

The Development and Validation of COVID-19 Prevention Behaviour Scale on Female Hungarian Population

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Abstract

In the emergency situation of an ongoing global pandemic, disease prevention behaviour is essential. However, after probing into the relevant scientific literature, we cannot find any validated tools or scales measuring preventive behaviour. The objective of this study was to develop and validate the Hungarian version of COVID-19 prevention behaviour scale (Covid-19-PBS). The items address major aspects related to preventive behaviour towards COVID-19 inspired by preliminary pandemic studies and the WHO prevention recommendations. 612 eligible female individuals were included in the study, the sample was recruited from the Hungarian general population, aged between 18 to 65 years. According to preliminary studies women are more likely to engage proactively in prevention behaviour, they perceive the risk of a disease more profoundly and even disease information seeking was more prevalent among women. An exploratory factor analysis was performed for this new scale, followed by a confirmatory factor analysis. According to our results, the model fit indices are adequate (CFI=.928, RMSEA=.064). Cronbach's alpha was used to examine the reliability of the factors, the internal validity of the scale is good ($\alpha = .78$). The final instrument contains 11 items with responses scored on a 4-point Likert scale and 3 domains: general hygiene, social distancing and COVID-19 information-seeking behaviour. Our results have revealed that the new scale has good psychometric properties and may be a useful instrument for assessing COVID-19 preventive behaviour across women.

Keywords: pandemic; assessment tool; general hygiene; social distancing; COVID-19 information-seeking behaviour

1. Introduction

Disease avoidance conduct in people is fundamental through the crisis of a worldwide pandemic, like the one Sars-Cov-2 created in 2020 (WHO, 2020). The fast spread of the infection changed numerous legislatures worldwide, and many governments enforced social distancing rules (Li, Pei, Chen, Song, Zhang, Yang, and Shaman, 2020). In these circumstances, the moral duty and furthermore the pace of preparatory and preventive conduct can stop undesirable outcomes. Therefore, in an epidemiologically uncontrolled context, where the Sars-Cov-2 virus is transmitted more rapidly, the potentially harmful effects become more powerful than before. Hence, all individuals' responsibility to prevent, regardless of culture, race or other demographic characteristics, is just as important in any country or part of the world.

Baumeister, Bratslavsky, Finkenauer and Vohs (2001) confirmed in their investigation the power of bad events over good ones, while they most likely serve a significant role in human accommodation and adjustment. This effect that bad circumstances have, is evolutionary significant. It is difficult to discover any special case, where pleasant or good occasions get more control over our behaviour and psychological reactions than bad or undesired ones. Still, we must consider/take into account that within an epidemiological context, the anticipation behaviour does not continuously occur at high levels/vigorously, and the risk discernment isn't naturally actuated. Individuals need time to choose and adjust their potential response. In addition, their preventive behaviour is changing depending on the circumstances, moreover it is decided by numerous cognitive appraisals they make within the geographical region they live in. Furthermore, personal characteristics play a critical part as well. In the study of Ibuka, Chapman, Meyers, Li, & Galvani (2010) appeared that preventive behavioural choices related to H1N1 flu avoidance were not consequently enacted and took weeks to be exhibited.

Across the results of numerous studies, gender differences in risk perception were revealed (Ibuka & et al., 2010; Bish, & Michie, 2010, Gustafsson, 1998). Higher rates of active involvement and collaboration for prevention were found among women. Moreover, deeper risk perception and greater adequate information-seeking about the virus were revealed, in comparison to men. Positive cognitive predispositions, like positive thinking, individual behavioural control and other positive illusions can, at a certain level, offer assistance to overcome challenges in daily life, but within the setting of viral contagion, there are instances when they can have a converse impact, contrary to what is desirable.

Overconfidence related to health, regardless of behaviour, regrettably contributes nothing to disease control. The results of various HIV studies conducted on male subjects support this. Moreover, concerning HIV, a higher acceptance of the probability of dying predicted longevity (Taylor, Kemeny, Reed, Bower & Gruenewald, 2000; Reed, Kemeny, Taylor, Wang & Visscher, 1994; Kemeny, 1994).

On the other hand, fear led people to engage in preventive behaviour, as it changed health related intentions, attitudes and behaviour (Tannenbaum, Hepler, Zimmerman, Saul, Jacobs, Wilson, & Albarracín, 2015). Conformity to public health legislations was predicted by fear, a fact revealed in studies exploring the effects of the COVID-19 (Harper, Satchell, Fido & Latzman 2020). Predicting negative consequences promoted health appropriate behaviours in citizens, similar to SARS-CoV outbreak response. Worry related to getting infected with SARS predicted health-seeking behaviours (Lau, Yang, Tsui, & Kim, 2005). Similarly, the adherence to public health policies related to the SARS outbreak control were predicted by risk perception, self-efficacy and the endorsed prevention efforts from the society (Tang & Wong, 2003).

Prevention behaviour, as the most important behavioural factor in epidemiological events, was frequently assessed in threatening situations involved in the spread of a disease (Choi & Kim, 2016; Jang et al., 2019. Tang & Wong, 2004; Li et al., 2020), yet there are no validated tools which could be used for more coherence between studies. Well operationalized scales of systematic prevention can be useful both in individual and collective adjustment, while they can provide a solid ground for personal and collective behaviour check-up and correction.

As the COVID-19 pandemic emerged, an abundance of research concerned with prevention came into view and many investigated preventive behaviours both as an act of avoiding individual infection and as a way of preventing or stopping the spread of the coronavirus. However, there is a lack of validated tools for measuring the concept of prevention behaviour in the context of COVID-19. The majority of studies assess preventive behaviour

through relevant unidimensional questions, but this approach is not necessarily the best way to conceptualize prevention, as health maintenance guidelines cover several different areas of possible individual precautionary and preventive practices. Therefore, a multidimensional approach can be the basis for a better prevention-oriented consultancy or training. Usually individuals engage in some acts of prevention instinctively, but many times only the most obvious steps are taken. Considering potential COVID-19 preventive interventions, we would like to highlight the importance of a multidimensional tool kit, seeing as these can highlight prevention steps which lack in the population and need to be implemented with further assistance or help. The development and validation of a multidimensional COVID-19 prevention behaviour scale thus, could resolve the issue of absent consistency across measurement instruments employed by scientific studies and could also support individual and collective adjustment to prevention policies.

1.1 Objectives

As presented above, COVID-19 prevention assessment tools are very diverse in the literature, and consistency between studies is low. The lack of standardized and valid prevention assessment instruments motivated this study. The aim of the study is the development and validation of a multidimensional COVID-19 prevention behaviour scale for Hungarian speaking population. The included prevention behaviour dimensions are: general hygiene, social distancing and information seeking.

2. Research method and procedure

2.1. Participants

An initial number of 991 individuals recruited from the general population of Hungary completed the scale. The verification of criteria for inclusion and the identification of outliers led to a final sample of 612 female participants, aged between 18 and 65 years. Descriptive statistics of the participants are presented in Table 1.

Table 1. Sociodemographic data of the participants

		Total sample (N=612)
Age (M±SD)		48.49 (9.77)
Gender	Female	612 (100%)
Education level	8 grades/Grade 8 or less	4 (.7%)
	Baccalaureate	164 (26.8%)
	College, university	377 (61.6%)
	Master's degree	47 (7.7%)
	Doctor's degree	20 (3.3%)
Residency	Capital city	162 (26.5%)
	City	321 (52.5%)
	Village	129 (21.1%)
Marital status	Single	90 (14.7%)
	In a relationship	115 (18.8%)

	Married	290 (47.4%)
	Divorced	99 (16.2%)
	Other	18 (2.9%)
Acquaintance infected	Yes	86 (14.1%)

Note: Values represent frequency and percentage, unless indicated otherwise.

2.2. Instruments

A structured survey was used for recording the sociodemographics of the participants. The initial *COVID-19 prevention behaviour scale* (Covid-19-PBS) includes 20 items, inspired by preliminary studies on past pandemics (ex. Cheng & Ng, 2006) and the WHO prevention recommendations (WHO, 2019). The preliminary scale covered five dimensions of preventive behaviour: social distancing, general hygiene, hand hygiene, information-seeking and health behaviours, but based on item and factor retention criteria, we saved 11 items and 3 factors (social distancing, general hygiene, information-seeking) from the original scale. The items were rated on a 4-point scale from 1 (very unlikely) to 4 (very likely). Higher scores suggest greater engagement in preventive behaviour.

2.3. Procedure

Initial steps included the main data cleaning analysis processes based on the work of Tabachnick & Fidell (2013). To diminish the influence of outliers and missing values for each variable, cases with outliers and/or with missing values were excluded from the main data analysis.

Descriptive statistics, namely percentages for categorical variables and mean and standard deviation for continuous variables were provided. The initial Exploratory factor analysis was followed by a Confirmatory Factor Analysis in the validation of the final version of the scale. Internal consistency of the scale and its subscales were examined by calculating Cronbach alpha's reliability values. SPSS version 23.0 for descriptive statistics and reliability measures, whilst the AMOS package for EFA and CFA calculations were used.

3 Results

3.1 Exploratory factor analysis

For the identification of the subdimensions/factors measured by the scale and for the retention of items, Field's (2009) criteria was applied and this resulted in keeping 11 items of the total 20 items from the initial version of the scale (see Table 2).

Table 2. Summary of exploratory factor analysis for COVID-19 prevention behaviour scale (Covid-19-PBS) (N = 612)

	Items	Components		
		General hygiene	Social distancing	Information searching
1	Használok védőmaszkot. (I wear a face mask.)	.776	.011	.167

2	Használok orvosi kesztyűt. (<i>I wear gloves.</i>)	.798	.034	.049
3	A ruháim azonnal kimosom, amikor hazaérkezem. (<i>I wash clothes immediately after coming in from outside.</i>)	.619	.281	.047
4	Fertőtlenítem az otthonom ajánlott vegyszerekkel vagy hígított klórral. (<i>I clean the house with disinfectant or a diluted bleach.</i>)	.655	.232	.134
5	Elkerülöm azt, hogy kimenjek enni. (<i>I avoid going out to eat.</i>)	.006	.652	.119
6	Elkerülöm azt, hogy kimenjek vásárolni. (<i>I avoid going shopping.</i>)	.014	.728	.011
7	Elkerülöm az otthonomon kívüli tárgyak érintését (pl. kilincsek, lift gombok). (<i>I avoid touching objects outside my home e.g. elevator switch, door handle.</i>)	.347	.679	-.025
8	Elkerülöm azokat az embereket, akik köhögnek, tüsszentenek, vagy egyszerűen hazaértek egy COVID-19 által fertőzött zónából. (<i>I avoid meeting people who have a cough, sneeze, or have just been back from a COVID-19 affected region.</i>)	.179	.611	.254
9	Teljes mértékben sikerült betartani a karantén támasztotta szabályokat a koronavírus (COVID-19) járvány ideje alatt. (<i>I was able to fully comply with the lockdown rules during the coronavirus (COVID-19) outbreak.</i>)	.351	.489	.156
10	Hallgatom, nézem vagy olvasom a híreket. (<i>I watch, listen to or read news reports.</i>)	.145	.118	.850
11	Információt keresek az interneten. (<i>I search for information over the Internet.</i>)	.121	.141	.850
Eigenvalues		3.561	1.351	1.247
Cumulative %		32.376	44.659	55.998
α		.724	.696	.705

Note: Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 5 iterations.

The adequacy of sampling is tested through Kaiser–Meyer–Olkin (KMO). As $KMO = .808$ fell within the acceptable interval of 0.8 - 0.9 (Field, 2009), it was deemed good. Bartlett's test of sphericity $\chi^2(55) = 1477.56$, $p < .001$ indicated sufficiently large correlations between items. Three components with eigenvalues over Kaiser's criterion of 1 explained 55.99% of the variance in preventive behaviour. Table 2 shows the factor loadings obtained after rotation.

The final instrument contained 11 questions with responses scored on a 4-point Likert scale, total score ranges from 11 to 44 points. The 3 domains of the 11-item *COVID-19 prevention behaviour scale* (Covid-19-PBS) includes general hygiene (item 1–4; score range 4–16), social distancing (item 5–9; score range 5–20) and information-seeking (item 11–12; score range 2–8).

3.2 Reliability/Internal consistency

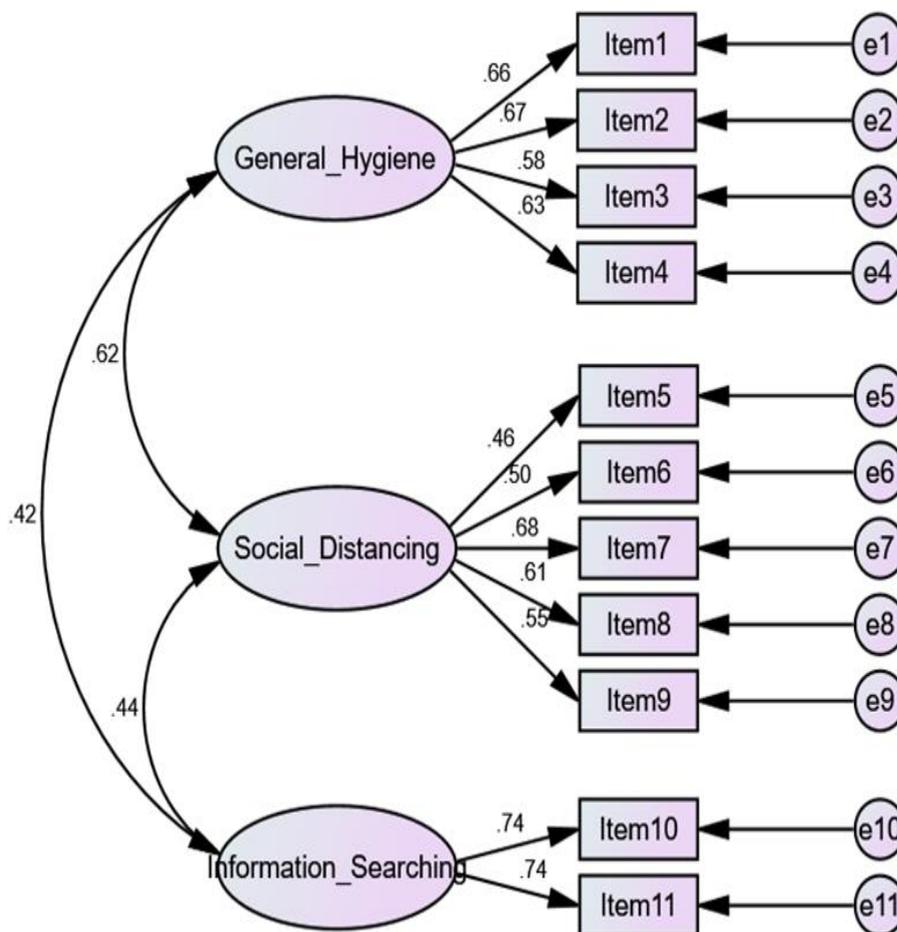
The scale produced acceptable and good internal consistencies in each of its subscales (see Table 2): general hygiene subscale $\alpha = .72$, social distancing subscale $\alpha = .69$ and

information seeking subscale $\alpha = .70$. The internal validity of the total scale is also good, $\alpha = .78$.

3.3 Confirmatory Factor Analysis

For the three-factor structure obtained by EFA, a Confirmatory Factor Analysis was performed with the AMOS package of SPSS (see Figure 1).

Figure 1. Factor structure of COVID-19 prevention behaviour scale (Covid-19-PBS)



The most commonly used procedure, Maximum Likelihood, was used to estimate the model fitting. The proposed 3-factor structure model was found to be adequate, as indicated by the model fit indices (see Table 3).

Table 3. Model Fit Indices of COVID-19 prevention behaviour scale (Covid-19-PBS)

		χ^2	df	p	CMIN/DF	NFI	IFI	TLI	CFI	RMSEA
COVID-19-PBS	3 factor structure	144.920	41	.000	3.535	.903	.928	.903	.928	.064

4 Discussion and conclusions

The current study presented the development of a new tool, the COVID-19 Prevention Behaviour Scale (Covid-19-PBS). Higher overall scores on the Covid-19-PBS indicate better prevention behaviour in relation to COVID-19. There are three main domains of preventive behaviour which can be measured by this instrument: general hygiene, social distancing and information seeking about COVID-19 and all three show a good fit. Findings demonstrated that the Covid-19-PBS has a stable three-dimensional structure with good psychometric properties.

In conclusion, the Covid-19-PBS can be used to assess COVID-19 prevention behaviour. This tool can be useful for professionals in order to develop more effective and targeted prevention programs especially in the female population, as the instrument was validated only in women, up to this stage. This tool can serve the purpose of improving individual and collective adjustment to prevention regulations during the epidemic, in females.

4.1 Limitations and further development

The scale was tested only on females, which makes the generalizability of findings impossible to males. The participants were from a Hungarian population and no data from male participants were obtained. Convenience sampling was used, which also affects how generalizable are the conclusions. Another limitation is linked to the dangers of self-reporting. Subjectivity and social desirability factors were not examined.

Finally, the three-dimensional factor structure of the scale was developed by performing a one-time EFA and CFA. Consequently, further verification is needed. For a deeper clarification of factors and with the aim of expanding the generalization of results, further steps are taken for its validation in male populations/ for men and in the general population of Hungary.

Ethics Statement

The study is in line with research ethics and data collection was approved by the Ethics Committee of the University of Babeş-Bolyai (RO) (reference number 6075/23.04.2020).

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Appendix

COVID-19 Prevention Behaviour Scale - Hungarian version

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- 1 Használok védőmaszkot.
(I wear a face mask.)
-
- 2 Használok orvosi kesztyűt.
(I wear gloves.)
-
- 3 A ruháim azonnal kimosom, amikor hazaérkezem.
(I wash clothes immediately after coming in from outside.)
-
- 4 Fertőtlenítem az otthonom ajánlott vegyszerekkel vagy hígított klórral.
(I clean the house with disinfectant or a diluted bleach.)
-
- 5 Elkerülöm azt, hogy kimenjek enni.
(I avoid going out to eat.)
-
- 6 Elkerülöm azt, hogy kimenjek vásárolni.
(I avoid going shopping.)
-
- 7 Elkerülöm az otthonomon kívüli tárgyak érintését (pl. kilincsek, lift gombok).
(I avoid touching objects outside my home (e.g. elevator switch, door handle).)
-
- 8 Elkerülöm azokat az embereket, akik köhögnek, tüsszentenek, vagy egyszerűen hazaértek egy COVID-19 által fertőzött zónából.
(I avoid meeting people who have a cough, sneeze, or have just been back from a COVID-19 affected region.)
-
- 9 Teljes mértékben sikerült betartani a karantén támasztotta szabályokat a koronavírus (COVID-19) járvány ideje alatt.
(I was able to fully comply with the quarantine rules during the coronavirus (COVID-19) outbreak.)
-
- 10 Hallgatom, nézem vagy olvasom a híreket.
(I watch, listen to, or read news reports.)
-
- 11 Információt keresek az interneten.
(I search for information over the Internet.)
-

The respondents indicate their behavioural likelihood using a four-item Likert scale. Answers included “very unlikely,” “unlikely,” “likely,” and “very likely”. The minimum possible score of each question is 1, and the maximum is 4. A total score is calculated by adding up each item score. The higher the score, the greater the self-reported COVID-19 prevention behaviour.