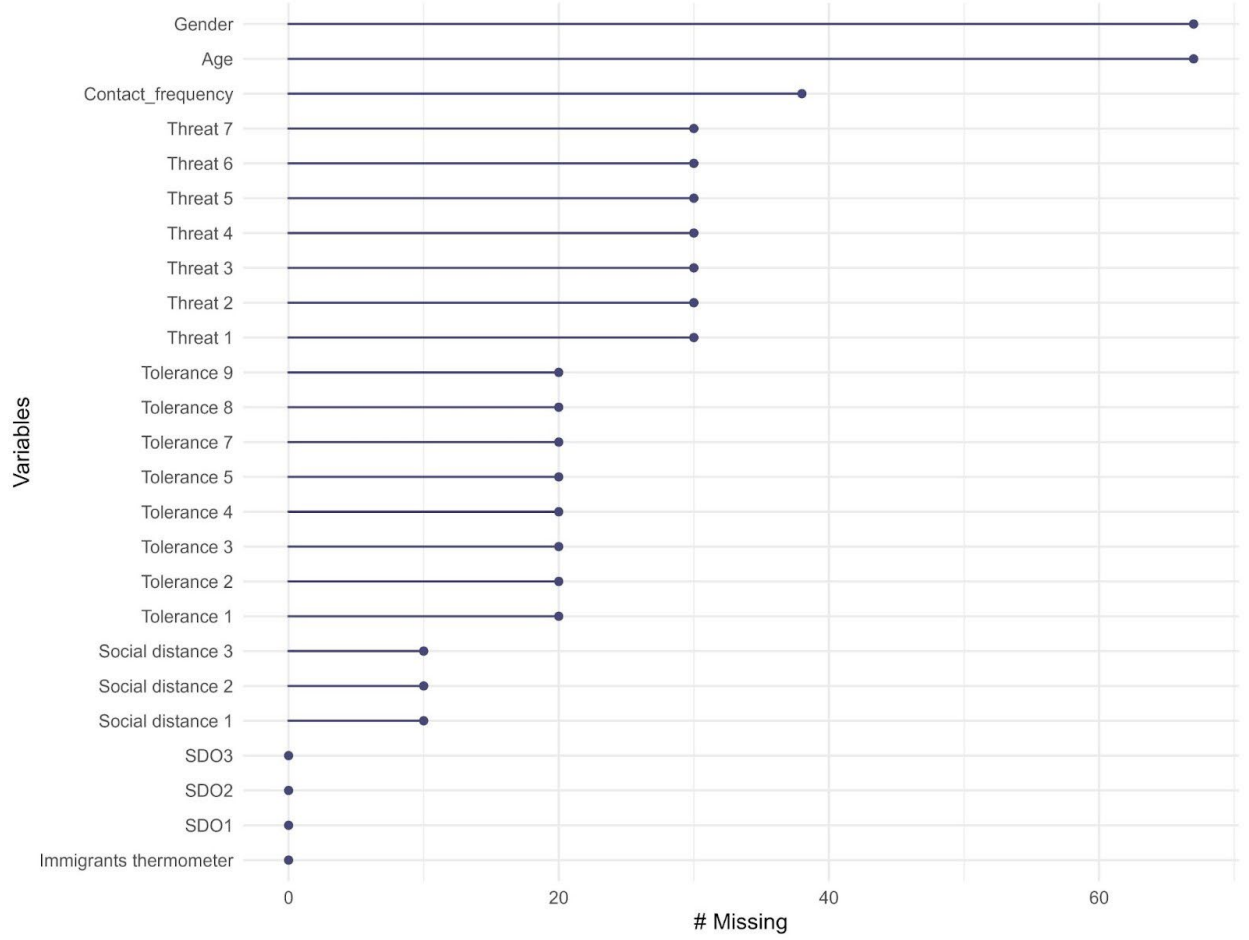

Figure 1 Missing data summary (Adolescent sample).

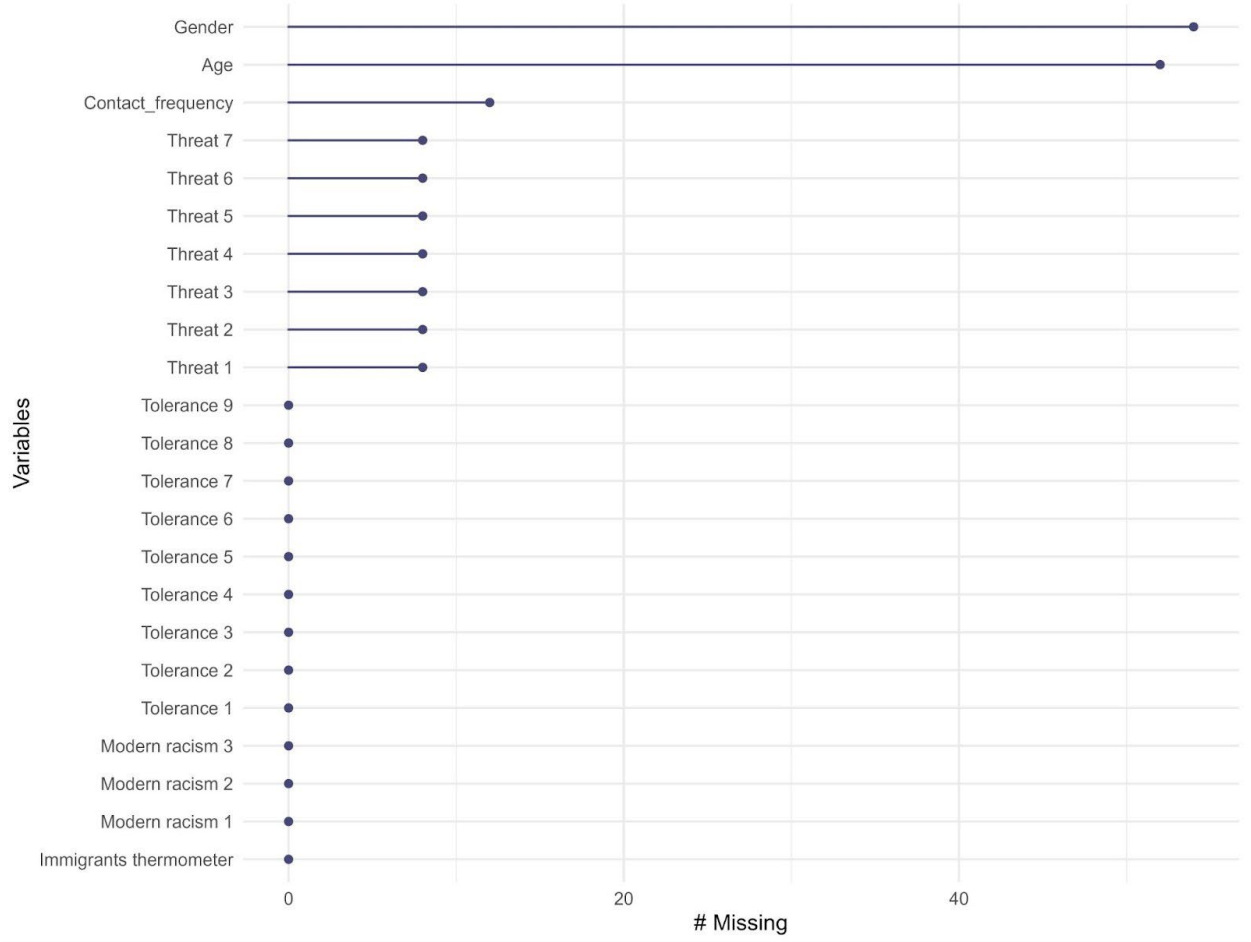

Figure 2 Missing data summary (Young adult sample).

Supplementary Material B – Descriptive statistics (after pairwise deletion)

Table 1 *Descriptive statistics for individual tolerance measure items*

Item	Sample	Mean	SD	Skewness	Kurtosis
T1	Adolescent	5.93	1.25	-1.19	1.11
	Young adult	5.91	1.14	-1.30	2.24
T2	Adolescent	6.14	1.03	-1.31	1.97
	Young adult	6.10	1.00	-1.45	4.07
T3	Adolescent	6.42	1.05	-2.49	7.61
	Young adult	6.46	.98	-2.47	7.45
T4	Adolescent	5.88	1.03	-.88	.91
	Young adult	5.94	.92	-.86	1.04
T5	Adolescent	5.40	1.33	-.87	.78
	Young adult	5.64	1.04	-1.24	3.26
T6	Adolescent	5.99	1.20	-1.49	2.37
	Young adult	6.12	1.09	-1.87	4.66
T7	Adolescent	4.93	1.30	-.23	-.24
	Young adult	5.14	1.35	-.53	-.07
T8	Adolescent	4.83	1.70	-.47	-.61
	Young adult	5.64	1.44	-1.33	1.53
T9	Adolescent	5.44	1.34	-.82	.75
	Young adult	5.55	1.31	-.90	.76

Table 2 *Descriptive statistics for individual measures*

Measure	Sample	Mean	SD	Skewness	Kurtosis
Tolerance (8 items mean score)	Adolescent	5.62	.80	-.44	-.04
	Young adult	5.80	.74	-1.07	2.97
Acceptance	Adolescent	6.16	.92	-1.25	1.53
	Young adult	6.16	.89	-1.76	5.21
Respect	Adolescent	5.64	1.03	-.68	.73
	Young adult	5.79	.87	-1.03	2.05
Appreciation	Adolescent	5.07	1.08	-.10	-.47
	Young adult	5.44	1.05	-.71	.68
Threat	Adolescent	3.46	1.24	.26	.06
	Young adult	3.20	1.27	.40	-.33
Contact quantity	Adolescent	2.35	1.92	1.40	.53
	Young adult	3.02	1.79	.89	-.44
Contact quality	Adolescent	5.25	1.24	-.52	.21
	Young adult	5.48	1.31	-.46	.04
Thermometer	Adolescent	55.41	21.78	-.25	.30
	Young adult	62.60	22.83	-.37	.09
Modern racism	Young adult	3.14	1.27	.43	-.04
Social distance	Adolescent	5.90	1.17	-1.23	1.46
SDO	Adolescent	2.73	1.15	.49	-.12

Supplementary Material C – Convergent validity (after pairwise deletion)

Table 3 *Correlation of Tolerance Scale and its factors with validation measures*

Measure	Sample	Total	ACC	RESP	APP
Immigrant Thermometer	ADL	.41 [.33, 49]	.26 [.16, .34]	.24 [.15, .33]	.43 [.34, .51]
	YA	.50 [.40, .59]	.31 [.19, .42]	.31 [.19, .42]	.51 [.41, .60]
Contact Frequency	ADL	.19 [.09, .28]	.07 [-.03, .16]	.14 [.04, .24]**	.22 [.13, .32]
	YA	.19 [.06, .31]**	.11 [-.02, .23]	.07 [-.06, .20]	.23 [.10, .35]
Contact quality	ADL	.25 [.12, .36]	.12 [-.01, .25]	.22 [.09, .34]**	.25 [.13, .37]
	YA	.47 [.36, .57]	.25 [.11, .37]	.37 [.24, .48]	.49 [.38, .59]
Threat	ADL	-.52 [-.59, -.45]	-.35 [-.44, -.27]	-.35 [-.44, -.27]	-.51 [-.58, -.43]
	YA	-.55 [-.63, -.46]	-.39 [-.50, -.28]	-.29 [-.40, -.17]	-.55 [-.63, -.45]
Social distance	ADL	.44 [.36, .51]	.18 [.08, .27]	.36 [.27, .44]	.49 [.41, .56]
SDO	ADL	-.43 [-.50, -.35]	-.24 [-.33, -.15]	-.36 [-.44, -.28]	-.41 [-.49, -.33]
Modern racism	YA	-.46 [-.55, -.35]	-.31 [-.42, -.19]	-.26 [-.38, -.14]	-.45 [-.54, -.34]

Note. *p < .05;** p <.01; if confidence intervals contain 0, then p > .05; otherwise, the p-value for correlations is < .001.

Supplementary Material D - Discriminant validity

Table 4 *HTMT2 correlation ratios among used measures in the sample of young adults*

Measure	1.	2.	3.	4.	5.	6.
1. Total score tolerance	1					
2. Acceptance	x	1				
3. Respect	x	.403	1			
4. Appreciation	x	.573	.671	1		
5. Modern racism	.594	.413	.369	.635	1	
6. Threat	.632	.449	.341	.702	.953	1

Table 5 *HTMT2 correlation ratios among used measures in the sample of adolescents*

Measure	1.	2.	3.	4.	5.	6.	7.
1. Total score tolerance	1						
2. Acceptance	X	1					
3. Respect	X	.580	1				
4. Appreciation	X	.598	.709	1			
5. Threat	.604	.418	.434	.678	1		
6. SDO	.611	.343	.580	.703	.673	1	
7. Social distance	.462	.207	.442	.659	.599	.553	1

Table 6 *Latent correlations among used measures in the sample of young adults*

	1	2	3	4	5	6	7
1. Tolerance	1						
2. ACC	X	1					
3. RESP	X	.408 [.246, .570]	1				
4. APP	X	.571 [.384, .757]	.670 [.467, .871]	1			
5. MR	-.641 [-.772, -.511]	-.371 [-.565, -.177]	-.356 [-.559, -.152]	-.684 [-.835, -.533]	1		
6. Feeling thermometer	.625 [.514 .737]	.338 [.200, .476]	.368 [.223, .514]	.673 [.561, .786]	-.737 [-.832, -.641]	1	
7. Threat	-.703 [-.812, -.594]	-.431 [-.575, -.287]	-.350 [-.540, -.159]	-.759 [-.866, -.652]	.934 [.873, .995]	-.741 [-.810, -.673]	1

Table 7 *Latent correlations among used measures in the sample of adolescents*

	TS	ACC	RESP	APP	TM	TH	SDO	SD
TS	1							
ACC	X	1						
RESP	X	.617 [.483, .750]	1					
APP	X	.652 [.549, .754]	.647 [.518, .775]	1				
TM	.493 [.394, .591]	.286 [.172, .399]	.284 [.151, .417]	.578 [.473, .682]	1			
TH	-.628 [-.733, -.522]	-.433 [-.540, -.326]	-.398 [-.540, -.256]	-.727 [-.820, -.634]	-.675 [-.737, -.612]	1		
SDO	-.740 [-.868, -.612]	-.441 [-.593, -.289]	-.569 [-.738, -.400]	-.775 [-.917, -.634]	-.519 [-.627, -.411]	.705 [.594, .816]	1	
SD	.589 [.474, .704]	.218 [.099, .338]	.412 [.269, .556]	.633 [.519, .747]	.505 [.420, .589]	-.593 [-.679, -.507]	-.550 [-.684, -.417]	1

Supplementary Material E: Number of response options

We intend to address the possible inconvenience related to the number of response options. In the current study, the seven-point Likert scale was adopted for each measurement in the survey and we opted not to use the original five-point Likert scale for the Tolerance Scale. The figure X capturing the response frequency indicates there is a noticeably strong preference of responses in the agreeable direction for majority of the items (with the exception of items 7 and 8), a phenomenon especially amplified in the young adult sample. Only a handful of respondents reflected in their replies a disagreement with the items' content. As indicated by Figure 3, most replies of disagreement were recorded for item 7 and 8 (> 20% in the ADL sample), however, for rest of the items the proportions of any level of disagreement were under 10%.

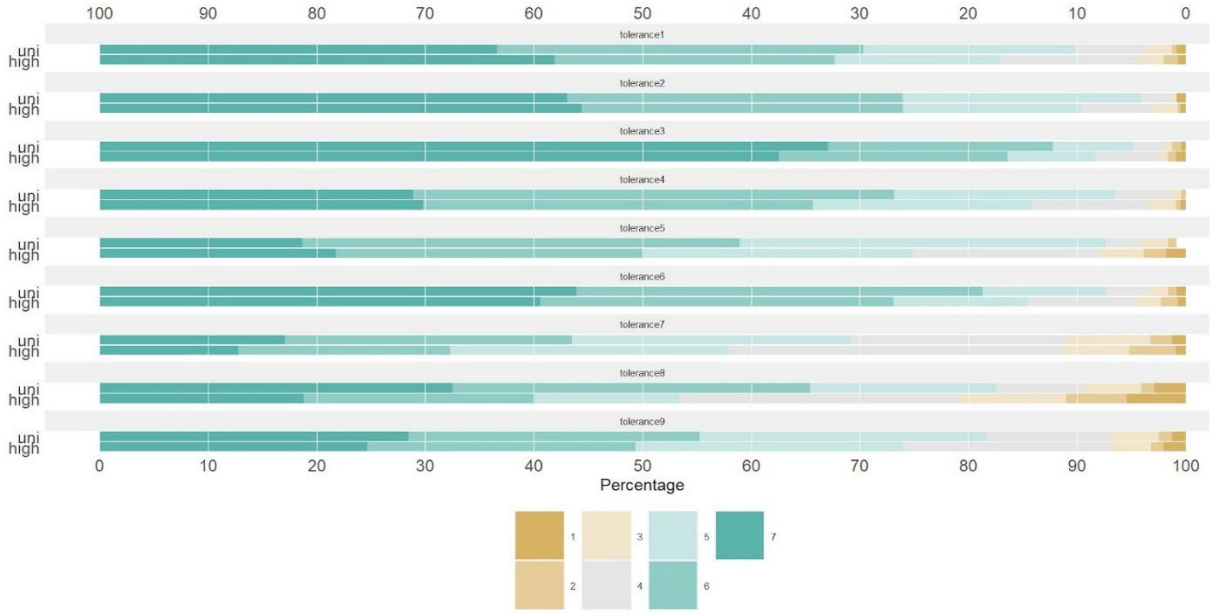

Figure 3 Response distribution per individual item.

For the purpose of parsimony and ease of interpretation, we forewent the proposed three factor model and assumed one factor structure of the Tolerance Scale to investigate item characteristic function (ICC). For this purpose, we employed the parameter logistic IRT model. ICC for each item of the Tolerance Scale (young adult sample) is displayed in Figure 4.

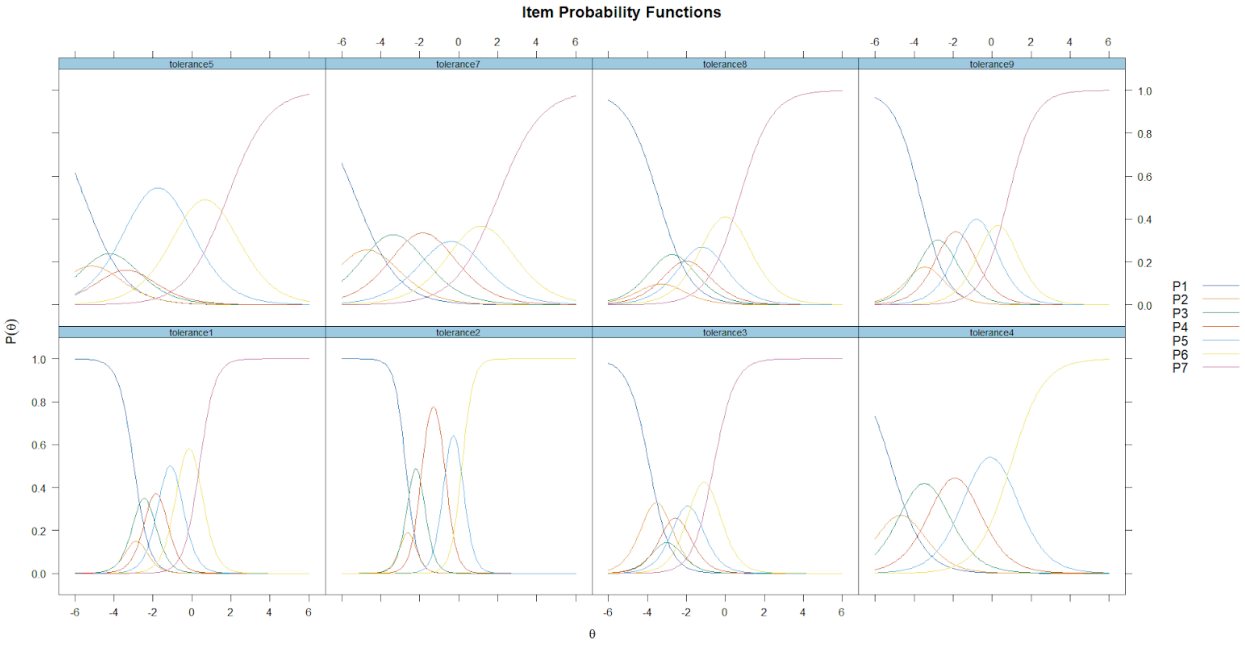

Figure 4 Item characteristic curves.

From this graph we can clearly see that response option 2 (“Disagree”) was not in most instances the most probable option for any level of latent variable. For these reasons we recommend using the original five-point Liker scale. This proposed shift should not have a negative impact on the psychometric properties of Tolerance Scale (Simms et al., 2019). We verified the results using a five-point response scale by merging responses “Disagree” and “Slightly disagree”. To avoid using asymmetrical response scale, we also collapsed response options “Slightly agree” and “Agree”, even though these response options were among the most frequently chosen.

Supplementary Material F

This supplementary material describes a more detailed description of fit of the three-factor CFA model with 8 items.

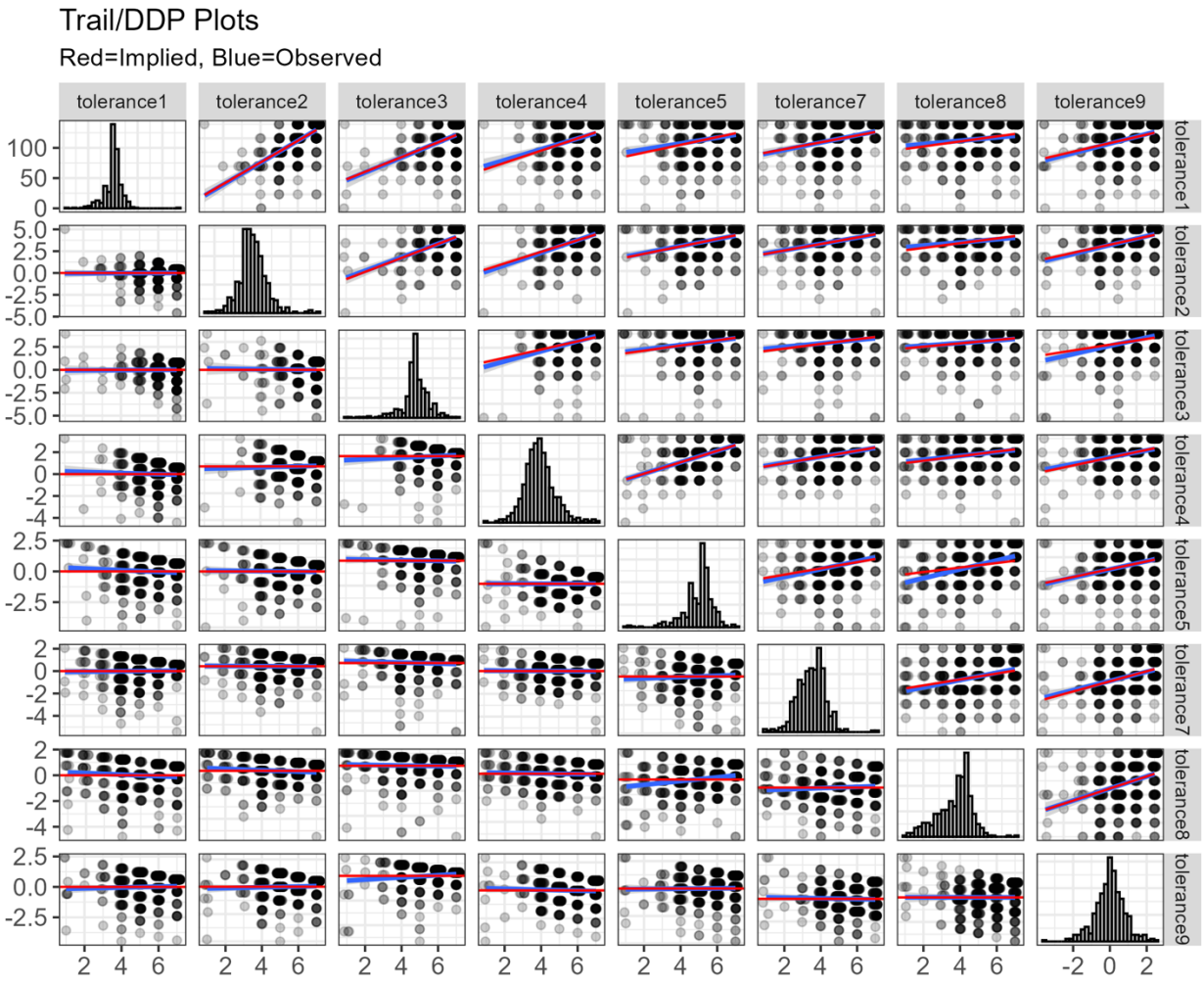

Figure 5 Trail and Disturbance-Dependence Plots (Adolescent sample).

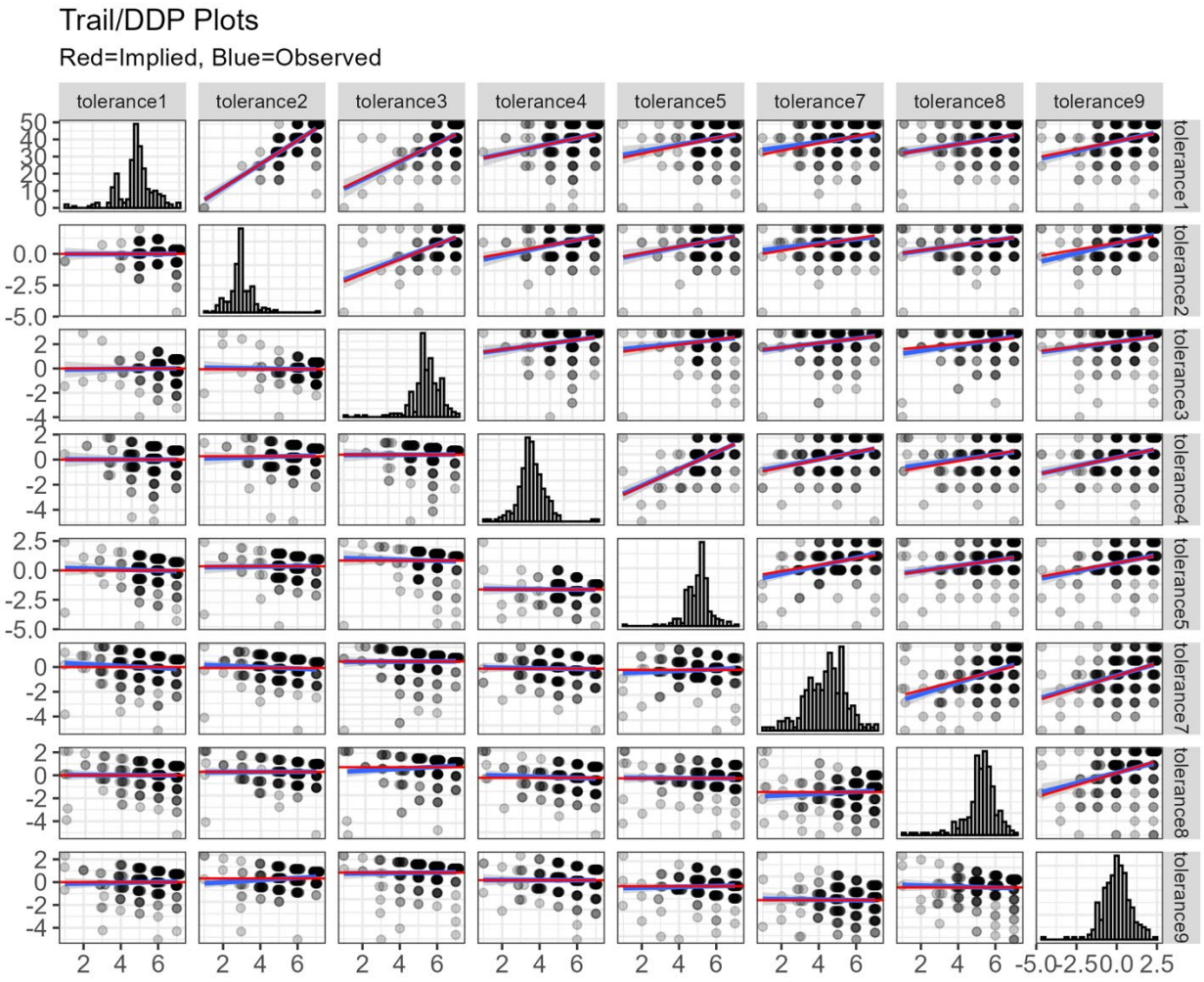

Figure 6 Trail and Disturbance-Dependence Plots (Young adult sample).

Supplementary Material G - Psychometric properties of validation measures

Modern racism, Social dominance orientation, and Social distance

Since each of these measures consists of three items, the one-factor structure provides a perfect fit given the fact the model is just-identified (saturated). Factor loadings for these measures were following given by the order of items:

a) Modern racism (Young adult sample): .52, .84, .69
b) Social dominance orientation (Adolescent sample): .55, .43, .56
c) Social distance (Adolescent sample): 93, .88, .91

Threat

We tested both a one-factor and a two-factor model. With the exception of higher RMSEA values, the one-factor model demonstrated a generally satisfactory fit to the data (ADL: χ^2 (scaling factor) = 49.53 (1.26), df = 14, p < .001, CFI = .974, TLI = .961, RMSEA = .089, 90% CI [.063, .116], SRMR = .026; YA: scaled χ^2 (scaling factor) = 65.80 (1.31), df = 14, p < .001, CFI = .934, TLI = .901, RMSEA = .142, 90% CI [.107, .179], SRMR = .040). The two-factor solution showed improved model fit across both samples (ADL: χ^2 (scaling factor) = 37.33 (1.24), df = 14, p < .001, CFI = .982, TLI = .971, RMSEA = .075, 90% CI [.048, .104], SRMR = .023; YA: χ^2 (scaling factor) = 42.02 (1.36), df = 13, p < .001, CFI = .962, TLI = .938, RMSEA = .112, 90% CI [.074, .152], SRMR = .038). However, despite the better overall fit, the two-factor model was ultimately not deemed feasible due to concerns about discriminant validity. The two factors (realistic and symbolic threat) were highly correlated: r = .89, 95% CI [.83, .95] in the YA sample, and r = .94, 95% CI [.90, .98] in the ADL sample, indicating moderate issues with discriminant validity.

Supplementary Material H - Item formulation

Tolerance

Ac1: People should have the right to live how they wish (Ľudia by mali mať právo žiť, ako chcú)

Ac2: It is important that people have the freedom to live their life as they choose (Je dôležité, aby ľudia mali slobodu žiť svoj život tak, ako si vyberú)

Ac3: It is okay for people to live as they wish as long as they do not harm other people (Ľudia môžu žiť ako chcú, pokiaľ neubližujú iným)

R1: I respect other people's beliefs and opinions (Rešpektujem presvedčenia a názory iných ľudí)

R2: I respect other people's opinions even when I do not agree (Mám rešpekt voči presvedčeniam a názorom iných ľudí, aj keď s nimi nesúhlasím)

R3: It bothers me that some people have different traditions and lifestyles (Vadí mi, že niektorí ľudia majú iné tradície a spôsob života)

Ap1: I like to spend time with people who are different from me (Rád/a trávim čas s ľuďmi, ktorí sú iní ako ja)

Ap2: I like people who challenge me to think about the world in a different way (Mám rád/a ľudí, ktorí ma podnecujú, aby som rozmýšľal/a o svete iným spôsobom)

Ap3: Society benefits from a diversity of traditions and lifestyles (Rozmanitosť tradícií a spôsobov života je prínosom pre našu spoločnosť)

Social distance

How acceptable or unacceptable would you find the following situations?

SD1: ...if a new student, who is an immigrant, is placed in your class (Ak by nový žiak alebo žiačka boli Tvojím spolužiakom/spolužiačkou v triede);

SD2: ...if a new student, who is an immigrant, is seated next to you in class (Ak by nový žiak alebo žiačka boli Tvojím spolusediacim/spolusediacou v lavici);

SD3: ...if a new student, who is an immigrant, goes out with you and your friends (Ak by nový žiak alebo žiačka išli s Tebou v partii von)

Modern racism scale

MR1: If immigrants would only try harder, they could be as well off as Slovaks (Keby sa imigranti viac snažili, boli by na tom rovnako dobre ako Slováci.);

MR2: Immigrants can blame themselves if people don't like them (Imigranti si sami môžu za to, že ich ľudia nemajú radi.)

MR3: It is okay if people don't want immigrants to live in their neighbourhoods (Je v poriadku, ak ľudia nechcú, aby imigranti bývali v ich okolí.).

Intergroup threat

TH1: Immigrants increase crime rates (Imigranti zvyšujú kriminalitu)

TH2: Immigrants are a physical threat to people's safety. (Imigranti sú fyzickou hrozbou pre bezpečnosť ľudí)

TH3: Immigrants take jobs from people born in Slovakia. (Imigranti berú prácu ľuďom, ktorí sa narodili na Slovensku)

TH4: Immigrants often come to Slovakia just to abuse our social system (e.g., unemployment benefits). (Imigranti často prichádzajú na Slovensku len preto, aby zneužívali náš sociálny systém (napr. podporu v nezamestnanosti).

TH5: It often happens that immigrants have customs and traditions that do not fit into Slovak society. (Často sa stáva, že imigranti majú zvyky a tradície, ktoré sa nehodia do slovenskej spoločnosti.)

TH6: Immigration is a threat to Slovak culture and traditions. (Imigranti sú hrozbou pre slovenskú kultúru a tradície.)

TH7: A large number of immigrants in Slovakia could endanger Slovak national identity. (Veľký počet imigrantov na Slovensku by mohol ohroziť slovenskú národnú identitu.)

Intergroup contact

IC1: How often do you spend time with immigrants (people who moved to Slovakia from other countries)? (Ako často tráviš čas s imigrantmi (ľuďmi, ktorí sa prisťahovali na Slovensko z iných krajín)? Môžu to byť napr. kamaráti, rodičia Tvojich kamarátov, susedia...)

IC2: How do you usually feel about it (Ako sa pri tom väčšinou cítiš?)

Social Dominance Orientation (SDO)

SDO1: Some groups of people are simply inferior to other groups (Niektoré skupiny ľudí sú jednoducho menejcennejšie než iné);

SDO2: It's okay if some groups have more of a chance in life than others (Je v poriadku, ak niektoré skupiny ľudí majú v živote viac príležitostí, než iné);

SDO3: If certain groups stayed in their place, we would have fewer problems (Ak by niektoré skupiny, ktoré majú nízke postavenie v spoločnosti, zostali tam, kde patria, mali by sme menej problémov)

References

Buuren, S. van, & Groothuis-Oudshoorn, K. (2011). mice: Multivariate Imputation by Chained Equations in R. *Journal of Statistical Software*, *45*, 1–67. https://doi.org/10.18637/jss.v045.i03

Fife, D. A., Brunwasser, S. M., & Merkle, E. C. (2023). Seeing the impossible: Visualizing latent variable models with flexplavaan. *Psychological Methods*, *28*(6), 1456–1477. https://doi.org/10.1037/met0000468

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, *43*(1), 115–135. https://doi.org/10.1007/s11747-014-0403-8

Heymans, M. (2022). *miceafter: Data and Statistical Analyses after Multiple Imputation*. R package version 0.5.0. https://CRAN.R-project.org/package=miceafter

Jorgensen, T. D., Pornprasertmanit, S., Schoemann, A. M., & Rosseel, Y. (2022). semTools: Useful tools for structural equation modeling. R package version 0.5-6. Retrieved from https://CRAN.R-project.org/package=semTools

McNeish, D. (2023, April 5). Dynamic fit index cutoffs for factor analysis with likert, ordinal, or binary responses. https://doi.org/10.31234/osf.io/tp35s

Robitzsch, A., & Grund, S. (2023). *miceadds: Some Additional Multiple Imputation Functions, Especially for 'mice'*. R package version 3.16-18. https://CRAN.R-project.org/package=miceadds

Rönkkö, M., & Cho, E. (2022). An Updated Guideline for Assessing Discriminant Validity. *Organizational Research Methods*, *25*(1), 6–14. https://doi.org/10.1177/1094428120968614

Rosseel, Y. (2012). lavaan: An R Package for Structural Equation Modeling. *Journal of Statistical Software, 48*(2), 1–36. https://doi.org/10.18637/jss.v048.i02

Schloerke, B., Cook, D., Larmarange, J., Briatte, F., Marbach, M., Thoen, E., Elberg, A., Crowley, J. (2024). *GGally: Extension to 'ggplot2'*. R package version 2.2.1. https://github.com/ggobi/ggally

Simms, L. J., Zelazny, K., Williams, T. F., & Bernstein, L. (2019). Does the number of response options matter? Psychometric perspectives using personality questionnaire data. *Psychological Assessment*, *31*(4), 557–566. https://doi.org/10.1037/pas0000648

Stanley D (2021). *apaTables: Create American Psychological Association (APA) Style Tables*. R package version 2.0.8. https://CRAN.R-project.org/package=apaTables

Wickham, H., Averick, M., Bryan, J., Chang, W., McGowan, L. D., François, R., Grolemund, G., Hayes, A., Henry, L., Hester, J., Kuhn, M., Pedersen, T. L., Miller, E., Bache, S. M., Müller, K., Ooms, J., Robinson, D., Seidel, D. P., Spinu, V., … Yutani, H. (2019). Welcome to the Tidyverse. *Journal of Open Source Software*, *4*(43), 1686. https://doi.org/10.21105/joss.01686