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ORIGINAL ARTICLE

Who agrees more? The role of age, education, and the ability to solve verbal analogies in acquiescence

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BACKGROUND
Acquiescence as one of the response styles is the participant's tendency to shift answers to agreement rather than to disagreement regardless of the items' content. Acquiescence together with other response styles could be a serious threat to the results of research. It can be affected by several individual characteristics including cognitive abilities. We explored the relationship between the ability to solve verbal analogies, age, education, and acquiescence.

PARTICIPANTS AND PROCEDURE
The sample contained 210 participants, 109 men and 101 women with age ranging from 17 to 70 (M = 45.11, SD = 13.66). The data were collected through an online panel of a research agency. We used Rosenberg's Self-Esteem Scale (RSES) for estimating acquiescence and 10 tasks for measuring the ability to solve verbal analogies.

RESULTS
We found a significant relationship between acquiescence and age with a medium effect and non-significant relationships between acquiescence, the ability to solve verbal analogies, and education.

CONCLUSIONS
Education seems not to be an adequate variable as a proxy for cognitive variables, and the ability to solve verbal analogies probably does not affect acquiescence in general. However, the existence of a negative relationship between age and acquiescence is quite surprising, and it could be caused by better developed self-identity of older participants.

KEY WORDS
bias; cognitive abilities; acquiescence; response styles

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BACKGROUND

Most of the research in personality psychology relies on self-report measures and honest and effortful responding of participants, so it is important to understand any possible biases in responding that can distort results (e.g., Danner et al., 2015). Response styles are one of the most studied categories of biases in personality psychology (e.g., He & van de Vijver, 2017; Johanson & Osborn, 2004). One such response style is acquiescence, which is a tendency of participants to shift their answers to items to agreement rather than to disagreement regardless of their content (e.g., Lechner et al., 2019; Primi et al., 2019). More broadly, it is part of the item reverse bias (see Weijters et al., 2013), but we decided to focus specifically on acquiescence. Even though there is a large amount of literature about acquiescence, still previous research has come to inconclusive results about the individual characteristics of people who respond to items in this way and why they respond like that. While it is possible that acquiescence can be affected by situational factors, we believe it is more likely a dispositional characteristic of participants based on its time stability (e.g., Havan et al., 2022), and method-consistency (e.g., Danner et al., 2015).

One of the important predictors of acquiescence is cognitive ability, as any responding to a questionnaire requires at least some cognitive processing (e.g., Lechner et al., 2019; Rammstedt & Kemper, 2011). However, we can take two perspectives on cognitive ability: The first is to ask which specific cognitive abilities (besides general intelligence) negatively correlate with acquiescence (Lechner & Rammstedt, 2015). The second perspective is the difficulty of the used measure (e.g., Davis et al., 2020), as more cognitively demanding measures require more cognitive processing. Considered together, it is probably the interaction of these two perspectives that affect acquiescence.

As Lechner and Rammstedt (2015) stated, it is important to find out which specific cognitive abilities have an effect on acquiescence. In this study, we explored the potential role of the ability to solve verbal analogies, education, and age on acquiescence. Some authors have used age and education as a proxy of cognitive abilities (e.g., Schneider et al., 2022). However, as yet, there is no consensus about the role of these demographic variables on acquiescence. Most of the studies have found that education negatively correlates with acquiescence (e.g., Costello & Roodenburg, 2015; Lechner et al., 2019; Meisenberg & Williams, 2008; Rammstedt & Kemper, 2011). Besides the obvious interpretation – that this relationship could be interpreted as reflecting a positive relation between education and intelligence (e.g., Rammstedt et al., 2016) – Meisenberg and Williams (2008) provided an interpretation that people with lower education (although they also mentioned lower income) could cope with the worse life situation by agreeing with statements of their "brighter compatriots". Besides what was written, these results were not confirmed in the Czech and Slovak Republics (see Havan et al., 2022; Rammstedt et al., 2013). One possible explanation is that education does not have to be the best indicator of cognitive abilities. As Čavojová and Jurkovič (2017) stated, formal education in Slovakia does not develop some partial cognitive abilities, such as critical thinking. That said, even if participants have a university degree, it does not have to mean that their cognitive abilities are higher than the rest of the population, and thus it does not have to affect the level of acquiescence.

Correlation between acquiescence and age is even more problematic. For example, Costello and Roodenburg (2015), like Meisenberg and Williams (2008), found a positive correlation between age and acquiescence (r = .27 for Costello and Roodenburg and r ranging from .01 to .22 for Meisenberg and Williams), whereas Soto et al. (2008) found the opposite relationship – higher age was associated with a lower level of acquiescence (as seen in Figure 1 in their article). This could be caused by differences in the age of the used samples – while Meisenberg and Williams (2008), like Costello and Roodenburg (2015), analyzed adult population (18 and more), Soto et al. (2008) examined adolescents (10-20 years). Lechner et al. (2019) pointed out that this relationship could be non-linear. They found that the highest level of acquiescence was in late adulthood (55+ years) and youth (16-24 years) while age groups in between had a lower level of acquiescence. Acquiescence decreases in young adulthood because participants have a better developed sense of self-identity. On the other hand, in the last decades of life, acquiescence is higher again because of the higher probability of decline of cognitive abilities (Schneider et al., 2022). Regarding the change of acquiescence with age, Wetzel et al. (2016) found that acquiescence was relatively stable across a timespan of 8 years, although a change over time was evident.

Besides age and education, we also focused on the ability to solve verbal analogies. Morsanyi et al. (2022) classified the ability to solve verbal analogies into a broader category – analogical reasoning. On the other hand, Duran et al. (1987) named this ability differently – as verbal ability. They defined it as the ability to reason with words in solving problems. Another important aspect is the knowledge about the content of the presented words; however, the ability to analyze, perceive, and apply relationships between words is also important to solve verbal analogy tasks. The verbal part of the ability to solve verbal analogies as a variable could be essential and makes it important for acquiescence – if participants want to answer the items, they must first understand the con-

tent of these items (see Tourangeau & Rasinski, 1988), which are mostly created by words. The inability to understand items is one of the key parts of mechanisms that are responsible for acquiescent responding (Lechner et al., 2019). In this study, acquiescence is measured through a self-esteem scale. We understand self-esteem as perceived competence at dealing with challenges of living in a worthy way over time (Mruk, 2006). We chose self-esteem because of its availability in accessible data and especially because its frequent use in acquiescence research has shown that it is a sensitive and reliable variable for detecting acquiescence (e.g., Di Stefano et al., 2012; Park & Wu, 2019).

PARTICIPANTS AND PROCEDURE

PROCEDURE

The sample used in this study was a sub-sample from a larger project with a focus on the understanding of self-esteem and its change after the performance (see https://osf.io/egs9z/). Participants were contacted via an online panel of a research agency; sampling was quota-based. The proportion of participants according their gender, age, and education reflected the proportion of these variables in the general population. Participants responded to all items online through Qualtrics. All participants were paid for their participation by the research agency. Data were collected between March 18 and March 23, 2022.

PARTICIPANTS

The sample consisted of 210 Slovak adult participants from the general population, 109 men and 101 women with age ranging from 17 to 70 (M = 45.11, SD = 13.66). The highest attained education was distributed as follows: 17 participants attained elementary education, 64 participants attained high school education without a diploma, 85 participants attained high school education with a diploma, 9 participants attained university bachelor's degree education, 31 participants attained university master's degree education, 3 participants attained university doctoral degree education and 1 participant did not indicate the highest attained education. We included two attention-check items to reduce the bias by careless response style. Participants who did not answer these items correctly were excluded from the final sample.

MEASURES

Acquiescence. We used Rosenberg's Self-Esteem Scale (RSES; Rosenberg, 1965) translated into Slovak by Halama (2008) for estimating acquiescence (the procedure is described in the data analysis section). It contains 10 items; 5 items are positive, and 5 items are reverse. The balanced number of the pro-trait and con-trait items are ideal to estimate acquiescence and to distinguish acquiescence factor and the substantive factor; thus RSES allows us to comfortably estimate acquiescence. Participants answered items with a 4-point Likert scale from *totally disagree* to *totally agree*. The value of internal consistency of the RSES was α = .85.

Verbal analogies. Verbal ability was measured by 10 tasks of verbal analogies (e.g. nose: smell; antennae [choices: signal, sound, waves, ears]). Participants had to choose one of the four answers and only one was correct. The answers were coded just as incorrect and correct (0-1). Six tasks were taken from Study 2 (George & Mielicki, 2023), and four were collected from public websites. The value of internal consistency was α = .73.

DATA ANALYSIS

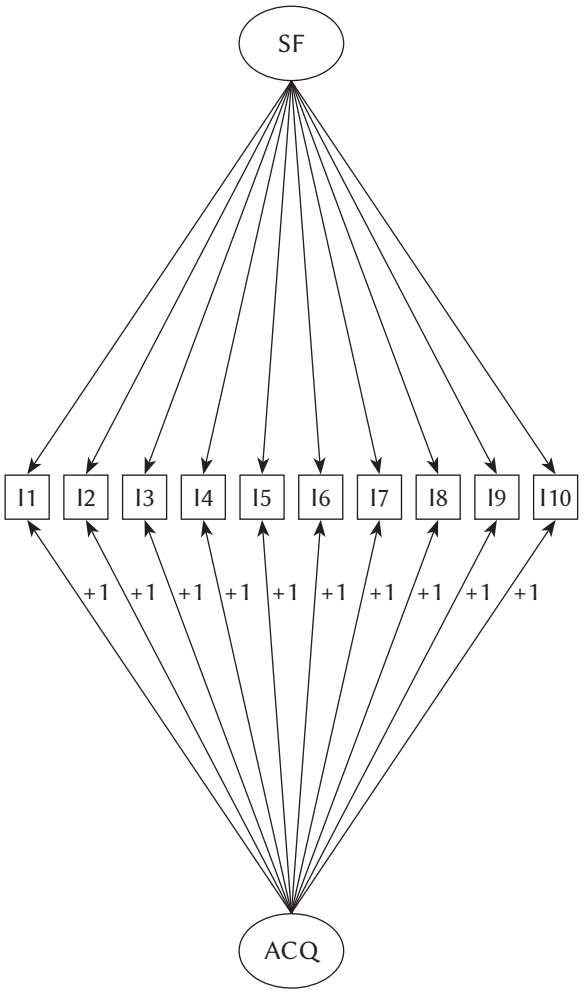
We used the latent approach for estimating acquiescence by confirmatory factor analysis (CFA) with the bifactor model using the MLR (maximum-likelihood robust) estimator. Bifactor is modeled as another factor besides the substantive factor that loads all items (in the case of RSES, also the substantive factor loads all items). The difference between substantive and acquiescence factors is that we fixed factor loadings of the bifactor to +1 because of the characteristic of acquiescence towards agreements (e.g., Fronczyk & Witkowska, 2020). Another condition in modeling acquiescence is that this factor is orthogonal to the substantive factor (e.g., Savalei & Falk, 2014). This could be a problem if acquiescence theoretically correlated with the substantive factor. However, to this day, we are not aware of a study or theoretical framework that could link acquiescence and self-esteem (see for example the comprehensive study of Lechner et al., 2019). The other conditions that must be met to estimate acquiescence are: model fit indices must be improved after adding the acquiescence factor into a factor with only the substantive factor; variance of the acquiescence factor must be non-zero, but it must be lower than the variance of the substantive factor; factor loadings of acquiescence must be non-zero, but they must be lower than factor loadings of the substantive factor (see Billiet & McClendon, 2000; Chylíková, 2020). The difference between our model and the model of Billiet and McClendon (2000) is that we modeled only one substantive and one acquiescence factor (although the same model was used by Savalei & Falk, 2014) and that we did not externally validate the acquiescence factor. We decided to skip this step because recently, just the fact that the factor loadings

are fixed to +1 with non-recoded items (e.g., Danner et al., 2015) is considered as sufficient to interpret an identified latent factor as acquiescence. We used this latent approach as it seems to be more suitable than the manifest approach (deviation from the median of the response scale with non-recoded reverse items) for detecting correlations with acquiescence and less affected by other errors and biases (see for example Danner et al., 2015; Danner & Rammstedt, 2016; Havan et al., 2022). For an illustration of how acquiescence was modeled, see Figure 1.

To access the participants' ability to solve verbal analogies, latent factor scores were obtained using a two-parameter logistic model within the item response theory framework (2PL IRT). Age and education were added to the model as observed variables. The correlations between the ability to solve verbal analogies, age, education, and acquiescence were computed in the environment of structural equation modeling (SEM) in the nested model of RSES with the acquiescence factor included, with age and education as observed variables, and verbal analogies using the latent score accessed through IRT analysis.

Figure 1

Model with substantive and acquiescence factors



Note. SF – substantive factor; ACQ – acquiescence factor; I – item.

DATA AVAILABILITY STATEMENT

The dataset, syntax and all used materials are available at https://osf.io/vz8gh/?view_only=673d26ab488543669a792c75505bc9fe.

RESULTS

Firstly, we ran the 2PL IRT model for the 10 items of verbal analogies. The model fit was good (CFI = .990, RMSEA = .028), so we obtained the latent factor scores and used them as the indicator of participants' ability to solve verbal analogies in the final CFA model.

Next, we estimated acquiescence in the RSES measure. All reported conditions were met and thus we accepted estimated acquiescence in this model. Detailed results are presented in Table 1.

In the final step, we tested the possible correlation between the ability to solve verbal analogies, age, education, and acquiescence. The detailed parameters of the nested model are presented in Table 2. We found non-significant relationships between acquiescence and the ability to solve verbal analogies (r = −.09) and education (r = .08). However, we found a negative correlation between acquiescence and age with a medium effect size (r = −.26).

DISCUSSION

Although we expected that acquiescence would be associated with a lower ability to solve verbal analogies, our results did not support this expectation. It is possible that verbal ability is not important for acquiescence – similar to cognitive reflection or selective attention as other insignificant predictors of acquiescence (see Havan et al., under review). The same result was obtained for the correlation between acquiescence and education. Even though many studies from Western Europe, the USA, and Australia have found a negative relationship between these two variables (e.g., Billiet & McClendon, 2000; Costello & Roodenburg, 2015; Rammstedt et al., 2017), we did not confirm it (same as Havan et al., 2022 or Rammstedt et al., 2013 in Eastern Europe region). One possible explanation is that education is not such an adequate indicator of cognitive abilities in our region. As already mentioned, education in Slovakia has many limitations and it is possible that the highest attained education does not properly reflect the level of cognitive abilities of participants.

Table 1

Model fit indicators, variances, and factor loadings for RSES with and without acquiescence in CFA

	RSES
CFI	
−RS	.920
+RS	.972
TLI	
−RS	.897
+RS	.963
RMSEA	
−RS	.087 [.065-.109]
+RS	.052 [.022-.078]
SRMR	
−RS	.060
+RS	.046
χ^2	
−RS	90.77
+RS	53.40
Degrees of freedom	
−RS	35
+RS	34
Variances	
SF	.09
RS	.02
Factor loadings	
SF	.30-.77
RS	.17-.26

Note. RSES – Rosenberg's Self-Esteem Scale; SF – substantive factor; RS – response style factor; –RS – only with substantive factor; +RS – response style factor included. Results of factor loadings are presented in the range from minimum to maximum in the absolute values.

Table 2

Model fit indicators, variances, and factor loadings of the nested model

	Nested model
CFI	.932
TLI	.918
RMSEA	.061 [.042-.079]
SRMR	.077
χ^2	113.20
Degrees of freedom	64
Variance of self-esteem	.09
Variance of acquiescence	.02
Factor loadings of self-esteem	.29-.77
Factor loadings of acquiescence	.17-.26

Note. Results of factor loadings are presented in the range from minimum to maximum in the absolute values.

Another possible explanation of non-significant correlations between acquiescence, education, and the ability to solve verbal analogies is that the RSES measure is relatively cognitively easy, and thus a high level of cognitive abilities of participants is not necessary to answer the items. The variance of the acquiescence factor was not so high as well (0.2), but it is similar to the results of other studies (e.g., Billiet & McClendon, 2000; Havan et al., 2022). The reason for choosing RSES for the identification of acquiescence is that it contains a balanced number of pro-trait and con-trait items, which is ideal for measuring acquiescence and differentiating it from a substantive variable (e.g., Ferrando & Lorenzo-Seva, 2010; Rammstedt et al., 2013). However, the interpretation by a low cognitive effort demanding measure does not explain why acquiescence negatively correlated with age. This result is quite complicated to interpret – the results of other researchers are not consistent. Some of them found a negative (e.g., Soto et al., 2008) correlation, and others a positive correlation (e.g., Costello & Roodenburg, 2015; Meisenberg & Williams, 2008) between these two variables. Even in the Slovak region, the correlation between these two variables had only negligible effect sizes (Havan et al., 2022). The inconsistency of the results could be caused by the non-linear relationship between age and acquiescence. If the relationship is positive, it could be caused by the possible cognitive decline of older participants (e.g., Schneider et al., 2022). If the relationship is negative, like ours, it could be caused by the better developed self-identity of older participants that allowed them to answer consistently and with regard to the content of the item (Soto et al., 2008). We are aware that a relatively small sample size (210 participants) precludes us from making strong generalizations and replication is needed to shed more light on these issues.

Still, we believe that it is important to examine specific cognitive factors that could affect acquiescence. This is important because one of the main characteristics of participants who have a tendency to answer in the direction of acquiescence is low cognitive ability. It is still not clear and definite which cognitive variables predict acquiescence (e.g., Havan et al., under review; Lechner & Rammstedt, 2015),

and future research and exploration of different cognitive abilities as predictors of acquiescence are still needed.

Disclosures

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