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Women’s Experiences of Symptoms of Suspected or Confirmed COVID-19 Illness During the Pandemic

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ABSTRACT

Objective: To explore experiences of symptoms of suspected or confirmed COVID-19 illness among women using the CovidWatcher mobile citizen science app.

Design: Convergent parallel mixed-methods design.

Participants: Twenty-eight self-identified women consented for follow-up after using CovidWatcher. Participants’ ages ranged from 18 to 83 years old.

Methods: We collected data via semistructured, virtual interviews and surveys: the COVID-19 Exposure and Family Impact Survey and Patient-Reported Outcomes Measurement Information System measures. We used directed content analysis to develop codes, categories, themes, and subthemes from the qualitative data and summarized survey data with descriptive statistics.

Results: We derived five themes related to symptom experiences: (a) Physical Symptoms, (b) Mental Health Symptoms, (c) Symptom Intensity, (d) Symptom Burden, and (e) Symptom Trajectories. Subthemes reflected more nuanced experiences of suspected or confirmed COVID-19 disease. For those without COVID-19, anxiety and mental health symptoms were still present. Of those who attested to one of the PROMIS-measured symptoms, all but one had at least mild severity in one of their reported symptoms.

Conclusion: This study demonstrates the cross-cutting impact of the COVID-19 pandemic on individuals who identify as women. Future research and clinical practice guidelines should focus on alleviating physical and mental health symptoms related to the ongoing pandemic, regardless of COVID-19 diagnosis.
As of September 2022, the United States has had more than 95 million confirmed cases of the novel coronavirus (COVID-19) infection (Johns Hopkins University, 2022). Although there are sex differences in COVID-19 case fatality rates, with men being at greater risk of dying, researchers suggest that women between the ages of 30 and 60 years are the most vulnerable to SARS-CoV-2 infection (Dehingia & Raj, 2021). Researchers noted the impact of the pandemic on women across fields, including education (Augustus, 2021), the labor workforce (McKinsey & Company, 2021), and gender equality (Alon et al., 2020). In women’s health care, researchers have shown negative impacts of the pandemic in a variety of areas, including intimate partner violence (Sediri et al., 2020), stress during pregnancy (Preis et al., 2020), and the emotional impact of infertility (Galhardo et al., 2021).

During the early pandemic, public health department officials and clinicians advised individuals with acute symptoms (e.g., fever, mild shortness of breath, sore throat, loss of taste or smell) to stay at home and monitor without receiving diagnostic confirmation of the virus (Caliendo & Hanson, 2022). Symptom self-monitoring and management quickly became a part of everyday life as daily symptom attestations for in-person activities became more widely used. Ultimately, the COVID-19 pandemic required a higher level of self-monitoring and management of symptoms than most individuals were accustomed to. Citizen science, or the public actively participating in collecting data for a research purpose, allows individuals to self-monitor by entering key information that helps support a specific health goal. There are multiple mobile apps available for women’s health, such as menstrual cycle trackers (Pichon et al., 2022), and citizen-science approaches to collect women’s symptoms and self-management in enigmatic diseases like endometriosis (McKillop, Mamykina, & Elhadad, 2018; Urteaga et al., 2020). Although symptom tracking and self-management are not new concepts in nursing research (Hickey et al., 2019), they are now large-scale options for acute and chronic conditions, such as COVID-19. Citizen science apps can support the self-monitoring of symptoms through a free survey interface where participants can enter daily symptom information, as well as reports about daily life, social support, and instrumental support needs during the pandemic (Columbia University, 2020; Turbe et al., 2021). One of these apps is Covid-Watcher, which allows users from across the United States to answer daily surveys on COVID-19 symptoms and the experiences of day-to-day life during the pandemic.

Although tracking apps can help identify symptom incidence, duration, and time lines, they often do not provide a rich depth of experiences outside of the reporting constraints of the app. Qualitative research has been used to expand on the lived experiences of participants with symptoms related to acute coronary syndrome (Davis, 2017), breast surgery (Mazor et al., 2017), and stress during childhood (Cheetham-Blake et al., 2019). Symptom self-monitoring has been shown to have a role in reducing health disparities (Nguyen et al., 2021; Schaffer et al., 2018); thus, examining individuals’ pandemic experiences could help identify gaps for health intervention. The purpose of this study was to explore the experiences of symptoms of suspected or confirmed COVID-19 illness among women using the CovidWatcher mobile citizen science app.

Methods

Research Design

A convergent parallel mixed-methods design was used. Qualitative and quantitative data were collected and analyzed together to find areas of overlap. Qualitative data were analyzed using a qualitative descriptive methodology, which is best suited to phenomena that are not well understood (Sandelowski, 2000), such as COVID-19 symptom experiences. Furthermore, this methodology centers the participant’s voice by allowing for the presentation and description of experiences using easy-to-understand language with minimal interpretation from the researcher (Bradshaw et al., 2017; Sandelowski, 2000; Sullivan-Bolyai et al., 2005). Using this approach, data collection and analysis occur simultaneously, and researchers make efforts to remain close to the data during analysis (Sandelowski, 2000).
Women’s Experiences of COVID-19 Symptoms

CLINICAL IMPLICATIONS

- Clinicians who care for women across the lifespan should be aware of the physical and mental toll that the COVID-19 pandemic may take on those they care for, regardless of a confirmed diagnosis of COVID-19 disease.
- Individuals are experts in their symptomology and can use mobile apps to self-manage symptoms and evaluate symptom severity.
- Clinicians should assess women diagnosed with COVID-19 for burdensome symptoms, such as fatigue, that may affect their quality of life or ability to perform social roles such as caregiving.

2000). The University of California, San Francisco Symptom Management Model directed the development of the interview guide (Dodd et al., 2001). This model proposes that symptom management, symptom experience, and outcomes are interconnected and influenced by factors related to the person experiencing the symptoms, their health or illness, their environment, and nursing science factors (Dodd, 2001). Quantitative data were analyzed using descriptive statistics and a comparison of means for our survey measures.

Recruitment and Sample

We used purposive sampling to recruit a diverse sample of participants from across the lifespan who could provide rich information about the phenomenon of women’s experiences of COVID-19 symptoms (Patton, 2015; Sandelowski, 2000).

To identify participants with first-hand experience of the phenomenon of interest, we conducted study recruitment through CovidWatcher (n = 1,109 users), a nationwide citizen science app. Participants responded to various survey questions about their experience during the COVID-19 pandemic. CovidWatcher participants who identified as female (n = 551 users) and had consented to be contacted were contacted by the study team for recruitment. Individuals were eligible for inclusion in this study if they (a) were a CovidWatcher participant who consented for future contact for research, (b) answered the symptoms attestation question at least once during their use of the app, (c) self-identified as a woman, (d) were able to participate in a videoconference interview in English or Spanish, and (e) were at least 18 years old.

Ethical Considerations

The Columbia University institutional review board approved this study (AAAT4525). Participants gave verbal consent before the interviews. We conducted the interviews using the Health Insurance Portability and Accountability Act (HIPAA)-compliant, secure videoconferencing platform Zoom Pro. To maintain confidentiality, participants were asked to use a pseudonym and to refrain from sharing identifying information during the interview. Study recordings, transcripts, and surveys were stored on a secure system accessible only to the research team. Participants received a $50 gift card by mail upon completion of the interview.

Data Collection

Each participant completed one semistructured interview between April and July 2021. We used an iterative interview guide (see Supplementary Figure S1); Box 1 displays sample interview questions. Nondirective probes (i.e., “Can you tell me more about that?”) were used to gain an in-depth understanding of symptom experiences and burden. The interview guide included a combination of open-ended and closed-ended (i.e., symptom inventory) questions and was developed through discussion with the research team and pilot tested with a principal investigator and study coordinator, in English and Spanish, before use.

Because of the potential lag time between a participant’s symptom experience and their interview, researchers used the critical incident technique to situate and remind the participant when they experienced their symptoms (Byrne, 2001; Lindberg et al., 1993). The critical incident technique includes asking participants to recall and describe a time when a behavior, action, or occurrence affected (positively or negatively) a specified outcome (Viergever, 2019). In this study, we asked participants to recall a time during the pandemic when they experienced symptoms that may be related to a diagnosis of COVID-19 (Byrne, 2001; Viergever, 2019). Each interview was conducted by two members of the research team with expertise in women’s health and/or qualitative research. Field notes (see Supplementary Figure S2) were created during and after the interviews to document nonverbal cues, participant characteristics, and a symptom time line.

BOX 1  SAMPLE INTERVIEW QUESTIONS

- Can you describe your experience when you first started having symptoms that you thought might be COVID-19?
- How long did each symptom last?
- Compared to being sick in the past, how severe were your symptoms?
- What were your most distressing symptoms?
- Did any symptoms prevent you from carrying out daily activities? Which ones?
Data collection ended once saturation, defined as the point at which no new information is learned from participant interviews, was achieved. A saturation table (Kerr et al., 2010) was created concurrently with data analysis and indicated that symptom saturation was reached after eight participant interviews. We conducted 20 additional interviews to confirm symptom saturation and expand on the pandemic’s mental, physical, and social impacts. The interviews were audio and video recorded, and the audio recordings were professionally transcribed. After transcription, we verified the transcripts for accuracy and removed any remaining identifying information. Dedoose version 9.0.46 (SocioCultural Research Consultants, 2022), a secure online software with encryption technology, was used to organize the data.

To further characterize the symptom experiences from a quantitative measure, participants were asked to complete symptom-specific Patient-Reported Outcomes Measurement Information System (PROMIS) measures (e.g., anxiety, depression, fatigue, pain, cognition) if they attested to that symptom during their interview (Redeker et al., 2015). PROMIS measures ask about a participant’s symptom experience over the last 7 days (HealthMeasures, 2022). To understand the broader impact of the pandemic on symptom experiences, participants also completed the COVID-19 Exposure and Family Impact Survey (CEFIS; Kazak et al., 2021). The CEFIS has three parts. Part 1 (25 questions, yes/no responses) measures the participant’s likelihood of exposure to COVID-19. The Exposure Score is a count of “Yes” responses and ranges from 0 to 25. Part 2 (12 questions) measures the impact of the pandemic on a family, with higher scores meaning a more negative impact or greater distress. The Impact Score may range from 12 to 60. Part 3 is an open-ended question for participants to expand on their experiences during the pandemic.

**Data Analysis**

We used an iterative codebook to guide our qualitative data analysis and defined boundaries, definitions, and examples for each code (MacQueen et al., 1998). To code the interviews, we used directed content analysis driven by the interview guide. Inductive coding was then used for codes not captured by deductive coding. We assigned codes to meaningful units in the data as they emerged from a line-by-line reading of the interview transcripts (Elo & Kyngäs, 2008). Shared codes were collapsed into categories, themes, and subthemes developed from shared categories. Two researchers coded the first five interviews, and then each coded half of the remaining interviews, meeting weekly to discuss the codes and update the codebook. Both researchers came to a consensus on all new codes through discussion.

We took several steps to ensure the rigor of the qualitative data. We performed member checking during data collection to ensure that emerging findings resonated with participants (Guba, 1981) and engaged in reflexive bracketing throughout data collection and analysis to reduce the influence of researcher bias on the data (Ahern, 1999). We also created field notes that included a symptom time line for each participant to triangulate the data. Finally, we engaged in regular peer debriefing meetings with other qualitative researchers during data collection and analysis.

For our survey measures, we calculated descriptive statistics, including the mean and standard deviation for continuous variables and frequencies for categoric variables. We tested for normality of the Exposure Score and Impact Score between participants with a suspected or confirmed case of COVID-19 compared to those without using the Shapiro–Wilk normality test. We compared the mean Exposure Score using an independent two-sample t test in RStudio (RStudio Team, 2020). The mean Impact Score between groups was not normally distributed; therefore, we used the nonparametric two-sample Wilcoxon rank test. PROMIS measures were scored and summed to create a total value for each participant. The T-scores and SE values were calculated using the total value of the ordinal responses. Published cut points were used to categorize T-scores into within normal limits, mild, moderate, or severe (Cella et al., 2010; Hays et al., 2015).

**Results**

The final sample size was 28, with 71% of participants identifying their race as White ( n = 20), 21% as Black ( n = 6), and 4% ( n = 1) as Asian; 1 (4%) participant declined to answer, preferring not to identify by her ethnicity. Furthermore, 46% ( n = 13) of participants identified their ethnicity as Hispanic. Eighty-five percent ( n = 24) of participants were located in the U.S. Northeast, 11% ( n = 3) in the U.S. South, and 4% ( n = 1) in the U.S. West. We present participant demographic characteristics, including age, race and ethnicity, reported symptoms, and COVID-19 diagnosis status in Table 1.

Although all of the participants reported that they had experienced COVID-19–like symptoms at some point since March 2020, only 7% ( n = 2) of participants had a confirmed COVID-19 diagnosis (polymerase chain reaction or rapid antigen test), 25% ( n = 7) likely had COVID-19 based on symptomology and exposure reporting, and 68% ( n = 19) had neither a likely nor a confirmed diagnosis of COVID-19.

**The effect of living in a pandemic is associated with increased somatic symptoms, especially for those under increased stress**

**Themes**

Our interview questionnaire probed for experiences related to COVID-19 and COVID-19–like illness as well as the intensity, burden, and trajectory of each participant’s symptom
recovery. Interview duration ranged between 45 and 60 minutes per participant. Five themes emerged from the data: Physical Symptoms, Mental Health Symptoms, Symptom Intensity, Symptom Burden, and Symptom Trajectories. Box 2 presents themes and codes; Table 2 provides exemplars representative of each theme.

### TABLE 1 PARTICIPANT DEMOGRAPHICS AND REPORTED SYMPTOMS

| Variable             | COVID-19 Diagnosis Status |
|----------------------|---------------------------|
|                      | Confirmed (n = 2)         | Suspected (n = 7) | Negative (n = 19) |
| Age, years, M (SD)   | 51.5 (7.8)                | 28.3 (7.4)        | 43.8 (18.6)       |
| Ethnicity, n (%)     |                           |                   |                   |
| Hispanic             | 1 (50.0)                  | 3 (42.9)          | 9 (47.4)          |
| Non-Hispanic         | 1 (50.0)                  | 4 (57.1)          | 10 (52.6)         |
| Race, n (%)          |                           |                   |                   |
| White                | 2 (100.0)                 | 6 (85.7)          | 12 (63.1)         |
| Black                | 0 (0.0)                   | 1 (14.3)          | 5 (26.3)          |
| Asian                | 0 (0.0)                   | 0 (0.0)           | 1 (5.3)           |
| Declined             | 0 (0.0)                   | 0 (0.0)           | 1 (5.3)           |
| Symptoms, n (%)      |                           |                   |                   |
| Cough                | 2 (100.0)                 | 7 (100.0)         | 11 (57.9)         |
| Fever                | 1 (50.0)                  | 4 (57.1)          | 2 (10.5)          |
| Headache             | 2 (100.0)                 | 7 (100.0)         | 7 (36.8)          |
| Shortness of breath  | 2 (100.0)                 | 5 (71.4)          | 8 (42.1)          |
| Fatigue              | 2 (100.0)                 | 6 (85.7)          | 7 (36.8)          |
| Muscle aches         | 2 (100.0)                 | 5 (71.4)          | 5 (26.3)          |
| Loss of smell        | 1 (50.0)                  | 4 (57.1)          | 0 (0.0)           |
| Loss of taste        | 1 (50.0)                  | 3 (42.9)          | 0 (0.0)           |
| Sore throat          | 1 (50.0)                  | 4 (57.1)          | 6 (31.6)          |
| Congestion           | 0 (0.0)                   | 5 (71.4)          | 8 (42.1)          |
| Chills               | 2 (100.0)                 | 4 (57.1)          | 2 (10.5)          |
| Runny nose           | 0 (0.0)                   | 0 (0.0)           | 5 (26.3)          |
| Nausea/vomiting      | 1 (50.0)                  | 2 (28.6)          | 5 (26.3)          |
| Back pain            | 0 (0.0)                   | 0 (0.0)           | 2 (10.5)          |
| Diarrhea             | 1 (50.0)                  | 1 (14.3)          | 5 (26.3)          |
| Insomnia             | 0 (0.0)                   | 0 (0.0)           | 2 (10.5)          |
| Rash                 | 0 (0.0)                   | 0 (0.0)           | 1 (5.3)           |
| Palpitations         | 0 (0.0)                   | 0 (0.0)           | 1 (5.3)           |
| Earache              | 0 (0.0)                   | 0 (0.0)           | 1 (5.3)           |
| Indigestion          | 0 (0.0)                   | 0 (0.0)           | 1 (5.3)           |
| Constipation         | 0 (0.0)                   | 0 (0.0)           | 1 (5.3)           |
|                      | 0 (0.0)                   | 0 (0.0)           | 1 (5.3)           |

Note. Postvaccine side effects were not included in the table for participants who had received the COVID-19 vaccine before their interview.
**Physical Symptoms.** The most frequently reported symptoms across all of our participants, regardless of suspected diagnosis, were cough (n = 20), headache (n = 16), shortness of breath (n = 15), fatigue (n = 15), congestion (n = 13), muscle aches (n = 12), sore throat (n = 11), and nausea (n = 8). Of those who had a likely or confirmed COVID-19 case (n = 9), headache (n = 9), fever (n = 5), and chills (n = 5) were the most commonly reported physical symptoms. At the time of the interview, only five participants had received their first two COVID-19 messenger RNA vaccinations, and all five reported symptoms consistent with an immune response to the vaccine. Participants reported palpitations (n = 1), rash (n = 1), back pain (n = 1), and insomnia (n = 1) when asked if they experienced any other symptoms outside of the Electronic symptoms list.

**Mental Health Symptoms.** We found substantial overlap between physical and mental health symptoms, including psychosomatic representations of anxiety, depression, and panic. For example, three participants endorsed shortness of breath related to stress and anxiety. Twenty-seven (96%) participants stated that they had mental health consequences of the pandemic. The remaining participant (#16) said she had been protected because of her racial identity: “Many of my friends feel the same way that life has not been terrible for us. White privilege has been very big.” One participant described her situational depression related to pandemic fatigue and expanded on her symptom experience of building anxiety by saying,

> In terms of vulnerability, the other piece of this that’s layered into this for me is that I have an anxiety disorder that often manifests with physical symptoms. Those first two weeks, in particular, two to three weeks, I would say, it was pretty bad anxiety and panic. (#25)

**BOX 2  INTERVIEW THEMES AND CODES**

**Physical symptoms:** Fatigue, cough, brain fog, body aches, pain, diarrhea, nausea, fever, chills, headache, loss of taste/smell, exhaustion, shortness of breath, sore throat, congestion  

**Mental health symptoms:** Depression, anxiety, panic attacks, stress, seeking mental health treatment, “No end in sight”  

**Symptom intensity:** “Worst [symptom] of my life,” seeking medical care for symptoms, symptoms compared to previous illness  

**Symptom burden:** Symptom distress, “not back to normal,” symptom checking, symptom tracking  

**Symptom trajectories:** Initial symptom, hiding COVID symptoms, self-diagnosis, symptoms prompting COVID diagnosis or testing, symptoms resolving, recovery process, symptom-driven testing, long COVID

Even without a history of anxiety or panic disorder, a common thread for many individuals was a heightened sense of insecurity and safety needs with a strong feeling of being out of control. One participant (#4), when prompted about if she has postacute sequelae of COVID (PASC), said, “I guess I am technically a COVID long-hauler, like, if you use that to describe, like, the mental health as a result of [the pandemic].” This emotional distress manifested as physical symptoms that overlapped with the COVID-19 symptom description. For many of our participants, using polymerase chain reaction or antigen testing (if available) helped reduce physical symptoms, which were often related to anxiety. A negative result provided temporary relief from anxiety related to a potential COVID case. “I’m like, thank God I know for a fact twice a week I don’t have it” (#4).

**COVID-19 Symptom Intensity.** We asked the nine participants who had a likely or confirmed case of COVID-19 about the intensity of symptom experiences. Six participants endorsed having the “worst [symptom] of my life,” including “the worst of everything” (n = 3), headache (n = 4), fatigue (n = 3), and sneezing (n = 1). Two participants said that their loss of taste and smell was particularly severe because they had never experienced those symptoms before. Compared to previous illnesses, several participants (n = 4) said that the symptom experience for COVID-19 was significantly different. One participant noted the presence of a particular symptom as a defining characteristic. She said,

> The fact that I had a fever was different. Like I get cold, but I rarely ever get a fever, so that’s why I was like, okay, this is a little different because I rarely experienced fevers. When I do, it tends to be really bad. (#3)

Because of their symptom severity, several participants considered going in person to a health care provider or hospital but were afraid of the crowds or potential exposure. One participant (#1) noted the ability to access telehealth services through her hospital system, where she was able to access medication prescriptions for her symptoms and connect with a specialist.

**COVID-19 Symptom Burden.** We assessed symptom burden among participants by asking them to describe their most distressing symptoms. Lingering symptoms or a feeling of “not being back to normal” was particularly distressing to some participants. A participant (#1) who experienced lingering parosmia after regaining her sense of smell described, “So that’s just it. I don’t, I don’t. I don’t feel like I’m back to normal. So there’s that, like, I’m not, I haven’t recovered, because oranges don’t smell like oranges anymore.” Some participants described physical symptoms such as headache, insomnia, or fever as particularly stressful because they interfered with their ability to perform daily tasks. Symptoms were especially burdensome if a participant...
have no one to support them. One participant (#24) said, “I think having people take care of you is helpful, and I didn’t really have that.” In contrast, other participants noted increased caregiving responsibilities during the pandemic, and there was a sense of concern among our participants about how their physical symptoms would affect these responsibilities in their household and extended family. One participant (#12) noted that she had to fill in for her mother’s caretaker for an extended period during the pandemic. This resulted in the participant experiencing increased back pain related to transferring and supporting her mother’s mobility. Another participant (#9) said she was trying to avoid the urban subway to decrease her potential exposure to COVID. She reported limiting travel to outings necessary to support her mother in caregiving duties for her grandmother with Alzheimer disease. Although she recovered from an early suspected COVID case, she still reported stress-related symptoms at the time of the interview, related to family caregiving responsibilities.

To monitor the severity and burden of their symptoms, many participants implemented symptom checking and tracking strategies to evaluate their overall health status. One participant (#18) monitored how long symptoms lasted to determine whether or not there was cause for concern. She said, “I was careful to monitor it to see if it would last more than 24 hours. And most of the time, it didn’t last more than 24 hours.” Even those in the study without suspected or confirmed COVID-19 disease used symptom monitoring through mobile apps, wearables, and medical equipment (e.g., pulse oximeter, thermometer) to assess their physical state. Specific to COVID tracking, participants indicated using apps in addition to CovidWatcher (e.g., Zoe, COVID Symptom Study), their employer’s symptom attestation, or their state-sponsored website or app for symptom and exposure tracking. One participant (#23) used a running note on her cell phone if she

| Theme                        | Exemplar Quotes                                                                                                                                                                                                 |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| **Physical Symptoms**        | And all of a sudden, I got this little like cough feeling, this pressure on my lungs which was new. (#1) I also lost my smell and my taste. (#2)                                                              |
| **Mental Health Symptoms**   | I would say that I think that probably suicidal thoughts have probably gotten worse over the last couple, year and a half. Probably due to the pandemic but also due to the unemployment, lack of support there and the demoralizing feeling of not having a job, worrying about paying for things. (#13) But mentally, I just wasn’t in a good place. So, I really have been trying to make an effort this semester to actually—and this has been the hardest semester, my mental health out of the two. But I have also been making a lot more effort to try and help myself, I guess. (#10) |
| **Symptom Intensity**        | The headache, the headache, the back pain that, like, it was really like a spinal thing, you know. That was probably the worst sore back headache I’ve ever had. And muscle ache. (#1) Because it’s different symptoms to the other diseases that I had. It’s different, the disease is totally different. I have had a flu, other flus; it’s very different. (#22) |
| **Symptom Burden**           | I think the exhaustion honestly. I just wasn’t able to do anything and by that I don’t mean . . . I guess it depends a little bit on the when, because it was distressing initially when I was so sick and I couldn’t get out of bed to get a glass of water. (#23) I would say the aches. Those are most debilitating. (#5) |
| **Symptom Trajectories**     | I had the residual symptoms of loss of smell and taste, those continued for about a month after. I remember I started having shortness of breath. I got all better, I wasn’t feeling sick anymore and then I started having shortness of breath in May I feel. (#17) The fatigue lasted a long time. It got less bad, there was the extreme fatigue the first week and then it got less bad. I went back to work, I mean I work remotely now but I would work but it was sort of building up and then also with shortness of breath, it’s more getting back my endurance. (#24) |

had exposed myself even just going to the store, or whatever, I would just write down . . . like, today, such and such happened, and then I could keep track of when the two weeks was up, and that sort of thing.

For some, documenting their data and experiences empowered them to protect themselves, ensure that they were acting appropriately with precautions, and evaluate their ability to go out into the world (e.g., work, social engagements, travel). One participant (#1) even said that “it was almost like a comfort to be able to [feel] like somebody cares” when she would add her symptoms to the CovidWatcher app.

**COVID-19 Symptom Trajectories.** For participants with likely or confirmed COVID-19, initial symptoms were sore...
throat (n = 3), fatigue (n = 2), cough (n = 1), fever (n = 1), and headache (n = 1). Several participants reported an initial symptom and then self-monitored to see if they would develop other symptoms that would lead them to believe they may have COVID-19 disease. One participant (#1) endorsed feeling confused about what to do about her initial “tickle in [her] throat.” She said, “[I] didn’t think too much of it. Was a little bit nervous because we were visiting grandparents, but just, you know, let it go.” Summarizing her experience, participant #6 said,

After I had initially gotten sick, over the first three or four days where the symptoms were really dramatic, I could feel them just getting worse and worse, until in the middle of the night, I just woke up and my fever had just broken in the middle of the night, but then I couldn’t smell or taste anything the next morning, but after that, it was really quite sudden. I’d say, once it got worse, all of a sudden, it got more or less better and more manageable.

The average duration of their symptom experiences was less than 2 weeks. However, one participant said she was still dealing with and adapting her lifestyle to her physical symptoms at the time of the interview, which was almost 10 months after her likely COVID-19 infection. Reflecting in the interview on her early symptom period with COVID, she (#1) said, “But for a while, it [her symptoms] was such a big part of my life that didn’t go away quickly that I was like, well, yeah, I’m still suffering from COVID symptoms.”

**Survey Results**

Using the CERIS instrument, the average Exposure Score was 12.0 (SD = 3.8), and the average Impact Score was 43.1 (SD = 8.2). When we compared the mean Exposure Score between those who had a suspected or confirmed COVID-19 case (n = 9) with those who did not (n = 19), there was no statistically significant difference (p = .97). Furthermore, there was also no significant difference in the Impact Score between the groups (p = .73).

The symptom-specific PROMIS measure T-scores are shown in Table 3. Anxiety was the most commonly reported symptom (n = 23) that participants were still experiencing after their reporting in CovidWatcher, followed by depression (n = 20), cognitive issues (n = 19), fatigue (n = 13), and then pain (n = 2). The most commonly reported symptom in the severe range was cognition (n = 2). Only three participants did not report still experiencing symptoms measured through the PROMIS scales. Of those who did attest to one of the PROMIS-measured symptoms, all but one had at least mild severity in one of their reported symptoms.

**Discussion**

This study describes symptoms, symptom intensity, symptom burden, and symptom trajectories for women with and without COVID-19 diagnoses across the United States. Participants’ descriptions of COVID-19 symptoms complement the current research literature; none of the studies in a recent systematic review of COVID-19 symptoms provided information on the chronicity or intensity of symptoms (Keeley et al., 2020). Additionally, our theme of Symptom Trajectories is particularly salient considering that symptom trajectories differ by sex, because women diagnosed with PASC are more likely to report anxiety, malaise, and fatigue (Sykes et al., 2021). However, further qualitative research is needed to explore the symptom trajectory and burden of PASC.

Our results support the conclusion that the COVID-19 pandemic has had a profound impact on women’s physical and mental health, regardless of confirmed COVID-19 diagnosis

In our study, women reported varied symptom experiences regardless of a confirmed COVID-19 diagnosis. PROMIS measures showed that participants are still experiencing distressing or bothersome symptoms related to anxiety, depression, fatigue, and pain months after their symptom reporting in CovidWatcher. Our findings support the existing quantitative literature on COVID-19 symptoms, which indicates low levels of confirmed diagnoses as well as symptoms reported by individuals without confirmed COVID-19 diagnoses. Although individuals with COVID-19 in a German study reported more symptoms, symptoms were reported across all three groups of positive test result, negative test result, and not tested; fatigue was the most reported symptom regardless of COVID diagnosis (Zens et al., 2020). This study is consistent with our finding that individuals experienced symptoms during the pandemic, irrespective of whether they had a confirmed case of COVID-19. The reporting of symptoms by individuals without a confirmed COVID-19 diagnosis points to possible issues in testing availability during the early stages of the pandemic (Rong et al., 2020) as well as the larger impacts of the pandemic on physical and mental health.

Participants in our study reported an average Impact Score of 43.1, which signifies a negative effect on the family and average–high distress regarding the events of the pandemic (Kazak et al., 2021). However, there were no significant differences in the Exposure Score or Impact Score between individuals who had a suspected or confirmed COVID-19 diagnosis and those who did not. This finding reinforces the idea that, regardless of COVID-19 status, there are physical and mental health impacts of living in a pandemic. The mental health impacts of the pandemic, particularly for vulnerable populations who may have had more negative repercussions,
| Symptom Measure | Anxiety | Depression | Fatigue | Pain | Cognition |
|-----------------|---------|------------|---------|------|-----------|
| n (%)           | 23 (82.1) | 20 (71.1) | 13 (46.4) | 2 (7.1) | 19 (67.9) |
| Mean (SD)       | 56.3 (8.9) | 56.0 (5.2) | 56.3 (8.1) | 51.2 (5.2) | 40.4 (9.1) |

Participants \((n = 28)\) T-Score (SE)

|   | Anxiety | Depression | Fatigue | Pain | Cognition |
|---|---------|------------|---------|------|-----------|
| 1 | 48.8 (2.9) | 53.4 (2.1) | 46.1 (2.1) | 47.5 (3.7) | 30.2 (2.8) |
| 2 | —       | —          | —       | —    | —         |
| 3 | 39.1 (5.9) | 48.3 (2.8) | 49.4 (2.1) | —    | 28.6 (3.1) |
| 4 | 62.0 (2.2) | 57.0 (2.0) | —       | —    | 35.2 (2.6) |
| 5 | 64.6 (2.2) | 59.3 (2.0) | 58.8 (1.9) | —    | —         |
| 6 | 58.2 (2.2) | 53.4 (2.1) | 57.6 (1.9) | —    | —         |
| 7 | 52.7 (2.4) | —          | 49.4 (2.1) | 54.8 (3.9) | 39.5 (2.6) |
| 8 | 45.9 (3.4) | —          | —       | —    | 31.6 (2.7) |
| 9 | 63.3 (2.2) | 55.9 (2.0) | —       | —    | 52.5 (3.1) |
| 10| 72.7 (2.2) | 65.5 (2.0) | —       | —    | 50.7 (2.9) |
| 11| 56.9 (2.2) | 55.9 (2.0) | —       | —    | 36.3 (2.6) |
| 12| —        | 58.1 (1.9) | —       | —    | 44.0 (2.6) |
| 13| 62.0 (2.2) | 64.2 (2.0) | —       | —    | 42.9 (2.6) |
| 14| 39.1 (5.9) | —          | —       | —    | 40.6 (2.6) |
| 15| —        | —          | —       | —    | —         |
| 16| —        | —          | —       | —    | —         |
| 17| —        | —          | 55.9 (2.0) | 53.7 (2.0) | —         |
| 18| 67.3 (2.2) | 59.3 (2.0) | 67.8 (2.0) | —    | —         |
| 19| 68.6 (2.2) | 64.2 (2.0) | —       | —    | 52.5 (3.5) |
| 20| 48.8 (2.9) | 52.0 (2.2) | —       | —    | 36.3 (2.6) |
| 21| 45.9 (3.4) | —          | —       | —    | —         |
| 22| 59.4 (2.2) | 61.7 (2.0) | 67.8 (2.0) | —    | 63.2 (5.8) |
| 23| 59.4 (2.2) | —          | —       | —    | —         |
| 24| 55.6 (2.2) | 52.0 (2.2) | 49.4 (2.1) | —    | 37.4 (2.6) |

(continued)
have been reported extensively in the literature (Perlis et al., 2021; Racine et al., 2021). Ettman and colleagues (2020) found a threefold increase in depression prevalence during the pandemic; socioeconomic factors, such as low income, and stressors, such as job loss, were noted to increase risk (Ettman et al., 2020). Researchers who conducted a systematic review of the impact of COVID-19 on mental health reported similar findings (Vindegaard & Benros, 2020). Living in a pandemic was also associated with increased anxiety, depression, and poorer psychological well-being; this finding was especially pronounced among women, those with poorer self-reported health, and those who had relatives with COVID-19 (Vindegaard & Benros, 2020).

The effect of living in a pandemic is associated with increased somatic symptoms, especially for those under increased stress, such as caregivers of elderly family members (Park, 2021). A study of family caregivers found that full-time caregivers reported increased physical symptoms such as headache, body ache, and abdominal discomfort during the pandemic compared to noncaregivers (Park, 2021). This finding is especially salient to our study, because some of our participants noted increased family caregiving responsibilities during the pandemic. Overall, our results support the conclusion that the COVID-19 pandemic has had a profound impact on women’s physical and mental health, regardless of confirmed COVID-19 diagnosis.

A strength of our study is the use of self-reported data from users across an extensive, nationwide citizen science app complemented by in-depth qualitative interviews and standardized PROMIS measures. Moreover, almost half our sample identified as Hispanic; a group that is typically underrepresented in research. Our study also had limitations. Although we had the capacity to conduct interviews in Spanish, our recruitment strategies were limited to English, and as such, no interviews were conducted in Spanish or any other language. As such, we may have missed some of the additional unique burdens faced by women who do not speak English. In addition, because of the timing of the data collection, our data do not include women’s experiences during the delta and omicron variant surges. Our study was conducted in New York City, an early epicenter of the COVID-19 pandemic, and participants were recruited through Covid-Watcher; thus, the findings cannot be generalized to other urban or rural settings or those who do not use such apps.

**Implications for Practice**

Our study describes the role of citizen science and symptom self-monitoring in supporting individuals with managing their health. Symptom tracking, in particular, may help to further characterize symptoms of PASC or help identify early warning signs of developing PASC. Clinicians who care for women across the lifespan should be aware of the physical and mental toll that the COVID-19 pandemic may take on their patients, regardless of a confirmed diagnosis of COVID-19. Understanding that symptoms can be present for months, at
varying levels of severity, is critical to meeting the needs of patients. Participants in this mixed-methods study experienced various symptoms, including new or worsening mental health symptoms for some women. Clinicians should be aware of the mental health and physical impacts of the prolonged stress of living in a global pandemic and offer support services and mental health screenings where appropriate. For women diagnosed with COVID-19, clinicians should assess for burdensome symptoms such as fatigue that may affect quality of life or the ability to perform social roles such as caregiving.

Conclusion
Our work demonstrates the impact of the COVID-19 pandemic on women’s self-perceptions of physical and mental health symptoms. Among participants with suspected or confirmed COVID-19, symptoms varied widely in intensity, burden, and recovery. Symptoms related to the pervasive stress of living in a global pandemic affected the participants in our study, regardless of suspected or confirmed COVID-19. Future research and clinical practice guidelines should focus on alleviating physical and mental health symptoms related to the ongoing pandemic, regardless of COVID-19 diagnosis.

Supplementary Materials
Note: To access the supplementary material that accompanies this article, visit the online version of Nursing for Women’s Health at [http://nwhjournal.org](http://nwhjournal.org) and at [https://doi.org/10.1016/j.nwh.2022.09.005](https://doi.org/10.1016/j.nwh.2022.09.005).

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