Fear of Coronavirus, Stress and Fear of Childbirth in Polish Pregnant Women During SARS-CoV-2 Pandemic

Joanna Dymecka 1, Rafał Gerymski 1, Adrianna Iszczuk 2 Mariola Bidzan 3

1 Department of Health Psychology and Quality of Life, Institute of Psychology, Opole University, Opole, Poland
2 Medical Center “MediClinica”, Opole, Poland
3 Department of Clinical and Health Psychology, Institute of Psychology, University of Gdansk, Gdansk, Poland

Authors Note

Joanna Dymecka https://orcid.org/0000-0002-7092-3017
Rafał Gerymski https://orcid.org/0000-0003-4847-1429
Mariola Bidzan https://orcid.org/0000-0003-0224-1994

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Correspondence concerning this article should be addressed to Mariola Bidzan, email: mariola.bidzan@ug.edu.pl
Abstract

Background: COVID-19 pandemic is the largest pandemic of aggressive coronavirus in the human population in the 21st century. The pandemic may have a negative emotional impact on pregnant women, causing fear and stress. Negative feelings during pregnancy affect the later fear of childbirth.

Objective: Our study aimed to determine the relationship between fear of COVID-19, stress and fear of childbirth. We assume that fear of COVID-19 will be a mediator of the relationship between perceived stress and fear of childbirth.

Methods: 262 Polish pregnant women participated in this study. Perceived Stress Scale (PSS-10), Fear of COVID-19 Scale (FOC-6), and Labour Anxiety Questionnaire (KLP II) were used in the study.

Results: There was a statistically significant, moderate, and positive relationship between perceived stress, fear of COVID-19, and fear of childbirth. Fear of COVID-19 was a statistically significant mediator in the relationship between perceived stress and fear of childbirth.

Conclusions: The COVID-19 epidemic may have a negative emotional impact on pregnant women, causing fear, stress, and increased fear of childbirth. Childbirth during the COVID-19 pandemic is perceived by women as a threat to their well-being and health. Therefore, it is especially important to support a woman in the perinatal period and to enable her to give birth to a companion.
Introduction

Pregnancy is a time of many changes in the woman's life. It may be associated with significant emotional stress, which may affect up to 75% of women [1]. Pregnant women are concerned about their health and their unborn child's health. Negative life events such as the outbreak of a contagious disease can also be the cause of stress. Pandemic brings uncertainty, numerous restrictions and changes, and a significant number of stressors [2].

The current COVID-19 pandemic caused by coronavirus SARS-CoV-2 is the largest pandemic of aggressive coronavirus in the human population in the 21st century. The clinical course of the COVID-19 disease varies from mild or even asymptomatic to severe respiratory failure and death [3]. From the current evidence base, it is not possible to conclusively state that pregnant women are at increased risk of severe consequences of COVID-19. Most women will experience mild or asymptomatic disease, but some may require mechanical ventilation and intensive care therapy [4]. In previous SARS-CoV and MERS-CoV coronavirus outbreaks, significant rates of maternal complications, including intensive care admissions, need for mechanical ventilation, and deaths have been observed [5]. This may have exacerbated fear in pregnant women during the COVID-19 outbreak.

While COVID-19 is not associated with a significant risk of severe disease in pregnant women, the same cannot be said for its psychological effects [6]. Pregnant women feel stress, fear, and anxiety during the global pandemic that caused the death of more than 3 million people worldwide. As a result of the rapidly increasing number of cases and deaths, both at-risk individuals and society as a whole, experience psychological distress and other mental health problems [7-10]. Increased responses to stress during and immediately after a serious life event are associated with adverse effects on physical and mental health, which is particularly important for pregnant women.
The presence of contagious diseases contributes to the increase of fear in society, as has already been demonstrated in previous epidemics [11,12]. There was a fear of getting infected, of dying and losing a loved one, and of contact with people who might be infected [13,14]. The COVID-19 pandemic probably increased fear among pregnant women. Women are most concerned about their elderly relatives, the health of their children, and then the health of their unborn child. More than half of women experience significant health anxiety [15]. Studies show that pregnant women believe they are more likely to develop a severe infection. Despite many preventive behaviors, most women are still afraid of getting infected [16]. Pregnant women are afraid of both the continuation of pregnancy and the risk of their own life and the need to terminate it as a result of infection. They are also afraid of the transmission of the infection to the fetus, as well as isolation and quarantine [17].

Pregnancy is also a period of preparation for childbirth, which for many women is a difficult and even traumatic situation. During a pandemic, fear of childbirth may be aggravated by a change in the course of labor. Women are afraid of the course of labor, complications, threats to their own and their child's health and life, and above all, intense pain sensations [18]. We suspect that fear of COVID-19 will be one of the predictors of fear of childbirth. Although there are currently no studies investigating the relationship of these variables. However, it has been shown that the COVID-19 pandemic caused an increase in fear among pregnant women [15,19], and negative feelings, thoughts and emotions during pregnancy, including early pregnancy, influence the later fear of childbirth [20]. Many studies have shown that fear of childbirth is associated with the severity of general anxiety [21,22], and that anxiety as a trait is its predictor [23]. Studies have also shown that support from loved ones is a mediator of fear of childbirth [19, 23, 24], while during a pandemic, family births were banned and women were deprived of this direct support. Therefore, we assume that fear of COVID-19 will be an
important predictor of fear of childbirth and a mediator of the relationship between perceived stress and fear of childbirth.

Materials and methods

Participants & Procedure

262 Polish pregnant women participated in this study. The average age of respondents was 28.40 years. Their exact characteristics are shown in Table 1. Due to the epidemiological threat, the respondents completed the questionnaires via the Internet. The study participants were informed about the anonymity of the study. They could stop filling the survey at any time and without giving any reason. All respondents gave their informed consent to participate in this study. Which was carried following the guidelines of Opole University’s Bioethics Committee.

Table 1. Characteristics of the studied sample (N= 262)

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>28.40</td>
<td>3.78</td>
<td>18.00</td>
<td>39.00</td>
</tr>
<tr>
<td>Week of pregnancy</td>
<td>31.58</td>
<td>7.09</td>
<td>7.00</td>
<td>42.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic</td>
<td>1</td>
<td>.38 %</td>
</tr>
<tr>
<td>Vocational</td>
<td>6</td>
<td>2.29 %</td>
</tr>
<tr>
<td>Secondary</td>
<td>68</td>
<td>25.95 %</td>
</tr>
<tr>
<td>Higher</td>
<td>187</td>
<td>71.37 %</td>
</tr>
<tr>
<td>Place of residence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Village</td>
<td>87</td>
<td>33.21 %</td>
</tr>
<tr>
<td>Town (&lt; 100,000 citizens)</td>
<td>73</td>
<td>27.86 %</td>
</tr>
</tbody>
</table>
Perceived level of stress was measured with the Perceived Stress Scale (PSS-10) [25]. It consists of 10 questions on a 5-point scale. The original version of the scale shows good reliability (Cronbach’s $\alpha$ from .78 to .86).

Fear of the coronavirus was measured with the Polish Fear of COVID-19 Scale (FOC-6) [26]. It is a 6 item questionnaire. Respondents answer the questions using a 5-point scale. The scale shows good reliability (Cronbach’s $\alpha=.83$)
Fear of Childbirth was measured with the Polish Labour Anxiety Questionnaire (KLP II) [27]. It is a 9 item questionnaire. Respondents answer the questions using a 4-point scale. The scale is characterized by acceptable reliability (Cronbach’s $\alpha = 0.69$).

**Statistical Analysis**

Group homogeneity was analysed with $t$-test and one-way ANOVA comparisons. To verify the hypotheses, it was decided to use the correlation analysis and the mediation analysis. The significance of the relationships between variables was tested with Pearson’s $r$ correlation. The mediation analysis was performed using the PROCESS v3.4 macro [28]. The power analysis was conducted using the G * Power 3.1.9.7 [29].

**Results**

**Group Homogeneity Analysis**

Before verifying the mediation hypothesis, it was decided to check whether the tested sample of pregnant women is a homogeneous group. For this purpose, the $t$-test and one-way ANOVA were used. The analyses showed that most of the grouping variables did not significantly differentiate the levels of perceived stress and fear of COVID-19. Statistically significant differences in the level of fear of childbirth were be observed for some grouping variables, however, the effect size measures of these differences ranged from small to moderate. Due to the lack of strong effect sizes and large differences in the numbers in individual categories of grouping variables, it was decided to treat the presented group of study participants as homogeneous. More detailed data are shown in Table 2.
### Table 2. Results of the t-test and one-way ANOVA group comparisons (N= 262)

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Grouping Variable</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
<th>t</th>
<th>p</th>
<th>$\eta^2$</th>
<th>Tukey’s HSD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Stress</td>
<td>Family Childbirth Planning</td>
<td>20.95</td>
<td>8.05</td>
<td>18.76</td>
<td>8.99</td>
<td>1.59</td>
<td>.114</td>
<td>.26</td>
<td></td>
</tr>
<tr>
<td>Fear of Coronavirus</td>
<td>(Yes ; No)</td>
<td>23.15</td>
<td>5.68</td>
<td>22.60</td>
<td>5.67</td>
<td>.58</td>
<td>.562</td>
<td>.10</td>
<td></td>
</tr>
<tr>
<td>Fear of Childbirth</td>
<td></td>
<td>15.57</td>
<td>5.37</td>
<td>13.48</td>
<td>5.97</td>
<td>2.28</td>
<td>.024</td>
<td>.37</td>
<td></td>
</tr>
<tr>
<td>Perceived Stress</td>
<td>Pregnancy</td>
<td>20.10</td>
<td>8.45</td>
<td>21.21</td>
<td>8.45</td>
<td>-1.08</td>
<td>.281</td>
<td>.13</td>
<td></td>
</tr>
<tr>
<td>Fear of Coronavirus</td>
<td>(First; Subsequent)</td>
<td>23.66</td>
<td>5.13</td>
<td>22.33</td>
<td>5.13</td>
<td>1.90</td>
<td>.059</td>
<td>.26</td>
<td></td>
</tr>
<tr>
<td>Fear of Childbirth</td>
<td></td>
<td>16.28</td>
<td>4.98</td>
<td>13.96</td>
<td>4.98</td>
<td>3.47</td>
<td>.001</td>
<td>.47</td>
<td></td>
</tr>
<tr>
<td>Perceived Stress</td>
<td>Childbirth</td>
<td>19.97</td>
<td>8.33</td>
<td>21.78</td>
<td>7.96</td>
<td>-1.71</td>
<td>.089</td>
<td>.22</td>
<td></td>
</tr>
<tr>
<td>Fear of Coronavirus</td>
<td>(First; Subsequent)</td>
<td>23.63</td>
<td>5.22</td>
<td>22.00</td>
<td>6.34</td>
<td>2.23</td>
<td>.027</td>
<td>.28</td>
<td></td>
</tr>
<tr>
<td>Fear of Childbirth</td>
<td></td>
<td>16.37</td>
<td>5.06</td>
<td>13.11</td>
<td>5.72</td>
<td>4.74</td>
<td>&lt;.001</td>
<td>.60</td>
<td></td>
</tr>
<tr>
<td>Perceived Stress</td>
<td>Chronic Diseases</td>
<td>22.47</td>
<td>8.49</td>
<td>19.89</td>
<td>8.04</td>
<td>2.28</td>
<td>.023</td>
<td>.31</td>
<td></td>
</tr>
<tr>
<td>Fear of Coronavirus</td>
<td>(Yes ; No)</td>
<td>23.92</td>
<td>4.87</td>
<td>22.74</td>
<td>5.93</td>
<td>1.51</td>
<td>.133</td>
<td>.22</td>
<td></td>
</tr>
<tr>
<td>Fear of Childbirth</td>
<td></td>
<td>16.69</td>
<td>5.24</td>
<td>14.68</td>
<td>5.52</td>
<td>2.67</td>
<td>.008</td>
<td>.37</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Grouping Variable</th>
<th>F</th>
<th>p</th>
<th>$\eta^2$</th>
<th>Tukey’s HSD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Stress</td>
<td></td>
<td>.74</td>
<td>.529</td>
<td>&lt;.01</td>
<td>-</td>
</tr>
<tr>
<td>Fear of Coronavirus</td>
<td>Education</td>
<td>1.24</td>
<td>.294</td>
<td>.01</td>
<td>-</td>
</tr>
<tr>
<td>Fear of Childbirth</td>
<td></td>
<td>.37</td>
<td>.769</td>
<td>&lt;.01</td>
<td>-</td>
</tr>
<tr>
<td>Perceived Stress</td>
<td></td>
<td>1.09</td>
<td>.337</td>
<td>&lt;.01</td>
<td>-</td>
</tr>
<tr>
<td>Fear of Coronavirus</td>
<td>Place of Residence</td>
<td>1.13</td>
<td>.325</td>
<td>&lt;.01</td>
<td>-</td>
</tr>
<tr>
<td>Fear of Childbirth</td>
<td></td>
<td>6.48</td>
<td>.002</td>
<td>.05</td>
<td>Towns &gt; Cities &amp; Towns &gt; Villages</td>
</tr>
<tr>
<td>Perceived Stress</td>
<td></td>
<td>.15</td>
<td>.858</td>
<td>&lt;.01</td>
<td>-</td>
</tr>
<tr>
<td>Fear of Coronavirus</td>
<td>Trimester</td>
<td>2.45</td>
<td>.088</td>
<td>.02</td>
<td>-</td>
</tr>
<tr>
<td>Fear of Childbirth</td>
<td></td>
<td>.76</td>
<td>.469</td>
<td>&lt;.01</td>
<td>-</td>
</tr>
</tbody>
</table>

Note: Education – df1=3; df2=258; Place of Residence – df1=2; df2=259; Trimester – df1=2; df2=259;

### Correlation & Mediation Analysis

The analysis of the Pearson’s $r$ correlation showed that there was a statistically significant, moderate, and positive relationship between three tested variables – perceived stress, fear of COVID-19, and fear of childbirth. In the next step, a bootstrapped mediation analysis (5000 samples) [30] using the PROCESS 3.4 MODEL 4 was used [28]. Before performing the analysis, variables were z-scored to obtain Beta coefficients. Results show that fear of COVID-19 was a statistically significant mediator in the relationship between perceived stress and fear of childbirth. More detailed data are presented in Table 3.
Table 3. Results of the Pearson’s r correlation and PROCESS model 4 mediation analysis (N=262)

<table>
<thead>
<tr>
<th>Correlation</th>
<th>M</th>
<th>SD</th>
<th>X</th>
<th>M</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>X – Dependent Variable – Perceived Stress</td>
<td>20.60</td>
<td>8.23</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M – Mediator – Fear of Coronavirus</td>
<td>23.06</td>
<td>5.67</td>
<td>.26***</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Y – Independent Variable – Fear of Childbirth</td>
<td>15.24</td>
<td>5.51</td>
<td>.47***</td>
<td>.43***</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mediation</th>
<th>Beta</th>
<th>SE</th>
<th>p</th>
<th>LLCI</th>
<th>ULCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>X -&gt; M</td>
<td>.18</td>
<td>.05</td>
<td>&lt;.001</td>
<td>.077</td>
<td>.274</td>
</tr>
<tr>
<td>M -&gt; Y</td>
<td>.32</td>
<td>.05</td>
<td>&lt;.001</td>
<td>.210</td>
<td>.419</td>
</tr>
<tr>
<td>X(M) -&gt; Y</td>
<td>.25</td>
<td>.04</td>
<td>&lt;.001</td>
<td>.178</td>
<td>.326</td>
</tr>
<tr>
<td>Indirect Effect</td>
<td>.06</td>
<td>.04</td>
<td>.002</td>
<td>.239</td>
<td>.388</td>
</tr>
</tbody>
</table>

Note: *** p<.001

Power Analysis

A post-hoc power analysis using G * Power 3.1.9.7 [29] showed that for a small-to-medium effect size of the presented relationships [$f^2=.08$] and the significance of alpha [.05], the obtained sample was sufficient to obtain a power of [.98].

Discussion

The study aimed to determine the relationship between perceived stress, fear of COVID-19, and fear of childbirth in Polish pregnant women during a global pandemic. Analyses point out that the relationship between all tested variables was significant. Perceived stress, fear of COVID-19, and fear of childbirth were positively correlated with each other. Mediation
analysis showed that fear of COVID-19 acted as a mediator between perceived stress and fear of childbirth.

Pregnancy is associated with significant emotional stress, which is caused by numerous physiological, physical, and psychological changes [31-36]. During this time, women are concerned about existing medical problems, physical symptoms, changes in the body, childbirth, and the health of their unborn child [37,38]. The present study showed that the level of stress measured by the PSS-10 (20.60) is higher compared to the pre-pandemic result of pregnant women (18) [32]. It is also higher than the Polish population average (16.6) [39]. This is consistent with the results of studies that show that pregnant women experience greater stress compared to people in the general population [32]. Some researchers suggest that stress may occur in up to 75% of pregnant women [1]. Perceived stress is related to the assessment of certain life events as potentially threatening. This perception is related to an individual's ability to deal with such events [40]. The cause of stress and negative emotions can be both environmental factors as well as problems related to pregnancy itself and changes in the body.

In addition to factors specific to each pregnancy, important causes of stress include the difficult events experienced during pregnancy, for example, the contagious disease pandemic. Studies have shown that experiencing a natural disaster or a state of emergency during pregnancy contributes to severe emotional distress [2, 41]. Studies show that pregnant women during the COVID-19 pandemic are experiencing moderate to high levels of psychological stress [42-44]. This is likely a result of the social, economic, and health complications that affect pregnant women and their families, as well as uncertainties about the effects of COVID-19 on the fetus [45]. The COVID-19 pandemic has caused fear, anxiety, and stress as a result of the spread of the disease itself, but also because of restrictive measures put to limit community transmission of the virus [14]. COVID-19 restrictions, isolation, and staying at home orders can adversely affect the functioning of pregnant women and increase symptoms of stress [42].
Moreover, pregnant women in most countries suffer from significant changes in the management of pregnancy, the course of labor, and postpartum care. Many health services have reduced face-to-face visits and limited medical services to using telehealth [6]. The combination of rapid transmission of SARS-CoV-2 in the community, death rates, and restrictive public health measures can emotionally and mentally overwhelm women during pregnancy. This can cause increased stress, fear, loneliness, and depression, especially for pregnant women, who are additionally burdened with caring for their health and protecting the unborn child [6].

Recent research identified two major domains of stress related to the COVID-19 pandemic in pregnant women in the US, Poland, Israel, and Germany: stress related to feeling unprepared for the birth due to the COVID-19 and stress associated with fear of COVID-19 infection [2, 46]. Both types of stress are related to the severity of the fear of COVID-19. One study found that around one-third of pregnant women during the COVID-19 pandemic experienced stress, both about preparing for childbirth and about the risk of infection. In addition to confirming factors previously established as contributors to prenatal stress, risk factors that are specific to the pandemic have also been identified, including pandemic-related income loss, the belief that someone is infected with COVID-19, and experiencing changes in prenatal care [45].

The current study showed that the stress experienced by pregnant women is related to fear of COVID-19. Research shows that pregnant women experience significant fear during the COVID-19 pandemic. Preis et al [2] found that pregnant women experienced a high prevalence of mild, moderate, and severe fear of COVID-19. Other research also found that the COVID-19 pandemic caused an increased fear among pregnant women. Women are worried about the health of their elderly relatives, their children, and their unborn child [15]. One study showed that among pregnant women, more than half of the respondents rated the psychological impact of the COVID-19 epidemic as severe, and about two-thirds reported higher than normal fear
and anxiety. Almost half of the women reported high fear regarding the vertical transmission of the disease [42]. The research shows that pregnant women are afraid of both the continuation of pregnancy and the risk of their own life and the need to terminate it as a result of infection. They are also afraid of isolation and quarantine [17]. Pregnant women believe they are more likely to develop a severe course of infection and that they can pass the infection onto their unborn child. Despite many preventive behaviors, most women are still afraid of getting infected [16]. Studies showed that many women overestimate the risk of infection during pregnancy [41].

Also during the current COVID-19 pandemic, the rules of care for a pregnant woman have changed in many countries. Access to health services was difficult. Prenatal care services were postponed except in compulsory and emergencies, while in some countries pregnant women were only asked to come to give birth. The lack of medical appointments dramatic and rapidly changing information from the media additionally increased fear and uncertainty in pregnant women. These situations affect pregnant women's choices and fears about their pregnancy and childbirth care [19,47]. Not surprisingly, more than 80% of women expressed fear of childbirth during the COVID-19 pandemic [6].

In the present study, fear of COVID-19 was found to mediate the relationship between perceived stress and fear of childbirth. Negative feelings, thoughts, and emotions in pregnancy, including the early pregnancy, affect the later fear of childbirth [20]. Pre-pandemic studies showed that fear of childbirth was associated with the severity of general anxiety [21, 22], and that anxiety as a trait was its predictor [23]. It has also been shown that women's experiences related to the fear of childbirth appear to be related to their emotional well-being and symptoms of stress [20, 48]. Also, other studies showed that the risk perception associated with fear of COVID-19 can increase the level of anxiety in pregnant women and mediate the relationship between social support and anxiety. These studies showed that the higher the level of risk
perception by pregnant women, the greater the level of anxiety [49]. Several studies have also shown that fear of COVID-19 can act as a mediator between intolerance to uncertainty and psychological well-being [50] and between perceived health status and insomnia, mental health and preventive behaviors [51].

Pregnant women during the COVID-19 pandemic experience severe stress because they cannot follow the previously prepared birth plan. Some of them are concerned about whether family members may be present during childbirth. There may also be worried about whether a woman or someone in her family will be in quarantine. Due to this stress, some women may expect a cesarean section. The course of labor during an epidemic is also a cause for concern [17]. Research suggests that a lack of control over decisions related to childbirth can be felt as traumatic. In many countries (e.g. the UK) women are asked to attend all prenatal visits alone, and some countries (including Poland) require to give birth alone, even though familial support during childbirth is considered essential for women's well-being [41].

Because of the COVID-19 outbreak, women's expectations of childbirth have completely changed. In the study by Ravalid et al. [6], fear, sadness, and uncertainty occurred in more than half of the women. During a pandemic, fear no longer correlated with expectation, impatience, joy, and meeting, but with sadness, loneliness, anguish, inability, feelings of isolation, and oppression. Childbirth during the COVID-19 pandemic is perceived by women as a threat to their well-being and health. While preparing for childbirth, women felt a sense of danger, fear, and loneliness. Although the media emphasizes that the restrictions are due to security reasons, this does not seem to be sufficient to alleviate the sense of fear and danger perceived by women who feel isolated from their partner and new prohibitions as immense loneliness [6]. Besides, maternity staff may be lower than usual during the COVID-19 pandemic because of reassignment of staff to other areas of the hospital or because of medical workers' infection. Staff may also limit contact with patients for their protection [19, 41, 47].
Therefore, many studies indicate the increased fear of childbirth, which is affected by the COVID-19 pandemic. One study showed that 16% of patients underwent cesarean section at the request of the mother [42]. This percentage is much higher than the 5-10% rate reported in the literature [52]. During the COVID-19 pandemic, due to new hospital restrictions, expectant mothers will have to go through higher levels of stress and fear as they will now have to cope alone as no spouse or companion is allowed to be in the delivery room to support them [6]. Studies have shown that support from loved ones is a mediator of fear of childbirth [24], while in the COVID-19 pandemic, family births were suspended in many countries, and women were deprived of this direct support. Fear and lack of support were predictors of fear of childbirth [22, 35, 53]. It has been shown in the literature that the support of the partner, mother, other family members, and friends of the pregnant woman in the perinatal period is important in reducing stress and fear [47]. Among the human rights relating to pregnancy and childbirth, the WHO recognizes the importance of companionship in childbirth, freedom of delivery positions, keeping mothers and their babies together after birth, and promoting breastfeeding. Unfortunately, in many places around the world, the pandemic has drastically changed care for women and children [6].

The presented study provides new and relevant data. However, it is not free from limitations. A tested mediation model may suggest causal relationships. The mediation analysis is only a complementary tool that does not allow to determine the cause and effect relationships. To verify such relationships, a longitudinal study should be carried out. The presented results are based on the Polish population. International research should be carried out to verify the significance of the proposed model. This would additionally require the use of the cultural equivalence analysis to compare various cultural groups.

**Conclusion**
From current research it can be concluded that the COVID-19 epidemic may have a negative emotional impact on pregnant women, causing fear and stress. Our results show that fear of COVID-19 was a mediator in the relationship between perceived stress and fear of childbirth. It is also worth paying attention to the fact that strong negative emotions that appear during pregnancy may cause and increase pregnancy symptoms and pregnancy complications, and may affect the mother's well-being, the course of pregnancy, and the child's condition.

Many studies have shown that high levels of perceived stress and fear during pregnancy are associated with several negative health consequences such as pregnancy complications, miscarriages, preterm labor, low birth weight, postnatal depression, and negative developmental outcomes in infancy [54-57]. Therefore, it is especially important to support a woman in the perinatal period and to enable her to give birth to a companion. It can be assumed that this will be a factor that will significantly reduce the fear of childbirth during the COVID-19 pandemic.

Abbreviations

COVID-19 - coronavirus disease 2019; SARS-CoV - severe acute respiratory syndrome coronavirus; MERS-CoV - Middle East respiratory syndrome coronavirus; PSS-10 - Perceived Stress Scale; FOC-6 - Fear of COVID-19 Scale; KLP II - Labour Anxiety Questionnaire;

Ethics approval and consent to participate

The presented study was in accordance with the guidelines of the Bioethics Committee of the University of Opole (no number assigned due to the Committee’s internal legal acts). Written informed consent about the participation in the study was routinely obtained from all study participants.
Consent for publication

Not applicable.

Availability of data and material

The data can be available from the corresponding author on the reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

JD conceived and designed the study and wrote the first and final draft of the manuscript. RG analyzed the data and wrote the final draft of the manuscript. AI designed the study and collected the data. MB supervised the research project and wrote the final draft of the manuscript. All authors have read and approved the manuscript.

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