



Research article

Faster detection of snake and spider phobia: revisited

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ABSTRACT

Snake and spider phobia are one of the most prevalent anxiety disorders, yet quick and reliable measures are rather scarce. Recently, attempts have been made to shorten two widespread measures of snake and spider fear, the Snake Questionnaire (SNAQ) and Spider Questionnaire (SPQ). The new 12-item scales demonstrate very good psychometric qualities in terms of internal consistency and discriminatory power. Using the same approach on a bigger sample from another cultural background, we aimed to verify psychometric properties of the short scales. In total, 2 644 Czechs completed the SNAQ, 1 816 of which also completed the SPQ. The item response theory revealed that nine and seven items on the shorter SNAQ and SPQ, respectively, were identical with the Hungarian study. The 12-item scales show excellent reliability ($\alpha = 0.84$ and 0.91) and highly correlate with scores on the full versions ($r = 0.81$ and 0.89) as well as with fear and disgust ratings of snake and spider images. Thus, despite slight discrepancies in the selected items, we confirm that the shorter SNAQ and SPQ keep considerable diagnostic strengths and can be used in the clinical practice as reliable, easy-to-administer, and fast screening tools for snake and spider phobia.

1. Introduction

There is a consensus throughout the literature that even though there are many triggers of human fears, animals in particular stand out of the list of phobic stimuli (Arrindell et al., 1991). Dysregulated, irrational fear of animals is considered as one of the most common phobias in human subjects with a life-time prevalence 3.3–5.7% (LeBeau et al., 2010). Similarly to other anxiety disorders, the prevalence of zoophobias is significantly gender-dependent affecting up to 4 times more women than men (12.1% vs. 3.3%; Fredrikson et al., 1996). However, the potential of various animal species to become a phobic stimulus is not evenly distributed as just of them, snakes and spiders, cause most of animal phobias. Davey (1994a) reported that snakes elicited anxiety in 53.3% and ophidiophobia, a clinically relevant fear of snakes, is believed to affect 2–3% of population (Klieger, 1987; Klorman et al., 1974; Polák et al., 2016), thus representing as much as a half of all animal phobias (Eaton et al., 2018; but see Wardenaar et al., 2017 who reported average prevalence of any animal phobia across the world to be estimated to 3.8%). Even higher prevalence of snake phobia, despite low local abundance of snakes, was found in the Swedish (5.5%, Fredrikson et al., 1996) or Hungarian population (4.2%, Zsido, 2017 and 3.3%, Zsido et al.,

2018), while a Dutch study reported a little lower value of 1.2% (Oosterink et al., 2009).

Besides snakes, spiders trigger a strong fear in many people too, especially in the Western society (Davey et al., 1998), although disgust might also play an important role in spider phobia (Davey, 1994b). The average prevalence of spider phobia varies across different countries, ranging from 2.7% in the Netherlands (Oosterink et al., 2009), through 3.5% in Sweden (Fredrikson et al., 1996) to even 8.1% (Zsido et al., 2018) and 9.5% in Hungary (Zsido, 2017).

Despite the high prevalence of snake and spider phobia, the number of reliable assessment measures is surprisingly limited (Antony, 2001). So far, only one standardized psychometrics has been used to quantify fear of snakes, the Snake Questionnaire (SNAQ; Klorman et al., 1974). There is a bit bigger choice of scales for measuring fear of spiders, e. g. the Fear of Spiders Questionnaires (FSQ; Szymanski and O'Donohue, 1995), Watts and Sharrock Spider Phobia Questionnaire (WS-SPQ; Watts and Sharrock, 1984); Spider Phobia Beliefs Questionnaire (Arntz et al., 1993), but it is especially the Spider Questionnaire (SPQ; Klorman et al., 1974) that is widespread in animal phobia research.

Psychometric properties of both the SNAQ and SPQ have been already verified in a few studies showing good results in terms of internal consistency (SNAQ: 0.78–0.89; SPQ: 0.81–0.89), excellent test-retest

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reliability (SNAQ: $r = 0.78\text{--}0.84$; SPQ: $0.87\text{--}0.94$) and potential to discriminate between normative and clinical fear (Fredrikson, 1983; Klieger, 1987; Klorman et al., 1974; Muris and Merckelbach, 1996; Polák et al., 2016; Zsido, 2017). It should be noted, however, that others have questioned those results and especially the SNAQ has been criticized for not being a good measure of ophidiophobia. Klieger (1987) argued against using it due to its low construct and criterion validity as a significant number of people scoring high on the SNAQ were actually able to approach a snake in a cage. Therefore, Klieger and Gallagher (1993) conclude that the SNAQ can identify fearful individuals, but is strongly biased by false positives, because some of the items tap into disgust rather than fear. Despite the criticism, it is still valuable as the only self-administered and formerly standardized tool assessing a verbal-cognitive component of the widespread fear of snakes.

It can be agreed that clinical practice would greatly benefit from having an easy-to-administer and fast tool to screen for highly prevalent specific animal phobias and shortening already well-established psychometric tools has now become a common trend in assessment (see for example Rammstedt and John, 2007). In a recent paper, Zsido et al. (2018) have taken this approach and demonstrated, that the SNAQ and SPQ can be shortened to just 12 out of the original 30 or 31 items, respectively, without much detriment to their psychometric qualities. This, according to the authors, would save considerable time in the assessment of specific phobias. Using an extensive sample of 1354 Hungarian respondents, their study shows that the shorter scales are still highly reliable (Cronbach's $\alpha = 0.88$ and 0.90 for the SNAQ and SPQ, respectively) and their scores significantly correlated (after a correction for redundancy) with the original measures' scores ($r = 0.89$ and 0.91 for the SNAQ and SPQ, respectively).

Currently, there has been a growing demand by psychiatrists and psychologists for developing fast and reliable diagnostic tools that could be easily administered in their everyday practice. Shorter instruments would also prove beneficial in research by providing rapid screening for specific individuals without a risk of overloading them, which is often the case in studies using human subjects. Therefore, being inspired by the contribution of Zsido et al. (2018) we have decided to repeat the analyses and verify their outcomes on a substantially bigger sample of subjects from the Czech Republic. Doing so, we would demonstrate that their findings might be generalised to a population speaking a different language and living in a slightly different cultural environment, which would greatly increase their validity. It would provide a strong evidence that scales used for assessment of the most common specific phobias might be considerably shortened without compromising their psychometric quality. Thus, our main goal was to develop a Czech 12-item version of the SNAQ and SPQ and test whether it can satisfactorily substitute the original scales.

2. Materials and methods

2.1. Subjects

The data for the following analyses were taken from two separate projects. A majority of subjects completed an assessment battery in Czech (including the SNAQ and SPQ) in an online study of animal fears. In total, 2 291 subjects were recruited from a Facebook community of more than 16 thousand followers. Out of these, 1 816 subjects completed both the SNAQ and SPQ while another 85 participants returned only the former scale. There were considerably more women than men ($N = 1278$ vs 519 , respectively, i.e. 70.4% women), the remaining subjects decided not to disclose their gender. The mean age in this sample was 33.2 ± 0.3 years. Most of the subjects have obtained a university degree ($N = 889$), 795 people have completed secondary education, and 108 participants have stopped after elementary school. In this study, the subjects were also asked about their field of study (specifically, whether it was biological or not), and the size of town where they had grown up for most of their childhood as both these variables might affect the level of animal fear (Polák et al., 2020).

Additionally, we had access to data from a sample of 745 subjects who completed a Czech translation of the SNAQ in a study testing its psychometric properties. There were almost twice as women as men ($N = 488$ vs. 257), the mean age was 27.8 ± 0.4 years. This variable sample consisted of high school and college students of natural and social sciences, psychologists, psychiatrists, researchers, university lecturers, etc. Overall, having combined these two data sets together, we acquired data from 2 646 subjects for the SNAQ and 1816 for the SPQ. All the participants provided their informed consent by pressing the corresponding button on the electronic form or signed a consent form and were debriefed after completing the measures. The study has been conducted in accordance with the ethical standards of the research ethics committee of the National Institute of Mental Health, Czechia and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

2.2. Assessment

2.2.1. Snake Questionnaire

The SNAQ is a 30-item self-report scale (see [Supplementary Material 1](#)) to assess the verbal-cognitive component of snake fear. Each item is a fearful or non-fearful statement related to snakes. Participants rate each item as true or false. The instrument is scored by assigning a "1" to each true response and "0" to each false response, 7 items are reverse-scored. A total score (ranging from 0 to 30) is calculated by summing all 'true' statements and serves as a measure of snake fear. The Czech translation of SNAQ demonstrated excellent psychometric qualities in terms test-retest reliability ($r = 0.94$) and internal consistency (Cronbach's $\alpha = 0.91$; for more details see Polák et al., 2016).

2.2.2. Spider Questionnaire

The SPQ is very similar to the SNAQ, adapted to quantify fear of spiders (see [Supplementary Material 2](#)). It contains 31 items (fearful or non-fearful statement) rated as true or false. It is scored the same way as the SNAQ, 9 items are reverse-scored and scores can range from 0 to 31. Internal consistency is also high (Kuder-Richardson formula 20, KR-20 = 0.89 ; Klorman et al., 1974 and Cronbach's $\alpha = 0.94$; Zsido, 2017), as well as the test-retest reliability ($r = 0.95$; Zsido, 2017).

For validity reasons, scores on two other psychometrics have been used, the Fear Survey Schedule II (Geer, 1965) and Disgust Scale-Revised (Haidt et al., 1994; modified by Olatunji et al., 2007; Czech translation by Polák et al., 2019).

2.2.3. Fear Survey Schedule II

The FSS-II is a self-report instrument to assess overall level of anxiety in a person's life, as well as particular areas of anxiety (such as social situations, injury, death, animals, etc.). It contains 51 items that are nouns relating to animals, social situations, injury and death, objects, noises, and other situations that are rated by the respondent on a 7-point Likert scale according to elicited fear from 1 ("no fear") through 4 ("some fear") until 7 ("terror"). A total score is calculated as a sum of item scores and can range from 51 to 357. Its internal consistency is exceptionally high (KR-20 = 0.94).

2.2.4. Disgust Scale-Revised

The DS-R is a self-report personality scale to assess individual differences in propensity to disgust. There are 25 disgust elicitor items loading on one of the three factors (core disgust, animal reminder disgust, contamination-based disgust) and two catch questions (item 12 and 16) allowing to identify those respondents that do not pay attention to the task or do not take it seriously. Each of the 27 items is rated by the participant on a 5-point Likert scale from 0 ("strongly disagree/not disgusting at all") to 4 ("strongly agree/extremely disgusting"), three items (1, 6, 10) are reverse-scored. A total score ranging from 0 to 100 is calculated by summing scores on all the 25 disgust elicitor items but three (item 1, 6, 10) that are reverse-scored. Similarly, subscale scores

may be calculated. According to the recent paper, the Czech DS-R demonstrates very good psychometric properties (Cronbach's $\alpha = 0.75$, test-retest reliability $r = 0.82$; Polák et al., 2019).

Finally, the participants scored three standardized photographs of a viper, grass snake, and spider on a 7-point Likert scale according to fear and disgust. The colour images representing typical individuals were taken from the Internet, digitally cropped, placed on a white background, and resized to a comparable size (regardless of their real size) using GIMP 2.8.16 (Kimball and Mattis, 2016).

2.3. Procedure

In this study, we used standardized Czech translations of the SNAQ and SPQ. These were developed in another project following the guidelines for translating and adapting tests set by the International Test Commission (ITC, 2017). This involved a translation to Czech by two fluent speakers of both languages and then a back-translation to English by an independent person. Three native English speakers then compared the original and back-translated items to determine whether they were equivalent in meaning. Any substantive differences in particular items were considered and appropriately revised by an expert panel consisted of researchers in psychology with the objective to obtain a translation corresponding to the most the original instrument. Finally, both pen-and-paper and computer versions were created.

Subsequently, a counter-balanced experimental design was adopted to verify psychometric qualities of the translated scales. Thus, a half of the subjects was administered the English SNAQ or SPQ first, followed by the Czech translation 2–3 months later to eliminate the carry-over effect. The other half was asked to complete the questionnaires in the reverse order. Participants were assigned to one of these groups randomly.

2.4. Statistical analysis

Similarly to Zsido et al. (2018), we first dropped all the reverse-scored items from the SNAQ and SPQ (6, 12, 14, 16, 17, 20, 25, 27, and 28). Then we used a confirmatory factor analysis (CFA) on the remaining items to check for unidimensionality of the data to be able to then apply the item response theory (IRT) approach, specifically a two parameter logistic item response model (2PL). We used the same threshold of $a = 1.7$ for the discrimination parameter (i.e. items with $a < 1.7$ were excluded from the analysis) and subsequently, from those surpassing the threshold we selected 12 items on each questionnaire based on their difficulty parameter b (four items with the lowest and highest b and four items with b closest to the median).

These new 12-item scales were then analysed for reliability using the Cronbach's α and Spearman-Brown coefficient of split-half reliability. Next, scores on the short questionnaires were calculated and correlated with the total scores on the original versions after correcting for redundancy as the items are shared (Levy, 1967). We also performed several validity analyses, including the Spearman's correlation between the short scales and other standardized assessment of fear and disgust or rating of snake and spider images according to fear and disgust. As the SNAQ and SPQ scores are not normally distributed in the general population (Fredrikson, 1983; Polák et al., 2016), a Generalized Liner Model (GLZM) for negative binomial distribution was used to analyse the effect of gender, age category, education level, field of study, and size of town on scores on the new shortened scales. Finally, we conducted a receiver operating characteristic (ROC) curve analysis and calculated the Youden index ($J = \text{maximum} \{ \text{sensitivity} + \text{specificity} - 1 \}$; Schisterman et al., 2005) to identify an ideal cut-off point on both shortened questionnaires for potential snake/spider phobia. First, the presumable snake or spider phobics in the data set were identified using their SNAQ or SPQ scores. Based on Fredrikson (1983) and Muris and Merckelbach (1996) we categorised all subjects scoring 23 points or higher on the SNAQ as snake phobics ($N = 60$, i.e. 2.27%; see also Polák et al., 2016 for more details) and those with at least 22 points on the SPQ as spider phobics ($N = 177$, i.e. 9.75%).

The IRT analysis was performed in the STATA, version 14 (StataCorp LP, 2015), for the CFA we used the SPSS Amos, version 24 (Arbuckle, 2016), all the remaining calculations were then conducted in the SPSS, version 22 (IBM Corp., 2013) and STATISTICA 13 (TIBCO Software Inc., 2017).

3. Results and discussion

3.1. CFA and 2PL model

The CFA revealed that a single latent variable (snake/spider fear) had the best fit to the data (SNAQ: GFI = 0.867, CFI = 0.841, TLI = 0.823, RMSEA = 0.075; SPQ: GFI = 0.872, CFI = 0.898, TLI = 0.887, RMSEA = 0.073). Based on the 2PL model (see also Figure 1 for a comparison of test information functions), 9 out of 12 items selected for the shorter version of the SNAQ (item 2, 3, 4, 8, 11, 19, 21, 22, and 29) were identical to those identified by Zsido et al. (2018). Instead of item 7, 13, and 30 reported in the original study on the 12-item scale (SNAQ-12), our 2PL analysis chose rather item 1, 9, and 26. The first two refer to avoiding outside activities (camping and swimming) when presence of snakes is expected, while the third one pertains to fear of snakes spreading onto similar animals (worms, other reptiles). On the other hand, items selected in the Hungarian study but not in ours refer to feeling terror or disgust when touching or just seeing a snake (item 7 and 13, respectively) or avoiding crossing an open field with a thought of snakes (item 30). Regarding the SPQ, the similarity with Zsido et al. (2018) seemed slightly lower, as 7 out of 12 items were the same (item 1, 3, 7, 9, 10, 29, and 30). While the authors included item 4, 5, 13, 21, and 26 into their short version (SPQ-12), our data showed there should rather be item 2, 8, 11, 15, and 22 instead (see Table 1 for detailed results from the 2PL analysis and the selected items). All these items found in our study but not in the Hungarian sample pertain to self-reported experience of anxiety triggered by any representation of spiders.

In order to distinguish between the 12-item scales as constructed by Zsido et al. (2018) from those re-analysed in our study, we will further refer to the short instruments based on the Czech sample as SNAQ-12 CZ and SPQ-12 CZ.

3.2. Reliability and validity

Both the SNAQ-12 CZ and SPQ-12 CZ showed excellent internal consistency (Cronbach's $\alpha = 0.84$ and 0.91 , respectively), which corresponds to the values reported by Zsido et al. (2018; $\alpha = 0.88$ and 0.90 for SNAQ-12 and SPQ-12, respectively) and is only slightly below the internal consistency of the full versions ($\alpha = 0.91$ and 0.95 for SNAQ and SPQ, respectively). Furthermore, the SNAQ-12 CZ and SPQ-12 CZ also demonstrated very good split-half reliability (Spearman-Brown $r = 0.87$ and 0.92 , respectively). Reliability did not change significantly when calculated for items from the Hungarian version of SNAQ-12 and SPQ-12 on our data sample ($\alpha = 0.86$ and 0.90 ; $r = 0.86$ and 0.91 , respectively). It is noteworthy that we have also run the same analyses with all the original items (i.e. including the reversed scored ones), but it did not change the results substantially. We have also calculated the item-total score correlations confirming satisfactory values for the selected items (see Table 2).

For both questionnaires, scores on the shorter version highly correlated with the original scale after correcting for redundancy ($r = 0.81$ and 0.89 for the SNAQ and SPQ, respectively). Again, this is only slightly lower than the correlations reported by Zsido et al. (2018; $r = 0.89$ and 0.91 for the SNAQ and SPQ, respectively) and remained unchanged when calculated for items from the original SNAQ-12 and SPQ-12 on our data sample ($r = 0.80$ and 0.89 , respectively). Furthermore, the discriminant construct validity expressed as a Spearman's correlation coefficient between the test scores on both scales of snake and spider fear has improved (i.e. lowered) by shortening the scales ($r = 0.34$ vs 0.26 for the long and short versions, respectively). Apart from that, scores on the SNAQ-12 CZ

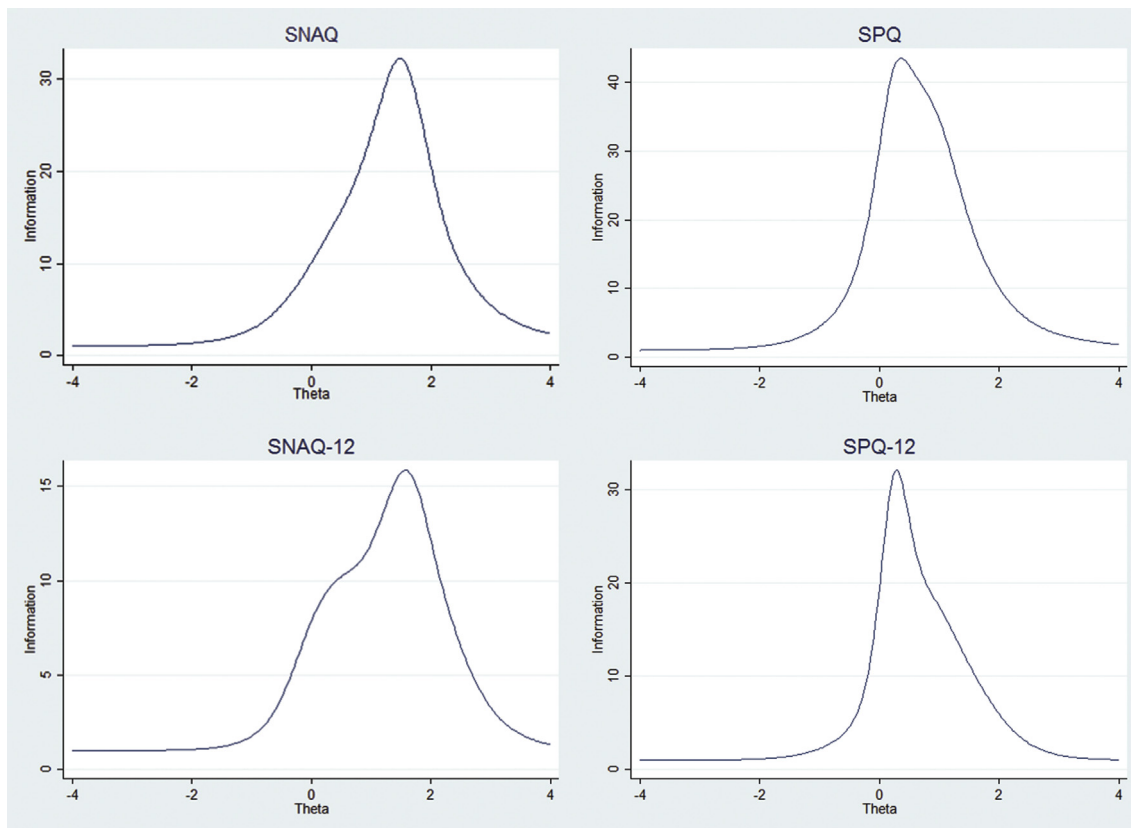


Fig. 1. Test information functions for the original Czech scales (SNAQ, SPQ) and their shorter 12-item versions (SNAQ-12, SPQ-12) as revealed by the IRT 2PL model.

and SPQ-12 CZ were positively correlated with a combined score from animal items of the Fear Survey Schedule II ($r = 0.56$ and 0.54 , respectively, both $p < 0.05$) and a total score on the Disgust Scale - Revised ($r = 0.40$ and 0.38 , respectively, both $p < 0.05$).

Finally, it was revealed that the SNAQ-12 CZ score was positively correlated with fear and disgust rating of an image of the viper (fear: $r = 0.61$, disgust: $r = 0.70$, both $p < 0.05$) and grass snake (fear: $r = 0.67$, disgust = 0.73 , both $p < 0.05$). Similarly, there was a statistically significant high positive correlation between the SPQ-12 CZ score and fear and disgust rating of a spider image (fear: $r = 0.76$, disgust = 0.80 , both $p < 0.05$). Overall, these values clearly demonstrate that shortening the original scales to just 12 items neither affected reliability nor did it compromise validity.

3.3. Descriptive statistics and effect of age and gender

The score distribution on both the SNAQ-12 CZ and SPQ-12 CZ is non-normal as evidenced by the Shapiro–Wilk test ($W = 0.81$, $p < 0.0001$, skewness = 1.35 , kurtosis 1.30 and $W = 0.85$, $p < 0.0001$, skewness = 0.84 , kurtosis = -0.55 , respectively). The mean score on the SNAQ-12 CZ ($M = 2.19 \pm 0.05$, $SD = 2.60$; 95% CI = 2.09 – 2.29) and SPQ-12 CZ ($M = 3.36 \pm 0.08$, $SD = 3.56$; 95% CI = 3.20 – 3.53) were slightly lower than those reported by Zsido et al. (2018; $M = 3.21$ and 3.95 for the SNAQ-12 and SPQ-12, respectively). This might be due to the three, respectively five, different items. However, even when we recalculated the mean score using items from the Hungarian SNAQ-12 and SPQ-12 on our data set, these were again slightly lower than in the original study ($M = 2.12$ and 3.11 , for the SNAQ-12 and SPQ-12, respectively). This could be explained by the fact that the total scores on the full scales were also lower compared to the study by Zsido et al. (2018; SNAQ: $M = 5.73$ vs 9.40 , SPQ: $M = 8.63$ vs 11.16). Moreover, our sample included a higher proportion of biology students who generally score lower on these scales (see below and Polák et al., 2016).

As revealed by the GLzM model, the SNAQ-12 CZ score was significantly affected by gender ($W = 44.86$, $\eta^2 = 0.02$, $p < 0.0001$), age category ($W = 13.60$, $\eta^2 = 0.01$, $p = 0.018$), and biological study ($W = 42.56$, $\eta^2 = 0.02$, $p < 0.0001$), but no education level ($W = 2.40$, $p =$

Table 1. Discrimination (a) and difficulty coefficients (b) for the Snake (SNAQ) and Spider Questionnaire (SPQ). The items selected for the reduced scales are in bold.

SNAQ	a	b	SPQ	a	b
1	1.91	2.55	1	2.53	1.49
2	1.76	1.72	2	2.09	0.75
3	4.39	1.63	3	2.70	0.71
4	3.36	1.42	4	2.71	0.56
5	1.95	1.02	5	3.35	0.46
7	3.39	1.17	7	4.07	0.29
8	2.97	0.01	8	5.57	0.34
9	2.16	0.79	9	3.84	1.07
10	0.26	2.74	10	2.31	-0.37
11	3.23	0.49	11	6.43	0.22
13	4.43	1.59	13	4.07	1.05
15	4.94	1.44	15	4.17	0.79
18	0.91	3.30	18	1.23	1.93
19	2.73	1.44	19	2.79	0.45
21	2.29	0.51	21	4.24	0.92
22	3.15	1.42	22	3.42	0.68
23	1.46	1.43	23	1.86	0.85
24	0.84	2.26	24	1.06	2.10
26	2.10	1.22	26	2.63	0.59
29	3.13	2.20	29	2.69	1.66
30	2.03	1.13	30	2.91	1.40
			31	1.35	0.86

Table 2. Spearman correlation coefficients between individual item responses and the total score on the Czech version of SNAQ-12 and SPQ-12.

SNAQ-12	r	SPQ-12	r
1	0.26	1	0.47
2	0.43	2	0.64
3	0.41	3	0.67
4	0.49	7	0.79
8	0.81	8	0.81
9	0.66	9	0.60
11	0.75	10	0.75
19	0.49	11	0.83
21	0.72	15	0.69
22	0.50	22	0.71
26	0.57	29	0.42
29	0.26	30	0.50

All correlations significant at the 0.01 level (2-tailed).

0.494), nor size of town ($W = 5.66, p = 0.341$). Similarly, there was a statistically significant effect of gender ($W = 100.72, \eta^2 = 0.06, p < 0.0001$), age ($W = 37.73, \eta^2 = 0.03, p < 0.0001$), and biological study ($W = 10.43, \eta^2 = 0.01, p = 0.001$), but no education level ($W = 5.06, p = 0.167$) nor size of town ($W = 10.70, p = 0.058$) on the SPQ-12 CZ scores. The identical finding has been previously reported for the full version of SNAQ (Polák et al., 2016). However, the effect of age seems intricate as it tends to be correlated positively with fear of snakes but negatively with fear of spiders. Although some authors note that fear of animals should decrease with age (Doctor et al., 2008; Fredrikson et al., 1996), others have found a reversed trend (Germano and Blaha, 2001; Polák et al., 2016), and therefore the relationship remains elusive. For the detailed results according to gender, age, and biological education, see Table 3.

3.4. ROC curve analysis

A cut-off point score of >7.5 was identified for the SNAQ-12 CZ with the absolute sensitivity of 1 and specificity of 0.964, $J = 0.964$. The area under curve (AUC) was 0.996. The same cut-off score of >7.5 was then found for the SPQ-12 CZ, with the sensitivity of 0.977 and specificity of 0.921, $J = 0.899, AUC = 0.988$. Therefore, subjects scoring 8 or higher on either of the questionnaires might potentially experience snake or spider phobia, which corresponds to 151 (5.7%) and 302 (16.6%) individuals in our sample. This, again, is very similar to the results of Zsido et al. (2018) who reported score ≥ 8 and 7 for the SNAQ-12 and SPQ-12, respectively. Nevertheless, with our data we reached higher AUC values demonstrating excellent discriminatory power of both scales. It should be noted though that especially for fear of spiders, the prevalence of subjects with potentially specific phobia as based on the selected cut-off point

seems highly overestimated and should be verified by further assessment. This may originate in the known high sensitivity and low specificity of the original scale (Fredrikson, 1983; Klorman et al., 1974). According to a Swedish study, prevalence of spider phobia is estimated to be 3.5% (Fredrikson et al., 1996), which would correspond to score 10 on the short scale.

4. Conclusion

The aim of this study was to re-analyse data from two popular measures of snake and spider phobia, the SNAQ and SPQ, using the approach of Zsido et al. (2018) to develop shorter, yet still reliable scales. We believe that bringing more evidence for psychometric qualities of these reduced and thus much faster-to-administer measures, which were tested on a nearly twice as big sample from another cultural background using a different language, would strongly support general reliability and validity of the new scales. Here we found a remarkable similarity with the original study. In total, 9 and 7 out of 12 items on the SNAQ-12 CZ and SPQ-12 CZ, respectively, were identical with those selected by Zsido et al. (2018). Furthermore, other psychometric indices of the short instruments, such as the internal consistency, correlations with their longer original versions, or their discriminatory power as diagnostic tools for specific animal phobias were all corresponding to the results published by Zsido et al. (2018).

Regarding the few conflicting items, it might have been caused by a different sample structure. While the proportion of men was comparable in both studies (H: 24.5% vs CZ: 30.7%), the Hungarian study included a bit younger subjects (mean age 25.6 compared to 31.2). Moreover, the proportion of biologically educated subjects was lower in the Hungarian study (11.5% vs 21.7%). All these variables are known to affect snake and spider fear. Although both studies present a comparably strong psychometric evidence with respect to the specific population they have been developed for, we have reached slightly higher AUC values, which correspond to better discriminatory power when distinguishing snake or spider phobics from healthy controls.

We have also provided more evidence of concurrent validity showing the shortened scales positively correlate with other measures of fear and disgust of animals. Some discrepancies between the original and our study in the selected items might be attributed to different sample characteristics. A high proportion of our subjects were biology students which is also reflected in the lower mean total scores on the SNAQ and SPQ compared with the Hungarian sample.

Despite that, it can be concluded that the short versions of SNAQ and SPQ the scales as presented here are reliable tools with a great clinical potential to provide quick and sound assessment of snake and spider fear. Their use is especially recommended in both research and clinical practice when quick screening for the two most prevalent animal phobias in the general population is needed. As snake and spider phobias remain often undetected, although their impact on health and socioeconomic

Table 3. Mean scores and their 95% confidence intervals (CIs) on the Czech version of SNAQ-12 (N = 2 540) and SPQ-12 (N = 1 797) categorized by gender, age, and biology education.

		SNAQ-12				SPQ-12			
		N	Proportion	Mean	95% CI	N	Proportion	Mean	95% CI
Gender	Men	779	30.7%	1.67	1.49–1.85	519	28.9%	1.97	1.68–2.27
	Women	1761	69.3%	2.40	2.28–2.52	1278	71.1%	3.92	3.73–4.10
Age	<19	328	12.9%	1.79	1.51–2.07	121	6.7%	4.31	3.68–4.93
	20–29	1043	41.1%	2.30	2.14–2.46	703	39.1%	3.86	3.60–4.12
	30–39	620	24.4%	1.98	1.78–2.18	515	28.7%	3.11	2.81–3.41
	40–49	304	12.0%	2.22	1.93–2.51	262	14.6%	2.97	2.54–3.39
	50–59	158	6.2%	2.42	2.02–2.83	133	7.4%	2.23	1.63–2.82
	60+	87	3.4%	3.00	2.46–3.54	63	3.5%	1.90	1.04–2.77
Biology education	Yes	574	24.6%	1.63	1.42–1.84	403	25.4%	3.26	2.91–3.61
	No	1757	75.4%	2.35	2.23–2.47	1185	74.6%	3.42	3.22–3.62

status of the person affected can be considerable, rapid screening might help identify those people and provide efficient and accessible treatment.

Declarations

Author contribution statement

J. Polák: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

K. Sedláčková: Performed the experiments; Contributed reagents, materials, analysis tools or data.

E. Landová: Contributed reagents, materials, analysis tools or data.

D. Frynta: Conceived and designed the experiments; Analyzed and interpreted the data.

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Competing interest statement

The authors declare no conflict of interest.

Additional information

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