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Analysis of the arachnophobia level based on contact with spiders and the Fear of Spiders Questionnaire

Analiza poziomu arachnofobii na podstawie kontaktu z pająkiem i kwestionariusza Fear of Spiders

Summary. Arachnophobia is one of the most common phobias in society. The study was based on an online survey and a stationary study. The questionnaire was completed by 364 respondents. In the first part the respondents determined their level of arachnophobia on the Likert scale (IOA, individual assessment of arachnophobia), and in the second part completed the Fear of Spiders Questionnaire (FSQ). Near 50% of respondents declared fear of spiders. There was a positive correlation between the FSQ results and IOA. In stationary study took part 7 women. Before the study, they completed the questionnaire from the first part of the study. During the study, the participants observed three spiders and the moult. Before, during, and after the study heart rate was measured. The mean score of the FSQ study was 103 and IOA scored between 5 to 7. The mean heart rate during contact with spiders was 113 bpm. Contact with spiders was a stressful situation, but the heart rate decreased just after 5 min.

Key words: stress, spiders, arachnophobia, Fear of Spiders Questionnaire

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INTRODUCTION

Phobias can be defined as a disorders, which can be characterized as strong fear during contact with the specific item (e.g. spider). People with phobias try to avoid the confrontation with the stimulus which cause fear [Binder et al. 2022]. Referring to the general population, the most common phobias are: related with illness, weather related (e.g. storms), animals, darkness and height. It can occur severally or more types of phobias in one person [Bilikiewicz 2011]. All kind of phobias have negative influence on well-being and could lower the quality of life. The physiologic symptoms of phobias are: tachycardia, increased number of breaths, swallow breathing and sweating [Adamczyk et al. 2018]. According to Bilikiewicz [2011] among the people, who are dealing with phobias, only one of four goes to the therapy. Mostly, there are the person whose life with phobia is highly limited. In society, the most common are social and specific phobias.

There are five types of specific phobias: 1) fear of animals – including dogs, spiders, and snakes; 2) fear of natural environment – including darkness, height, wind, and water; 3) situations' phobias – related to e.g. bridges, elevators, airplanes, small enclosed spaces; 4) fear of blood, injection, or injury (also known as blood-injection-injury); 5) other phobias – are connected with illness or death [Choy et al. 2007, Adamczyk et al. 2018]. These phobias constitute the most common anxiety disorder [Wittchen et al. 2011]. According to statistics, nearly 20% of the world's human population is affected by phobias. Serious limitations in everyday life due to specific phobias occur in 0.2% of people. Usually, phobic disorders have their beginning around the age of nine. Young women and low-income individuals are most likely to develop specific phobias.

The prevalence of a specific phobia may depend on the gender and age structure, education, the culture of the region, and even the latitude of the population surveyed. Among all specific phobias, acrophobia (fear of heights), claustrophobia (fear of enclosed spaces), and arachnophobia (fear of spiders) are the most common in the population [Adamczyk et al. 2018].

Among the methods of therapy for phobias are the method of immersion (implosion), the modeling method, and systematic desensitization. The implosion method of psychotherapy undermines the reality of the occurring danger and permanently lowers the level of fear, while the modeling method consists of the patient's observation of a model, i.e. a person free of phobia, who performs an activity causing anxiety in the patient. In the systematic desensitization method, fear overcoming is based on gradual exposure to a specific stimulus [Choy et al. 2007, Żołnowski and Lebiedź 2014].

Arachnophobia is an anxiety disorder consisting not only in feeling fear at the sight of a spider (or more broadly of arachnids, including scorpions and often other invertebrates similar in appearance to spiders) but also in a distorted perception of them. Unpleasant feelings are caused by the very sight and belief that these animals are dangerous, threatening to health and life, which in most cases does not reflect the actual threat. People who struggle with arachnophobia do not even have to see them start feeling fear [Landová et al. 2021].

The level of arachnophobia can be assessed using different types of questionnaires. These include the Fear of Spiders Questionnaire (FSQ) or the Spider Phobia Questionnaire (SPQ) [Muris and Merckelbach 1996]. The BAT (Behavioral Avoidance Test) [Wo-

ody et al. 2005], as well as its virtual version (VR-BAT) [Mühlberge et al. 2008], are also often used in studies on spider phobia.

The study aimed to analyze the level of arachnophobia in the national population (Poles) based on the Fear of Spiders Questionnaire (FSQ) and to assess the heart rate in a selected group of people suffering from arachnophobia after contact with a stressful stimulus (spiders of the genus Theraphosidae).

MATERIALS AND METHODS

First part was a voluntary survey questionnaire based on FSQ (Fear of Spiders Questionnaire) [Szymanski and O'Donohue 1995] 364 people took part. The survey was conducted by Google Forms and shared via social media from January 2021 to February 2022. The second part was stationary study with voluntary participants.

The general section of the survey included questions about the age, gender, domicile, and education of participants. There were also questions of IOA test (Individual Assessment of Arachnophobia), like: "Do you think, you have arachnophobia?", where the possible answers were: "yes" or "no" and "If you think, you have arachnophobia, how strong is it?", where the answer was in 7-point Likert scale (1 – the complete absence of phobia, 7 – very strong phobia). The last question in this part was: "What animals are you interested in?", here the possible answers were: "I'm interested in all animals", "I don't like animals", "mammals", "birds", "reptiles", "amphibians", "pisces", "insects", "arachnids".

In the next section (based on FSQ), the participants give answers on a 7-point scale, where 1 – "I completely disagree", 7 – "I completely agree". The level of arachnophobia was measured based on the sum of the points from all questions. The higher score the participant got, the higher level of arachnophobia was specified. The minimum number of points that could be obtained was 18 (complete absence of phobia), and the maximum was 126 (very strong phobia).

The study invitation was widespread through social media. We were looking for participants, who claim that they are scared of spiders. The basic contact was through the email address, where the description of the study and the FSQ questionnaire was sent. Only participants who declared that their state of health allows them to participate, took part in the stationary study. This study complies with The Code of Ethics of the World Medical Association (Declaration of Helsinki). Moreover, the privacy rights of human subjects were observed, and each participant signed the consent to take part in a stationary study. The participants were divided into two groups: research (after contact with the spider they were listening to the 1980s music) and control (after contact with the spider they were listening to no music).

Before entering the experimental room the pulse of the participant was measured (T0) [bpm – beats per minute] using a pulse oximeter. The participant approached the spider as close as it was possible for him, then the pulse was measured again. After that, the participant left the room and the next spider was placed on the table (the previous one was hidden). It was repeated four times (spider 1 – T1, spider 2 – T2, spider 3 – T3, and spider's molt, which was placed directly on the table (not in fauna box). The participant could observe the spiders and touch or put on the palm the moult (T4). After the stage of the

exposition to the stimulus, the participants were asked to go to the second room (rest room) for 15 minutes. This stage was named the rest phase. The research group during resting was listening to 1980s music and the control group did not listen to the music. The pulse was measured at 0 (T00), 5 (T05), 10 (T10), and 15 minutes (T15) of the rest phase.

Phot. 1. Spider *Lasiodora parahybana* used in the experiment

The mean and standard deviation was calculated for the questionnaire results in the first part of the study (FSQ results and IOA) for groups regarding gender and animal interest. In the second part of the study, the mean and standard deviation of pulse and questionnaire results (for participants) was calculated regarded to the groups (research or control). The normal distribution was measured using Shapiro–Wilk Test. Comparing the results in normal distribution t-student test was used and for the results without the normal distribution – U Mann–Whitney test. The tests were used to find significant differences between FSQ results and IOA (first part of the study); the pulse before the experiment and during contact with spiders; the pulse during contact with spiders and at the end of the rest phase (second part of the study). To find a correlation between FSQ results and IOA the R Spearman rank test was used. The value $P < 0.05$ was determined as significant.

RESULTS

In total 364 respondents fulfilled the questionnaire. The division among age, gender, education, and domicile is shown in Table 1. Among all respondents 48.8% claim that

they suffer from arachnophobia, 35% do not, 16.2% are not sure, do they have arachnophobia. Twenty six people among respondents declared, that they have the highest level of fear (marked 7 points in IOA). The average result for all participants was 4.

Table 1. Quantitative and percentage representation of respondents

Demographic variable	Level	n	Percentage (%)
Gender	male	61	16.5
	female	303	83.5
Age	>20 years	19	5.5
	20–29 years	325	90.0
	30–39 years	9	2.5
	40–49 years	5	1.0
	<50 years	5	1.0
Education	primary education	6	2.0
	secondary education	239	65.5
	higher education	118	32.5
Domicile	village	116	32.0
	town up to 50 000 citizens	42	11.5
	town up to 100 000 citizens	33	9.0
	town up to 250 000 citizens	58	16.0
	town over to 250 000 citizens	114	31.5

In the question "What animals are you interested in?", the most frequently chosen answer was "mammals*"* – 282 respondents (77.6%), for "arachnids" it was 9 respondents (2.5%). In the FSQ survey the average result was 63, and only two participants gained the maximum (126 points). Both of them were females and also scored 7 marked in IOA. In statistical analysis of the questionnaire (FSQ) and self-arachnophobia assessment (IOA), no normal distribution was found (in both cases $P < 0.001$). Significant differences between females (FSQ: $\overline{x} = 67.86$; IOA: $\overline{x} = 3.92$) and males were found (FSQ: $\overline{x} = 39.5$; $p < 0.001$, $Z = –5.850$; IOA: $\overline{x} = 2.65$; $p < 0.001$, $Z = –4.464$) (Tab. 2). The differences were also found between respondents who were interested in different kind of animals, especially the one who marked mammals, birds, amphibians, pisces and arachnids and the respondents who marked that they are not interested in any animals (Tab. 3). The clear trend was observed, that people who are interested in arachnids, don't suffer from arachnophobia (FSQ: $\overline{x} = 21.8$ vs. $\overline{x} = 63.7$; $p = 0.003$, $Z = 2.920$; IOA: $\overline{x} = 1.2$ vs. $\overline{x} = 3.74$; $p = 0.005$, $Z = 2.800$). There was also a positive correlation between the FSQ results and IOA ($r = 0.85$).

A stationary study took part 7 women aged 22–27. Each of them declared fear of spiders. Participation in the study was completely voluntary. The participants declared

that they don't suffer from any disease which will be a disadvantage to taking part in the study. The mean score of the Fear of Spiders Questionnaire study among the women was 103 points. The results obtained in the survey were between 88 to 124 points. Self-arachnophobia assessment scored between 5 to 7. It can indicate that the women, who took part in the stationary study had a moderate to a strong level of fear of spiders (based on FSQ and IOA). The mean heart rate during contact with spiders was 113 bpm (increased).

Table 2. Mean scores for level of arachnophobia relative to gender (mean ± standard deviation)

Survey tool	Women (n = 303)	Men (n = 61)
Fear of Spiders Questionnaire results	67.86 ±34.33*	39.50 ±26.26*
Self-arachnophobia assesment	3.92 ±1.91*	2.65 ±1.96*

* Values marked with an asterisk in the rows are significantly different ($p < 0.05$)

Table 3. Mean scores for level of arachnophobia in terms of respondents' interest in different animals (mean ± standard deviation)

Specification	Answer	n	Fear of Spiders Questionnaire (FSQ results)	Self-arachnophobia assessment (IOA pts)
All animals	yes	55	41.0^{A} ±34.88	2.44^{B} ±1.5
	no	308	67.13^{A} ±35.05	3.94^{B} ±1.96
Mammals	yes	282	66.77^{C} ±34.77	3.96^{D} ±1.94
	no	74	49.12^{C} ±31.1	2.74^{D} ±1.8
Birds	yes	104	70.54^{E} ±35.52	4.28^{F} ±1.96
	no	259	60.21^{E} ±34.05	3.48^{F} ±1.93
Reptiles	yes	74	67.19 ±38.06	3.97 ±2.01
	no	289	62.14 ±33.83	3.64 ±1.96
Amphibians	yes	48	75.94^{G} ±35.9	4.27^{H} ±2.00
	no	315	61.23^{G} ±34.2	3.62^{H} ±1.96
Fish	yes	44	77.43^{I} ±37.95	4.64^{J} ±2.19
	no	319	61.2^{I} ±34.04	3.58^{J} ±1.91
Insects	yes	12	76.25 ±38.91	4.25 ±1.86
	no	351	62.72 ±34.56	3.69 ±1.97
Arachnids	yes	5	21.8^{L} ±6.87	1.2^{M} ±0.44
	no	358	63.75^{L} ±34.63	3.74^{M} ±1.96

$^{A-M}$ Values marked with the same letters in the rows differ significantly ($p < 0.05$)

The heart rate in particular stages of the study had a normal distribution ($0.120 < P < 0.670$). Because of the fact, that two participants denied touching or putting the moult on the palm, this stage was not taking into account in statistical analysis. There were no differences between the heart rate in experimental group (T0: $\overline{x} = 101$; T1–T3: $\overline{x} = 113$; 118; 113; TK: $\overline{x} = 84$) and the control (T0: $\overline{x} = 85$; T1–T3: $\overline{x} = 115$; 111; 106; TK: $\overline{x} = 85$) during the study (T1–T3: $p = 0.929$, $t = –0.094$; $p = 0.763$, $t = 0.319$; $p = 0.790$, $t = 0.281$), and during the rest phase (experimental: T00–TK: $\overline{x} = 110$, 89, 86, 84; control: T00–TK: $\overline{x} = 101$, 85, 84, 85, T00–TK: $p = 0.695$, $t = 0.415$; $p = 0.780$, $t = 0.295$; $p = 0.879$, $t = 0.160$; $p = 0.943$, $t = –0.076$). There were significant differences between heart rate at the beginning of the study (before the contact with spiders) and during the study (T0: $\overline{x} = 94$; T1–T3: $\overline{x} = 114$; 115; 110; $p = 0.029$, $t = –2.851$; $p = 0.013$, $t = –3.521$; $p = 0.048$, $t = –2.485$), and between the beginning of the study and the heart rate at the end of the rest phase (TK: $\overline{x} = 84$; T1–T3: $\overline{x} = 114$; 115; 110; $p = 0.003$, $t = 4.952$; $p = 0.001$, $t = 5.801$; $p = 0.005$, $t = 4.380$) – Fig. 1.

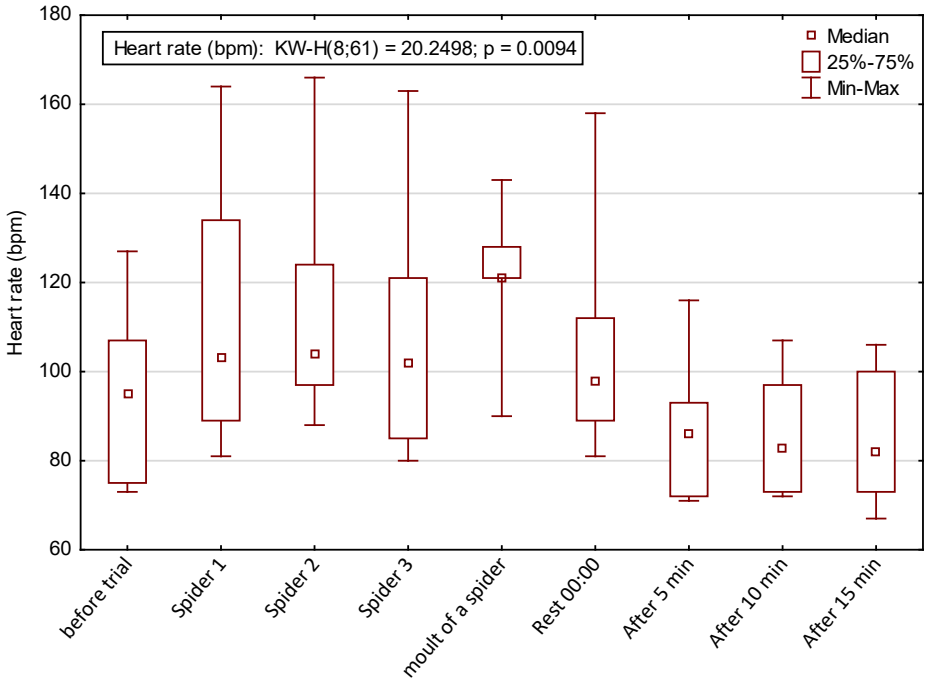

Fig. 1. Mean heart rate (bpm) of study participants at each stage of the study (n = 7, moult: n = 5)

There were no statistical differences in the heart rate during the rest phase between the examined and control group. Based on these results it cannot be concluded that music from the 1980s has a positive influent on calming after a stressful situation. Significant differences between heart rate before starting the experiment and during the contact with spiders shows, that for participants it was a stressful experience. Additionally, significant

differences between heart rate at the beginning, during, and at the end of the rest phase shows, that the heart rate decreased just after 5 min (in the experimental and control group). Before the start of the study, the heart rate was higher than at the end, so the participants felt stressed even before the study (but it wasn't a significant difference). There was no strong correlation between heart rate during the study, the FSQ results, and IOA. The continuation of the study is planned to establish will the trend continue or change.

DISCUSSION

Arachnophobia is the most common animal phobia. This phobia is found in 2.7–6.1% of the general population and is more prevalent among women than among men, which may be due to social factors [Cornelius and Averill 1983]. The same results were presented by Katkin and Hoffman [1976], Bernstein and Allen [1969], and Prokop et al. [2010].

The results obtained in our study confirm this trend. The average prevalence of arachnophobia varies from country to country. In the Netherlands, it is 2.7% and in Hungary even 9.5%. In a study of 813 American students, 34% had a severe or significant fear of spiders. The exact etiology of arachnophobia and fear associated with spiders is unknown [Polák et al. 2022]. Fear of spiders often occurs in species that are completely harmless to humans. Hauke and Herzig [2017] report that only 0.5% of all spider species are potentially life-threatening to humans. In contrast, Skokan and Herman [1999] point out that only about 50% of spider genera have chelicerae large enough to penetrate human skin. Interestingly, in a survey of students in two geographically and culturally distant countries (Slovakia and South Africa), higher levels of fear of spiders were reported by students from an African country where, compared to Europe, there are more spiders potentially dangerous to humans [Prokop et al. 2010]. The participants try to avoid contact with spiders. Two of them denied touching the moult. Binder et al. [Binder et al. 2022] also confirmed that avoidance is common behavior in people suffering from phobias.

Despite the positive effects of music on humans, e.g., calming, stimulating, improving mood, influencing our emotions, and helping us to relax during the stressful stimulus [Bartoń and Blaut 2011, Skotnicka and Mitas 2014], in the present study, the authors did not confirm that listening to music from the 1980s facilitated the return of heart rate to baseline, despite being considered pleasant and positive. This may have been related to the small group of subjects studied, so the study would have to be considered preliminary. The reference value for heart rate in an adult is considered to be 60–90 bpm [Cohen and Muehl 1977, Wawrzała et al. 2020]. An elevated heart rate is referred to as tachycardia and can result from a variety of causes, including in stressful situations [Kim et al. 2017] or during exercise [Cohen and Muehl 1977]. In the study conducted, the participants' heart rate during exposure to the stressful stimulus was over 100 bpm, while the end heart rate was within reference values. Therefore, it can be unequivocally concluded that contact with the spider or its moult caused stress in the participants. To get a clear answer to the question "Does listening to music after exposure to a stressful stimulus noticeably reduce stress?", more detailed studies should be conducted on larger groups of volunteers. The use of music therapy can be a component of phobia treatment by suppor-

ting mental health and positively influencing relaxation [Skotnicka and Mitas 2014]. However, varied methods are most commonly used to treat arachnophobia. Systematic desensitization can be performed in a variety of forms and is most commonly used in the treatment of arachnophobia. The most popular is *in vivo* exposure, or confrontation with a real spider. However, imagined spiders or virtual spiders are also used instead of living spiders. Methods of spider phobia therapy with the help of virtual reality (VR) are gaining popularity, which allows multiple exposures of effects relevant to the therapy process, varying degrees of therapist participation, gradually increasing the level of difficulty, and offering sensations that are impossible or dangerous to elicit in the real world [Bouchard et al. 2006, Gulla 2015]. Granado [2007] presents one more treatment form (SLAT) that does not use in any way the image of the spider itself, only photographs containing its features. It is intended for people with very severe arachnophobia who would not even undertake to look at a spider.

The treatment of specific phobias produces moderate results. In many cases, symptoms return after the cycle of psychotherapy is completed. In their publication, Adamczyk et al. [2018] mention combining psychotherapy with pharmacotherapy and lists medications used to support psychotherapy.

CONCLUSIONS

Spiders are an indispensable part of almost any environment, so fear of these animals can affect our well-being quite significantly in a negative way. Fear of spiders is one of the most common phobias in society. It can often cause quite strong stress reactions, so it is important to use scientific methods in determining the degree of arachnophobia and undertake appropriate therapy.

From this study, the following conclusions can be drawn:

1. Nearly 50% of the respondents stated that they suffer from arachnophobia.
2. There were significant differences in the results between men and women in both tests used to determine the level of arachnophobia (FSQ – Fear of Spiders Questionnaire, IOA – Individual Assessment of Arachnophobia).
3. The effect of contact with spiders on heart rate was demonstrated, which confirms the assumption and belief of the participants that contact with spiders was a stressful situation for them.
4. To obtain more reliable results, the study should be continued on a larger number of subjects suffering from arachnophobia.

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Streszczenie. Arachnofobia jest jedną z najczęściej występujących fobii w społeczeństwie. Przeprowadzone badanie było oparte na na ankiecie online i badaniu stacjonarnym. W ankiecie wzięło udział 364 respondentów. W pierwszej części uczestnicy określali swój subiektywny poziom lęku przed pająkami w skali Likerta (IOA), a drugą część stanowił kwestionariusz Fear of Spiders Questionnaire (FSQ). Niemal 50% respondentów zadeklarowało, że boi się pająków. Zaobserwowano pozytywną korelację pomiędzy poziomem IOA oraz FSQ. W badaniu stacjonarnym wzięło udział 7 kobiet. Przed badaniem wypełniły kwestionariusz z pierwszej części badania. W trakcie badania uczestnicy obserwowali trzy pająki i wylinkę, w tym czasie mierzony był poziom tętna. Średni wynik kwestionariusza FSQ wyniósł 103, a IOA od 5 do 7. Średni poziom tętna podczas kontaktu z pajakami wynosił 113 bpm. Kontakt z pająkiem był dla uczestników doświadczeniem stresującym, ale poziom tętna spadł do poziomu bazowego po około 5 min.

Słowa kluczowe: stres, pająki, arachnofobia, Fear of Spiders Questionnaire

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