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kľúčové slová: optimizmus, nádej, sebaúčinnosť, pandémia COVID-19, zvládanie, mentálne zdravie, úzkosť, subjektívna pohoda

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INTRODUCTION

According to the Greek myth known as Pandora’s box, hope (translated more broadly as expectation) was the last thing that remained when Pandora opened the jar unleashing misery all over the earth (Pandora, 2020). From the ancient myth to the products of modern cinema (e.g., The Shawshank Redemption), it seems that the theme of positive expectations during obscure times resonates with people. Inspired by this observation, we examine the role of various forms of expectancies during the event that has recently shaken up our lives - the onset of the COVID-19 pandemic. The aim of the present research was twofold. First, we aimed to corroborate the role of three conceptually related but distinct individual differences variables from a field of positive psychology (namely optimism, hope and self-efficacy) in the context of selected mental health consequences (namely anxiety and well-being) during the onset of the COVID-19 pandemic in Slovakia. We also examined the indirect role of the perception of coronavirus as dangerous. Second, we wanted to examine the hypothetical role of coping strategies as potential mediators between cognitions related to positive future expectancies and well-being and anxiety later - after the first national lockdown.

1.1 COVID-19 and mental health consequences

COVID-19 is a substantial public health problem. As the virus spread quickly around the world, many countries implemented strict restrictive measures. Despite the positive effect of COVID-19 related restrictions in reducing the number of positive cases, the psychological, mental and emotional impact of the COVID-19 pandemic has been documented (Rajkumar, 2020). For example, an emerging line of research has already indicated that the COVID-19 pandemic is associated with an increase in different negative mental health consequences such as sleep problems, an increase in depressive and anxious feelings, stress and post-traumatic stress symptoms (Holmes et al., 2020; Serafini et al., 2020).

There are numerous psychosocial factors that may have contributed to the psychological and emotional impact of the COVID-19 pandemic. For example, it is critical to not only consider the disease-related stress but also the situational consequences of being locked down at home and direct and indirect effects on daily psychological and social functioning. The absence of usual daily activities, habits and social necessities could have a significant effect on perceived stress (Droit-Volet et al., 2020). This is especially the case when the nature of the stress is not well-understood, its occurrence is uncertain or when individuals appraise themselves as having little control over the stressors’ onset or termination. For example, in the case of the SARS pandemic, the immediate psychological impact included significantly higher stress levels among the population (Lee et al., 2007) and during the quarantine in Canada, 29% of people from the representative sample showed symptoms of post-traumatic stress syndrome (PTSS) (Hawryluck et al., 2004). In terms of the COVID-19 pandemic, Salari et al. (2020) found that anxiety symptoms were prevalent in 31.9% of the studied population (analysis of 63,439 individuals) during the first wave.

No wonder that researchers call for the need to monitor and better understand COVID-19-related mental health consequences and potential psychosocial protective factors (see e.g. Pfefferbaum & North, 2020). Based on this appeal, we decided to focus on one particular group of theoretically grounded individual differences that could serve as protective factors in the present context - three forms of positive expectancies.
1.2 Positive expectancies

Expectancies represent a shared feature across three renowned positive psychological constructs - optimism, hope and self-efficacy. Self-efficacy regards the 'judgments of how well one can execute courses of action required to deal with prospective situations' (Bandura, 1982; p. 122). Self-efficacy is future-oriented, cognitive in nature, focused on the self and related to perceived abilities although not to the intention of an individual to do something (Rand, 2018). While Bandura himself understood self-efficacy as situation-specific, more generalized approaches can be found as well (e.g., Schwarzer, & Jerusalem, 1995). Optimism concerns the general expectancy that ‘good rather than bad things will happen’ (Scheier & Carver, 1985; p. 219). As such, optimism is future-oriented and cognitive in nature, but it is not self-focused and does not encompass perceived ability or intention (Rand, 2018). Hope (Snyder et al., 1991) is conceptualized as a ‘cognitive set that is based on a reciprocally derived sense of successful agency (or more colloquially will) and pathways (also called ways)’ (p. 571). While agency component represents the ‘sense of successful determination in meeting goals in the past, present, and future’; pathways component captures ‘a sense of being able to generate successful plans to meet goals’ (p. 570). Hope is also future-oriented and cognitive although it is more directly related to goals and goal-directed behaviour. Additionally, hope is self-focused and encompasses both perceived ability and intention (Rand, 2018).

Emerging empirical evidence suggests that optimism, hope and self-efficacy represent conceptually related yet still distinct constructs. In terms of factor structure, Magaletta and Oliver (1999) conducted an exploratory factor analysis of all three expectancy related variables. The results indicated the existence of four distinct factors categorizable as self-efficacy, optimism and two separate subscales of hope. In addition to the factor structure, these variables also differentially predict the various psychological outcomes related to mental health consequences and well-being. For example, Yang et al. (2014) have examined the role of optimism, self-efficacy and hope in depression and anxiety among patients with cervical cancer in China. The results indicated that even when accounting for age, all three variables predicted depression while optimism and hope predicted anxiety. When the focus is shifted to the more positively framed well-being, Magaletta & Oliverv (1999) examined hope, optimism and general self-efficacy in the context of general well-being among university students. The results indicated that optimism, self-efficacy and general hope statistically significantly predicted well-being and remained the significant predictors even when accounting for each other. However, when the two subscales of hope were differentiated, pathways did not remain a significant predictor when self-efficacy and agency were first entered into the model and the role of hope could be more nuanced than assumed.

As suggested by Rand (2018), the ambiguity in predicting various mental-health-related consequences could be explained by the role of different coping strategies as mediating factors. In particular, optimism should be negatively related to dysfunctional coping while self-efficacy and hope should be related more to problem-focused coping. Due to goal-related nature, hope should be especially associated with coping strategies related to achievements of goals as active problem-focused coping (for a review see Rand, 2018).

1.3 Present study

This paper responds to the call to investigate the psychological consequences of the Covid-19 pandemic and the role of possible psychosocial protective factors (e.g., Holmes et al., 2020). Our conceptualization was based on (A) the theoretically ground-
ed notion that hope, optimism and self-efficacy are conceptually related but are still ‘structurally distinct and differentially related to important psychological consequenc-es, including psychological adjustment, coping strategies, or goal-directed performance’ (Rand, 2018; p. 1). Moreover, our rationale was based on (B) recent evidence of the role of coping strategies during a pandemic (e.g., Taha et al., 2014), and (C) suggested mediating role of coping strategies between future expectancies and mental health consequences (Rand, 2018).

The aims of the present paper are two-fold. First, we aim to corroborate the role of three future related expectancies (optimism, self-efficacy and two subscales of hope – agency and pathways) as predictors of well-being and anxiety during Covid-19 pandemic. In particular, we were interested what is the role of three variables related to positive expectancies during the onset of the pandemic and if this pattern of results replicates later (after the national lockdown). Additionally, we aimed to examine the indirect role of perception of coronavirus as dangerous. Second, we aim to examine the role of coping strategies (M) as potential mediators between cognitions related to future expectancies (X) and selected mental health consequences later (Y).

In the main study, 1011 participants were asked about their well-being and anxiety symptoms as well as about their level of optimism, hope and self-efficacy and to what degree they see coronavirus as dangerous. The participants were sampled shortly after the Slovak Government declared a national emergency and implemented the first containment measures of travel restrictions, facemask wearing and so on (T1) after the first cases of COVID-19 infection. As this situation was novel and unprecedented, the room for examination of the role of future expectancies emerged to be especially suitable. Consequently, we conducted a longitudinal follow-up after the next phase of government restrictions - a national lock-down. The lockdown included the quarantine rules, the closure of schools, airports, restaurants, bars, and shops (except for grocery stores, pharmacies, and banks) as well as a ban on all public events and gatherings. 390 participants that participated in the main study agreed to participate again and their symptoms of anxiety and well-being were assessed one more time (T2). Participants were also asked regarding the coping strategies that they had used in the last two weeks. The main goal of this part was to replicate the role of future expectancies in anxiety and well-being in another phase of pandemic development as well as to further corroborate the hypothesised role of coping strategies as potential mediators between cognitions related to future expectancies and selected aspects of mental health.

2 METHOD

2.1 Sample

Main study consisted of 1011 participants (84% females; M_{age}=32 years; SD=11.05; Med=29, Mode=22). The participants were recruited using social media (convenience sample). Of these, 391 respondents agreed to participate also in the second wave (T2) (88% females; M_{age}=32 years; SD=11.52; Med=29, Mode=22).

2.2 Measures

*The adult hope scale* (T1) (Halama, 2001; Snyder et al., 1991) is a 12-item self-report scale that assesses the sense of hope. Four items are from the agency factor (e.g.

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1 Data collection started 12.3.2020 shortly after the emergency was declared, and was open till the beginning of the next month (approximately three weeks).

2 Data collection started 22.4. 2020 (two weeks after the the start of the lock-down), and was open till the beginning of the next month (approximately two weeks).
‘I energetically pursue my goals’), and four items are from the pathway factor (e.g. ‘I can think of many ways to get the things in life that are important to me’). Four items are used as distractors (e.g. ‘I feel tired most of the time’). The items were scored on 4-point scale ranging from ‘absolutely false’ to ‘absolutely true’. The internal consistency for the pathways subscale was McDonald’s $\omega=0.74$ and for the agency subscale was $\omega=0.76$.

The life orientation test revised (T1) (Kövérová & Ferjenčík, 2013; Scheier et al., 1994) is a 10-item self-report scale that assesses positive expectations about the future (e.g. ‘I am always optimistic about the future’). The items are scored on 5-point Likert scale ranging from ‘strongly disagree’ to ‘strongly agree’. The internal consistency of the scale was McDonald’s $\omega=0.83$.

The general self-efficacy scale (T1) (Košč et al., 1993; Schwarzer & Jerusalem, 1995) is a 10-item self-report scale that assesses self-efficacy (e.g. ‘I can always manage to solve difficult problems if I try hard enough’). The items were scored on a 5-point Likert scale ranging from ‘strongly disagree’ to ‘strongly agree’. The internal consistency of the scale was McDonald’s $\omega=0.88$.

Coping in T2 was assessed using the Brief COPE (Carver, 1997; Ficková, 1992). The Brief COPE (Carver, 1997) is a short multidimensional inventory that assesses the coping style that people use to deal with the stressful situations that they encounter. It contains 14 two-item scales that measure 14 conceptually differentiable coping reactions. Slovak adaptation (Ficková, 1994) differentiates 3 types of strategies, namely Problem-focused strategies (active coping, instrumental support, and planning), Emotion-focused coping (acceptance, emotional social support, humor, positive reframing, and religion), and Dysfunctional coping strategies (behavioral disengagement, denial, self-distraction, self-blaming, substance use, and venting emotions). The participants were asked to rate the extent to which they had used each of the strategies in managing stressful situations in the previous two weeks in relation to measures imposed by the government. This was done on a five-point Likert scale from 1 (not at all) to 5 (usually). The internal consistency was McDonald’s $\omega=0.75$ for active coping strategies; $\omega=0.59$ (CI upper bound 68) for emotional coping strategies; and $\omega=0.76$ for dysfunctional coping strategies.

The WHO-5 well-being index (Topp et al., 2015) is a scale that assesses the level of well-being in the last two weeks (e.g. ‘I have felt active and vigorous’). Items are scored on a 6-point scale ranging from 0 (at no time) to 5 (all the time). The internal consistency of the scale was McDonald’s $\omega=0.86$ (T1) and $\omega=0.89$ (T2).

The anxiety scale of the Symptom Checklist-90- R (SCL-90-R, Derogatis, 1977) was used to assess anxiety symptoms. The Symptom-Checklist 90-Revised is a widely-used measure designed for the screening and assessment of psychopathology based on the severity of the symptoms. The scale is used in both clinical and research settings due to the relationship between the SCL symptoms and the DSM criteria for specific (DSM-5) syndromes. This scale comprises 10 items which are scored on a 5-point Likert scale from 0 (not at all) to 4 (extremely) capturing the severity of anxiety symptoms over the past week. The internal consistency of the scale was McDonald’s $\omega=0.92$ (T1) and $\omega=0.93$ (T2).

Subjective perception of the danger of coronavirus consisted of four items which asked about the danger of coronavirus for participants, their family, acquaintances and people in the country. Items were scored on a seven-point Likert scale from 1 (not at all) to 7 (very high). The internal consistency was McDonald’s $\omega=0.80$. 
2.3 Analysis plan

The analysis was conducted in the JASP version 0.14. In order to address the first research question, linear regression was used. In particular, Bayesian multi-model inference was chosen over the classical frequentist approach to overcome the selection problem and associated issues (e.g., unreliable estimates of the regression coefficients) (Bergh et al., 2020, 2021). In fact, Bayesian multi-model inference is considered as a preferable solution in the situation as this as ‘instead of settling, perhaps prematurely, on a single model for inference, multi-model inference retains all models and calculates for each model a weight that indicates the degree to which the data support that model’ (Bergh et al., 2021, p. 2). This is done via accomplishing ‘variable selection and parameter estimation simultaneously instead of sequentially’ (p. 3). In order to address the second research question, a simple path mediation analysis (Hayes, 2017) was conducted. Furthermore, to gain further insight into the process of anxiety/well-being development, we accounted for anxiety/well-being in T1 as well as for the age and gender of participants. Simple path mediation analysis was used also to examine the indirect role of subjective perception of considering coronavirus as dangerous.

3 RESULTS

3.1 Predicting anxiety

The results of the Bayesian linear regression predicting (log) anxiety indicated that a model that contains optimism and self-efficacy is preferable according to the data. Regarding $BF_{M'}$ (which quantifies the evidence for each model compared to all the other models), the data provided very strong support for this model ($BF_{M'}=50.37$). According to the posterior model $P(M|data)$, the probability for the model increased from 3% to 63% after observing the model. This model explains 14% of the variance in anxiety. As indicated by $BF_{01}$, this model is much better than a null model.

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3 The data, code, materials as well as supplementary results can be found at https://osf.io/m34vt.
4 For the interested reader, the results of the Frequentist regression analysis were computed as well and can be found in the on-line supplementary materials on OSF.
5 Alternative models with all possible combinations of predictors were estimated and then compared using two forms of Bayes factors, $BF_{01}$ and $BF_{M'}$. $BF_{01}$ quantifies the evidence in favour of the best model relative to the alternative model of interest, e.g. null model; while $BF_{M'}$ quantifies the evidence for each model compared to all the other models. In addition, model averaging was used to further summarize the importance of individual predictors across all the potential models. Model averaging provides evidence for the inclusion of every variable corrected for multiple testing. For this purpose, the inclusion Bayes factor was computed. $BF_{incl}$ quantifies how much the observed data are more probable under models that include a predictor relative to models that do not. It should be noted that for all analysis, Jeffreys-Zellner-Siow prior and Beta binomial model prior were used.
6 Before the analysis, the model assumptions were checked. First, the independent variables were plotted against the dependent variables. The plots indicated that the relationships were approximately normal. Following this, the assumptions regarding normally distributed residuals were checked. The model’s predictions were plotted against the model’s residuals to check for heteroscedasticity. The results suggested that the variance of the prediction error is based on the model’s predictions and heteroscedasticity should not be issue. However, an examination of the Q-Q plot of the theoretical quantiles expected under a normal distribution against the observed quantiles of residuals suggested that the residuals did not appear to be normally distributed. In order to overcome potential violations, anxiety was log-transformed yielding to residuals that were more in line with the assumptions of linear regression.
7 Mediation analysis was conducted with the bias-corrected percentile method and 5000 replications and full information maximum likelihood with Mplus emulation. Both, confidence intervals and p-values were calculated.
that does not contain any predictors and the predictive performance of this model is about five-time (moderate evidence) better than a model with optimism, pathways and self-efficacy; and nine times (strong evidence) better than a model with optimism, agency and self-efficacy. Moreover, this model is much better than other alternative models.

When all the existing models are taken into account simultaneously via the Bayesian model-averaged analysis, both optimism and self-efficacy are relevant predictors of \((\log)\) anxiety. The Inclusion Bayes factor (BF\(_{inc}\)), quantifying how much the observed data are more probable under the model that includes a specific predictor in comparison to models that do not include the predictor, indicated that the model with optimism is \(5.85e +9\) times more probable and the model with self-efficacy is about \(1333.76\) times more probable than models without these variables. As estimated, a one-unit increase of optimism is associated with a decrease of \(-8.53e -3\) \(\log\) in anxiety and a one-unit increase of self-efficacy is associated with a decrease of \(-6.53e -3\) \(\log\) in anxiety on average. There is some evidence against the relevance of both subscales of hope when predicting anxiety. The posterior summaries are shown in Table 1.

When \((\log)\) anxiety was assessed later in follow up (T2 - after lock-down), the pattern of results was replicated. A model with optimism and self-efficacy is preferred according to the data. Regarding BF\(_M\), the data provided strong support for the model that contains these two variables (BF\(_M\)=14.92) from T1. The probability for the best model increased from 3% to 34% after observing the model. While the predictive performance of this model is much better in comparison to the majority of alternative models, it only provides two and a half to four times better predictive performance in comparison to the model that contains the optimism, self-efficacy and agency or pathway subscale.

When all the models are taken into account simultaneously, optimism is the most relevant predictor of \((\log)\) anxiety. Both self-efficacy and the agency subscales are somewhat marginal predictors. According to the BF\(_{inc}\), the model with optimism is substantially more probable than the model without this variable. However, the models with self-efficacy and agency are only about one to three times more probable than the models without these variables. The posterior summaries are shown in Table 2.

### 3.2 Predicting well-being

When the focus is shifted to the more positively framed well-being, the results indicate that the model containing optimism and both subscales of hope is preferable according to the data. The data provides strong support for the model (BF\(_M\)=17.86). The probability for the best model increased from 5% to 48% after observing the model and the model explains 18% of the variance in well-being. As suggested by BF\(_0\), the predictive performance of this model is substantially better than a null model that does not contain any predictors. In comparison to the other models, the predictive performance of this model is about three to four times better in comparison to the model with optimism and agency or the model with optimism, agency and self-efficacy. It is about seven times better than the model with all the variables. The other models are much worse in comparison to the best model.

When all the models are taken into account via the Bayesian model-averaged analysis, the Inclusion Bayes factor (BF\(_{inc}\)) indicates that the model with optimism is \(5.58e+8\) times more probable than the model without this variable and the model with agency is about 43 times more probable than the models without this variable. Furthermore, the posterior including the probabilities of the models for both variables
**Table 1** Posterior Summaries of Coefficients - (log) anxiety at T1

| Coefficient  | P(incl) | P(excl) | P(incl|data) | P(excl|data) | BF\textsubscript{inclusion} | Mean     | SD       | 95% Credible Interval |
|--------------|---------|---------|------------|------------|--------------------------|----------|----------|----------------------|
| Intercept    | 1.00    | 0.00    | 1.00       | 0.00       | 1.00                     | 1.25     | 4.79e-3  | 1.24 1.25             |
| Optimism     | 0.50    | 0.50    | 1.00       | 1.71e-10   | 5.85e+9                  | -8.53e-3 | 1.20e-3  | -0.01 -6.37e-3       |
| Hope\textunderscore Agency | 0.50 | 0.50 | 0.18 | 0.82 | 0.23 | 1.71e-4 | 1.42e-3 | -2.17e-3 3.70e-3 |
| Hope\textunderscore Pathways | 0.50 | 0.50 | 0.26 | 0.74 | 0.36 | 1.16e-3 | 2.81e-3 | -1.18e-3 8.16e-3 |
| Self-efficacy | 0.50    | 0.50    | 1.00       | 7.49e-4    | 1333.76                  | -6.53e-3 | 1.61e-3  | -1.00e-2 -3.85e-3    |

The “Posterior Summaries” P(incl) refers to the prior probability of including each predictor; P(incl|data) to the posterior probability of including each predictor; P(excl|data) to the posterior probability of excluding each predictor; BF\textsubscript{inc} refers to a Bayes factor for the change from prior to posterior inclusion odds for the predictor after seeing the data.

**Table 2** Posterior Summaries of Coefficients - (log) anxiety in T2

| Coefficient  | P(incl) | P(excl) | P(incl|data) | P(excl|data) | BF\textsubscript{inclusion} | Mean     | SD       | 95% Credible Interval |
|--------------|---------|---------|------------|------------|--------------------------|----------|----------|----------------------|
| Intercept    | 1.00    | 0.00    | 1.00       | 0.00       | 1.00                     | 1.19     | 7.65e-3  | 1.17 1.20             |
| Optimism     | 0.50    | 0.50    | 1.00       | 6.21e-6    | 160918.69                | -0.01    | 2.03e-3  | -0.01 -6.72e-3       |
| Hope\textunderscore Agency | 0.50 | 0.50 | 0.46 | 0.54 | 0.84 | -3.39e-3 | 5.09e-3 | -0.02 2.59e-5   |
| Hope\textunderscore Pathways | 0.50 | 0.50 | 0.33 | 0.67 | 0.48 | 1.82e-3 | 4.74e-3 | -4.14e-3 0.01 |
| Self-efficacy | 0.50    | 0.50    | 0.75       | 0.25       | 3.00                     | -4.45e-3 | 3.45e-3  | -0.01 1.23e-6        |

The “Posterior Summaries” P(incl) refers to the prior probability of including each predictor; P(incl|data) to the posterior probability of including each predictor; P(excl|data) to the posterior probability of excluding each predictor; BF\textsubscript{inc} refers to a Bayes factor for the change from prior to posterior inclusion odds for the predictor after seeing the data.
are close to 1 while the inclusion probability of the pathways subscale is lower. The model with the hope pathway is about 4 times more probable than the model without this variable. In contrast, the posterior inclusion probability for self-efficacy decreased although there is rather a lack of evidence regarding this predictor. The posterior summaries are shown in Table 3.

When well-being was analysed later (T2 - after national lock-down), previous results replicate as optimism and both subscales of hope seem to be important in predicting well-being. This is in line with the previous finding as the model that contains optimism and both subscales of hope is one of the preferable models. The data provides moderate support for the model (\(BF_\text{M} = 9.42\)). The probability for this model increased from 5% to 33% after observing the model and the model explains 25% of the variance in well-being. As indicated by \(BF_\text{inc}\), this model is substantially better than a null model that does not contain any predictors, but, there is uncertainty about whether omitting self-efficacy or pathways or both explains the data worse. Other models are much worse.

When all the existing models are taken into account simultaneously, optimism and the agency subscales seem to be the most important predictors of well-being at T2 as their posterior including probabilities are close to 1. According to the \(BF_\text{inc}\), the model with optimism is 320 times more probable than the model without this variable and the model with agency is about 88 times more probable than the model without this variable. Pathways and self-efficacy seem to be important to a much lesser degree as models with these variables are only one to two times more probable than the models without these variables. The posterior summaries are shown in Table 4.

### 3.3 Mediation analysis

As one can argue that the relationship between expectancies and criterion variables can be explained by the general connection between optimism, hope, self-efficacy and anxiety and well-being irrespective of the COVID-19 situation, we conducted an additional analysis with the subjective perception of the danger of coronavirus as a potential mediator.

When examining the model with (log) anxiety as the criterion variable, the total effects of optimism (\(b=-8.29e-3; SE=1.25e-3; p<.001; CI [-0.627e-3]\)) and self-efficacy (\(b=-7.60e-3; SE=1.85e-3; p<.001; CI [-0.379e-3]\)) were statistically significant. There was also a significant direct effect found for optimism (\(b=-7.87e-3; SE=1.21e-3; p<.001; CI [-0.525e-3]\)) and self-efficacy (\(b=-5.91e-3; SE=1.85e-3; p<.001; CI [-9.81e-3, -2.41e-3]\)) when the indirect effect was accounted for. Crucially, there was indirect effect of optimism (\(b=-1.04e-3; SE=3.58e-4; p=0.004; CI [-1.82e-3, -3.86e-4]\)) and self-efficacy (\(b=-1.69e-3; SE=5.32e-4; p=0.001; CI [-2.84e-3, -7.17e-4]\)) on anxiety through perception of coronavirus as dangerous.

Second, there was a total effect of optimism (\(b=0.25; SE=.04; p<.001; CI [0.18, 0.32]\)), agency subscale of hope (\(b=0.28; SE=.10; p=.004; CI [0.06, 0.47]\)) and pathways subscale of hope (\(b=0.24; SE=.12; p = .05; CI [0.02, 0.46]\)) when well-being as the criterion variable was examined (but note that the last mentioned result could be a false positive). There was a direct effect of optimism (\(b=0.23; SE=.04; p<.001; CI [.15, 0.30]\)), agency subscale of hope (\(b=0.27; SE=.09; p = .004; CI [0.06, 0.46]\)) and pathways subscale of hope (\(b=0.28; SE=.12; p = .018; CI [0.06, 0.50]\)). Importantly, there was statistically significant indirect effect of optimism on well-being through perception of COVID-19 as dangerous (\(b=.02; SE=7.75e-3; p=.006 CI [7.97e-3, 0.04]\)); and the indirect effect of self-efficacy on well-being through perception of COVID as dangerous (\(b=0.03; SE=.01; p=.003; CI [0.01, 0.06]\)).
Table 3 Posterior Summaries of Coefficients - well-being at T1

| Coefficient       | P(incl) | P(excl) | P(incl|data) | P(excl|data) | BF_inclusion | Mean   | SD    | Lower  | Upper  |
|-------------------|---------|---------|-----------|-----------|--------------|---------|-------|--------|--------|
| Intercept         | 1.00    | 0.00    | 1.00      | 0.00      | 1.00         | 12.99   | 0.14  | 12.71  | 13.27  |
| Optimism          | 0.50    | 0.50    | 1.00      | 1.79e-9   | 5.58e+8      | 0.25    | 0.04  | 0.17   | 0.32   |
| Hope_Agency       | 0.50    | 0.50    | 0.98      | 0.02      | 42.95        | 0.31    | 0.11  | 0.11   | 0.56   |
| Hope_Pathways     | 0.50    | 0.50    | 0.79      | 0.21      | 3.82         | 0.21    | 0.15  | 0.00   | 0.45   |
| Self-efficacy     | 0.50    | 0.50    | 0.41      | 0.59      | 0.70         | 0.03    | 0.05  | -0.04  | 0.14   |

The “Posterior Summaries” P(incl) refers to the prior probability of including each predictor; P(incl|data) to the posterior probability of including each predictor; P(excl|data) to the posterior probability of excluding each predictor; BFinc refers to a Bayes factor for the change from prior to posterior inclusion odds for the predictor after seeing the data.

Table 4 Posterior Summaries of Coefficients - well-being at T2

| Coefficient       | P(incl) | P(excl) | P(incl|data) | P(excl|data) | BF_inclusion | Mean   | SD    | Lower  | Upper  |
|-------------------|---------|---------|-----------|-----------|--------------|---------|-------|--------|--------|
| Intercept         | 1.00    | 0.00    | 1.00      | 0.00      | 1.00         | 14.66   | 0.22  | 14.21  | 15.09  |
| Optimism          | 0.50    | 0.50    | 1.00      | 3.11e-3   | 320.10       | 0.21    | 0.06  | 0.10   | 0.33   |
| Hope_Agency       | 0.50    | 0.50    | 0.99      | 0.01      | 87.92        | 0.50    | 0.16  | 0.21   | 0.83   |
| Hope_Pathways     | 0.50    | 0.50    | 0.69      | 0.31      | 2.23         | 0.22    | 0.21  | -2.97e-3 | 0.63   |
| Self-efficacy     | 0.50    | 0.50    | 0.58      | 0.42      | 1.40         | 0.07    | 0.09  | -0.04  | 0.27   |

The “Posterior Summaries” P(incl) refers to the prior probability of including each predictor; P(incl|data) to the posterior probability of including each predictor; P(excl|data) to the posterior probability of excluding each predictor; BFinc refers to a Bayes factor for the change from prior to posterior inclusion odds for the predictor after seeing the data.
Furthermore, in order to further decipher the role of coping strategies in predicting stress, depression and anxiety during COVID-19, a mediation analysis was carried out with three positive future expectancies at T1 as predictors ($X_{123}$), the three coping strategies measures at T2 as mediators (M) and well-being and anxiety measured at T2 as two separate criterion variables ($Y_1$ and $Y_2$). Moreover, to generalize beyond the general role of expectancies in well-being and anxiety, we accounted for anxiety/well-being in the first wave of measurement and for selected demographic information. Thus, we added anxiety/well-being in T1, as well as age and gender as background confounders for this analysis.

First, when examining the mediation model with (log) anxiety as the criterion variable, the total effect of optimism (but not self-efficacy) was statistically significant ($b=-5.61\times10^{-3}; SE=1.71\times10^{-3}; p<.001; CI [-9.37\times10^{-3}, -1.93\times10^{-3}]$). There was also a significant direct effect found for optimism even when the indirect effect was controlled for ($b=-3.29\times10^{-3}; SE=1.58\times10^{-3}; p=.037; CI [-6.73\times10^{-3}, -4.28\times10^{-3}]$). Crucially, there was indirect effect of optimism on anxiety through dysfunctional coping ($b=-1.89\times10^{-3}; SE=.837\times10^{-3}; p=0.024; CI [-3.64\times10^{-3}, -4.04\times10^{-3}]$). However, a reader should consider this finding with a grain of salt as this finding will no longer be considered as significant if a more strict Bonferroni criterion would be applied (possibly false-positive result).

Second, there was a total effect of optimism ($b=0.15; SE=.06; p=.007; CI [0.04, 0.26]$) (but not hope) when well-being as the criterion variable was examined. No direct effect on well-being has been found when the indirect effects were accounted for (all $p > 0.05$). Crucially, when anxiety in T1, age and gender were accounted for, three indirect effects were deemed statistically significant. The indirect effect of optimism on well-being through dysfunctional coping strategies ($b=0.062; SE=.020; p=.010; CI [0.01, 0.06]$); the indirect effect of optimism on well-being through emotional coping strategies ($b=0.036; SE=.014; p=0.010; CI [0.01, 0.06]$); and the indirect effect of self-efficacy on well-being through emotional-focused coping strategies ($b=-.055; SE=.024; p=.024; CI [-0.10, -0.01]$). However, the two last-mentioned results could be false-positives (as these results will not pass the adjusted $\alpha$ when a more strict Bonferroni correction would be applied). Due to the page limitation constraints, all indirect, direct, and total effects are shown in the online appendix.

4 DISCUSSION

According to the ancient myth, it was hope (translated more broadly as expectation) which was the last thing that remained when Pandora opened the jar (Pandora, 2020). Inspired by this and similar cultural references, the present study aimed to corroborate the role of three positive expectancies in well-being and anxiety during the onset of the COVID-19 pandemic. Moreover, we examined the indirect role of considering coronavirus as dangerous in the relationship between expectancies and criterion variables. Furthermore, we examined the hypothesized role of coping strategies as a potential mediator between cognitions related to positive expectancies and mental health consequences after a national lockdown.

Before proceeding to the interpretation of results, it is important to stress out that it is not possible to infer causality in a mainly cross-sectional study like this as a shared variance between variables simply does not imply causation. Rather, we will use terms predictor, mediator, and criterion variable conceptually, as the selection of variables and their role in the hypothesised conceptual model was based on previous research and theoretical ramifications. Thus, although we cannot rule out the possibility that a higher level of optimism, hope, and self-efficacy are ‘caused’
by well-being and anxiety/or that they are complexly intertwined; the premise of the present study was that although optimism, hope, and self-efficacy are open to change to some degree, the evaluation of well-being and symptoms of anxiety are more state-like on the state-trait continuum (malleable due to situation and thus considered as criterion variables).

In the main part of the present study, it has been shown that the more the people are optimistic, the more well-being and fewer anxiety symptoms they reported during the onset of the COVID-19 pandemic. This was true irrespective of the time of data collection as similar results occurred when an emergency was declared and after a national lock-down. This is an interesting and important finding because optimism differs from other examined constructs in one crucial aspect – optimism is not self-focused. This fundamental difference can be narratively instantiated by the differences between the following statements: ‘It will be good’ (Optimism) vs. ‘I can do it’ (Self-efficacy) vs. ‘I will do it’ (Hope).

The positive role of optimism has been previously supported in the context of the COVID-19 pandemic as well as in the context of various aspects of psychological functioning in general. For example, across nearly four hundred samples, Alarcon et al. (2013) have meta-analytically corroborated that optimism is negatively related to anxiety, depression and stress. However, Alarcon et al. (2013) have also shown that an important correlate of variables related to mental health is also hope.

We found some evidence against including both hope subscales when predicting anxiety although the situation was different when predicting well-being as discussed below. The observed - somehow limited - role of hope in anxiety is in line with the findings of Wright et al. (2011). They found that when accounting for optimism, pain acceptance and other psychological variables, hope was not a statistically significant predictor of psychological distress in a sample of obese participants with musculoskeletal pain. However, in the present study, a different pattern of results emerged when a more positively oriented criterion variable in terms of general well-being was analysed. The results have indicated that not only optimism but also hope seems to be relevant predictor of well-being.

In particular, in the main study, there was very strong evidence for including agency while the evidence for pathways was found to be moderate. Furthermore, this pattern of results replicated in the follow up where well-being was assessed shortly after national lockdown. This more nuanced pattern of results supports the results of other studies. For example, when focusing on the role of hope in the context of the COVID-19 pandemic, Prasath et al. (2021) found that optimism and self-efficacy were the strongest predictors of the well-being of university students before the COVID-19 pandemic. This pattern of results was slightly different during the onset of the COVID-19 pandemic, though. Hope and resilience become more salient than before.

Although not focusing on pandemic per se, Rand et al. (2011) have found that both hope and optimism were related to academic life satisfaction, and Gallagher and Lopez (2009) have found that although hope and optimism together accounted for a significant proportion of various components of well-being, hope was more related to eudemonic well-being. In fact, Rand (2018) has stressed that hope could be related to more purposeful aspects of well-being and this could be also the case in a present study. Moreover, these results are in line with Magaletta and Oliver (1999). They found that optimism, general hope and self-efficacy statistically significantly predicted well-being and remained a significant predictor even when accounting for each other. However, when the two subscales of hope were differentiated, the pathways did...
not remain a significant predictor when self-efficacy and agency were entered first. As in the present case, this could be explained by the fact that hope and self-efficacy share some common variance.

With regard to self-efficacy (a third selected predictor related to expectancies), both optimism and self-efficacy were shown to be important negative predictors of anxiety when expecting an outburst of the pandemic. The results for self-efficacy, though, were much less decisive in the longitudinal follow up after a lock-down. This pattern of results is similar to what was observed by Prasath et al. (2021) and there are some explanations for this phenomenon. First, the sample size was limited in follow up in the present research. Second, self-efficacy is relatively context-specific and may change in even short periods. For example, Mækelæ et al. (2020) have stated that when people believe that government restrictions are effective in protecting them, their self-efficacy is boosted. On the other hand, the lockdown has been challenging for many individuals such as those who are self-employed, entrepreneurs or many parents, especially women, who have had to deal with the balance of work and supporting the online learning of their children (for further discussion see McLaren et al., 2020).

In general, the present findings are in line with the conceptual background that served as a basis for a present study (e.g., Rand, 2018) as well as with emerging empirical literature concerning the COVID-19 pandemic. For example, Turliuc and Candel (2021) found that Psychological capital (higher-order construct containing optimism, hope, self-efficacy and resilience) had a negative effect on anxiety, stress and depression, and a positive effect on satisfaction with life. Similarly, Robles-Bello et al. (2020) found that resilience during COVID-19 was predicted by a set of variables. However, at the final stage of analysis, optimism and self-efficacy were considered as important predictors of resilience besides factors like age, education level and employment.

Note, however, that there is some possibility that the relationship between three predictors and criterion variables is explained by the general relationship between the variables rather than specific factors related to the COVID-19 pandemic. For example, Prasath et al. (2021) found that optimism and self-efficacy were the strongest predictors of the well-being of university students before the COVID-19 pandemic and the pattern of results changed during the COVID-19 pandemic when hope and resilience become more salient. However, in both cases, optimism played a crucial role, and, thus, a more general role of optimism irrespective of a pandemic could be assumed. Although deciphering the role of COVID-19 specific vs. more general role of expectations in mental health is beyond the scope of the present study and, thus, we reserve it for future research (and consider it as a limitation of the present study), we also examined the indirect role of subjective perception of the danger of coronavirus as a potential mediator between expectancies and criterion variables during the onset of COVID-19 pandemic. It was shown that considering coronavirus as dangerous mediated the relationship between optimism and self-efficacy as predictors and both criterion variables - anxiety and well-being.

Furthermore, it is important to note that Prasath et al. (2021) found that the main pattern of results could be mediated by coping strategies – an idea that is in line with theoretical suggestions crucial for the present research. Thus, in the second part of the analysis, we analysed the coping strategies as a putative mediator between expectancies as predictors and well-being and anxiety as criterion variables. In particular, well-being and anxiety in T2 were used as criterion variables, and hope, optimism and self-efficacy in T1 as predictors. We also accounted for the well-being and anxiety measured in T1 to focus more on a change in time and also for the age and gender.

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of participants. It was hypothesized that optimism would be related to positive reappraisal strategies, acceptance and negatively to dysfunctional coping while hope and self-efficacy would be related more to approach and problem-focused coping strategies (for a review see Rand, 2018).

The path analysis indicated that there was a significant indirect effect of optimism on both anxiety and well-being through dysfunctional coping strategies and this pattern of results replicated even when anxiety/well-being in T1, age and gender were accounted for.

In particular, the more the participants were optimistic at T1, the less dysfunctional coping styles they used and the less anxiety and more well-being they reported at T2. This pattern of results supports the proposal that optimism is negatively related to the use of disengagement and avoidance coping and consequently to various health-related issues as suggested by Rand (2018). In fact, although some previous studies have established that optimism is positively related to well-being in times of adversity (Carver et al., 2010; Rasmussen et al., 2009), Carver et al. (2010) suggested that coping mediates this relationship. This is in harmony not only with our results but also with different research conducted in the context of the COVID-19 pandemic. For example, Prasath et al. (2021) found that coping strategies mediated the relationship between the well-being and optimism component of Psychological capital. In particular, they found that problematic coping strategies (and in some instances also adaptive coping strategies) mediated the relationship between optimism and various aspects of well-being. We found that this is true not only for the student population but also for the more general population, and not only for well-being but also for anxiety.

While the present research provides interesting and promising findings, it also has some limitations. As such, present results should be considered as an introductory probe into the topic and further replication and conceptual extensions are encouraged. For example, it would be beneficial to extend the present results by examining the role of future expectancies across various cultures through a multi-lab network. Furthermore, various aspects of well-being and mental health, as well as different conceptualizations and operationalizations of positive expectations could be systematically examined in future studies. Additionally, although evidence was provided that the variables related to expectancies (and optimism especially), could be considered relevant in the present context, this is not to say that they are the sole or most important predictors. A similar concern is related to the coping strategies as mediators.

Moreover, as mentioned, although we presented the results of longitudinal follow up, interpretation related to causality should be avoided. Rather, the causal role of variables should be examined in future research. For example, when interested in a change of mental health over time, latent growth models could be used with three (and optimally more) measurement points. Last but not least, while the results of the present study show that optimism (and potentially other future expectancies) could play some positive role in maintaining well-being and shielding from anxiety during a time of crisis, these variables could also have negative consequences. Consider, for instance, outcomes as (non)adherence to safety measures, where over-optimism could, at least hypothetically, lead to carelessness and negative health-related consequences. Future research is welcomed to uncover the above-mentioned questions more thoroughly.
5 CONCLUSIONS

In conclusion, it was shown that optimism seems to be a robust predictor of selected mental health consequences of the COVID-19 pandemic worth future investigation. Furthermore, the path analysis indicated that this effect is mediated via considering coronavirus as dangerous, and, there was also a significant indirect effect of optimism on both anxiety and well-being through dysfunctional (and potentially also emotion-focused) coping strategies. Moreover, beyond optimism, it seems that self-efficacy and hope could be relevant to a certain extent as well. In particular, hope was important when considering well-being while self-efficacy seems to be important when considering anxiety during the onset of a pandemic. This finding, however, did not replicate when previous anxiety/well-being, as well as age and gender, were accounted for. While the present study has some limitations, it is hoped that it will encourage future research into the topic, contribute to the investigation of additional protective factors, and help to equip people better in case the COVID-19 pandemic is prolonged (e.g., new waves or mutations will strike) or a different ‘pandora box’ will emerge.

REFERENCES


Optimizmus ukrytý v Pandorinej skrinke: Rola troch typov očakávania (optimizmus, nádej a sebaúčinnosť) v rámci subjektívnej pohody a úzkosti počas nástupu pandémie COVID-19


Otázky a hypotézy. Predkladaná štúdia sa zaobereť tým, akú rolu zohrali tri druhy pozitívnych očakávania (optimizmus, nádej a sebaúčinnosť) v rámci subjektívnej pohody a prežívané úzkosti počas nástupu prvej vlny pandémie COVID-19 na Slovensku.


Analýzy. V rámci analýzy dát boli využité dva postupy. Prvý bol reprezentovaný lineárnou regresiou pracujúcou s viacerými modelmi (Bayesiánsky prístup), druhý médiačnou analýzou (Frekventistický prístup).


Limity. Medzi limity možno zaradiť príležitostný výber výskumného súboru a to, že otázka, týkajúca sa toho, do akého miery tu šlo o vzťah špecifický pre pandémiu, zostáva aj naďalej otvorená. Okrem toho je nevyhnutné, aby výzkumníci zostali pri vyjadrovani sa k otázke kauzality nanajvýš opatrní.