



Post-9/11 veterans perceptions of the pandemic: Areas of greatest impact on health and well-being



Andrea F. Kalvesmaki^{a,b,*}, Eleanor Gonzales^{a,b}, Robert T. George^{a,b}, Huong Nguyen^{a,b}, Mary Jo Pugh^{a,b}

^a Informatics Decision-Enhancement and Analytic Sciences Center (IDEAS) Center, VA Salt Lake City Health Care System, 500 Foothill Drive, #182, Salt Lake City, UT 84148, USA

^b Division of Epidemiology, University of Utah School of Medicine, Salt Lake City, UT 84132, USA

ARTICLE INFO

Keywords:

Veteran health
Veteran well-being
COVID-19 impact
Qualitative methods
Thematic analysis

ABSTRACT

Objective: Assess potential impacts of the COVID-19 pandemic on a subset of Post-9/11 U.S. Veterans included in a study of post-traumatic epilepsy (PTE).

Methods: Two measures were added to a structured health interview for Veterans during temporary pandemic research shutdown: a validated health questionnaire [1] previously completed by survey, and a semi-structured instrument developed to assess whether pandemic conditions affected responses to the health questionnaire and identify unique impacts. Interviews were conducted between August 2020 – February 2021. Scaled items were calculated and *t*-tests used to compare results. Open-ended items were coded using thematic analyses.

Results: Veterans identified eight major areas of impact with negative and positive impacts: mental health, family, social, work/employment, access to resources, physical health, finances, and education.

Innovation: The temporary shut-down of a large health study for Post-9/11 Veterans provided an opportunity to devise an instrument to assess COVID-19's impact on health and well-being. The instrument was accepted as of the first Veteran instrument in a pandemic SDOH research repository [2], and is being used in other studies.

Conclusion: This study highlights the need to assess and understand interrelated relationships of factors impacting health and well-being, especially as COVID-19 moves from pandemic to endemic with reverberating effects across multiple social determinants of health (SDOH).

1. Introduction

In early 2020, the novel coronavirus COVID-19 swept across the United States, shutting down work operations in many sectors, including health research. These shutdowns halted a study our team was conducting on health experiences¹ of Post-9/11 Veterans with traumatic brain injury (TBI) and potential post-traumatic epilepsy (PTE) from March–May 2020.² Prior to the shutdown of our research facility, our team had interviewed 119 Veterans to collect data on lifetime TBI history, seizure history, and general mental and physical health outcomes. During this time, distress calls to mental health hotlines for civilians and Veterans increased dramatically, indicating the pandemic might have exacerbating effects on mental health and social concerns for Veterans [3].

In the initial month of resuming interviews, Veterans in the study deviated from the health topics of the structured interview to initiate discussions of how the pandemic was affecting their lives. The Veterans wanted to talk, and not just about their health. The original structured interview was comprised of validated instruments related to health outcomes associated with epilepsy and TBI but did not account for potential impacts related to COVID-19. The anecdotal evidence from interviews completed after we resumed data collection the study during the pandemic indicated that Veterans were experiencing positive as well as negative outcomes in other social determinants of health (SDOH). As such, the study team saw an opportunity to expand the original intent of the study to collect data on pandemic related impacts these Veterans were experiencing to inform VA healthcare research and practice.

Abbreviations: TBI, traumatic brain injury; mTBI, mild traumatic brain injury; PTE, Post-traumatic epilepsy; PWE, people with epilepsy; REDCap, Research Electronic Data Capture; SDOH, social determinants of health; VA, Veteran Affairs; USAMRDC, United States Army Medical Research & Development Command; VR-12, Veteran's RAND 12 item health survey.

* Corresponding author at: VA Salt Lake City Healthcare System, 500 Foothill Dr. Bldg. 2, Salt Lake City, UT 84148, USA.

E-mail addresses: andrea.kalvesmaki@hsc.utah.edu, andrea.kalvesmarki@va.gov (A.F. Kalvesmaki), Eleanor.Gonzales@hsc.utah.edu (E. Gonzales), u1295277@utah.edu (R.T. George), huong.nguyen@hsc.utah.edu (H. Nguyen), MaryJo.Pugh@hsc.utah.edu (M.J. Pugh).

¹ The Epidemiology of Epilepsy and Traumatic Brain Injury: Severity, Mechanism, and Outcomes (USAMRDC: W81XWH-16-2-0046)

² Abbreviations used in this article: TBI, traumatic brain injury; mTBI, mild traumatic brain injury; PTE, Post-traumatic epilepsy; PWE, people with epilepsy; REDCap, Research Electronic Data Capture; SDOH, social determinants of health; VA, Veteran Affairs; USAMRDC, United States Army Medical Research & Development Command; VR-12, Veteran's RAND 12 item health survey

<http://dx.doi.org/10.1016/j.pecinn.2022.100096>

Received 11 April 2022; Received in revised form 10 October 2022; Accepted 3 November 2022

2772-6282/Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Here we present the COVID interview instrument we developed, and the impacts Veterans described. Based on these findings, we offer considerations for healthcare providers and researchers when assessing the interplay of SDOH in overall well-being as COVID-19 becomes endemic.

1.1. Studying the COVID-19 pandemic

Health researchers and social scientists have worked to understand the impact of COVID-19 among various groups and populations, especially among underserved populations, the rural poor, and people with specific health conditions. Conflations of conditions create a syndemic effect and it is necessary to account for vulnerabilities across dimensions including health and social outcomes [4].

TBI is commonly comorbid with mental health conditions and pain, and presents long term health concerns, especially for Post-9/11 Veterans [5]. Extant data demonstrates the relationship among TBI—including mild TBI (mTBI) which accounts for ~85% of TBI exposures—and epilepsy [6]. Emerging evidence also suggests that epilepsy and post-traumatic epilepsy are associated with significant decrements in self-reported physical, emotional, and cognitive health-status [6]. While emerging data suggest specific quality of life and mental health impacts for people with epilepsy (PWE), there is a dearth of evidence regarding the impact of the pandemic on people with TBI and even less known about the impacts of COVID-19 on self-reported social, emotional, and functional status of Veterans with epilepsy, post-traumatic epilepsy, and complex comorbidity.

Early studies of COVID-19 among PWE found increased frequency, duration or intensity of seizure activity during the pandemic [7-10], and quality of life for PWE was negatively affected during the pandemic with depression and anxiety as the primary contributing factors [10]. However, one study found a small number of individuals reported improved health due to reduced travel, fewer infections, and a more relaxed lifestyle at home [11]. These studies were conducted earlier in the pandemic and contain evidence that changing social situations and reduced availability of medical services have negatively impacted PWE, but only begin to explore the mechanisms of these impacts. Little is said about the social and functional status of PWE during the pandemic and these studies make no mention of Veterans.

Much research conducted over the course of the pandemic has been quantitative, statistical summaries of observable effects. Yet, studying the collective effects of the pandemic requires research strategies that address both biological and social processes [4]. Accordingly, our team explored how other researchers used qualitative and mixed methods approaches to assess pandemic impacts to best capture Veteran voices in a more organic way.

Results from an online survey with open-ended questions asking adults to describe their experiences indicated many reported negative mental health impacts such as loneliness, stress, economic uncertainty, and increased concerns about exposing their family to the virus, yet a few respondents reported positive outcomes, such as working from home and a break from daily pressures [12]. Similarly, college students, working and non-employed adults in online focus groups and telephone interviews identified negative impacts such as decreased socialization and mobility, poorer sleep habits, increased burnout due to working from home or online learning, and increased stress and anxiety especially about their health [13]. Yet, participants also reported positive impacts (e.g., more time with family, more time for hobbies, improved eating habits and increased exercise) [13]. Interviews with young adults highlighted negative effects on mental health such as stress and anxiety, increased familial disagreements, and decreased socialization which led to increased loneliness and growing concerns about their families' and their own health [14]. These youth also identified positive changes in themselves and greater closeness with family and highlighted using coping techniques such as online socialization [14]. In an online open-ended survey study, adolescents described negative effects on their socialization and interpersonal relationships (e.g., loss of contact, missed life events, more fights), daily life (e.g., lower productivity), and mental/physical health, yet also mentioned positive outcomes such as

enjoying more time with parents/friends and more time for personal growth [15]. Studies on romantic partners' relationship dynamics indicated both positive and negative relational changes [16], elderly adults interviewed by phone with a semi-structured instrument indicated concerns with protective hygiene habits, yet they also described coping plans, acceptance, and hope [17]. Parents with young children who were asked to describe their experiences in open-ended surveys described both positive and negative impacts on their children's learning, social development, and recommended strategies to support learning [18]. These primary lived experience data describe diverse lived experiences—including resilience and hope—that are not possible to understand using structured survey data. Understanding how various groups, including PWE, experienced the pandemic was helpful in contextualizing and preparing for our data collection with Veterans, who are underrepresented in qualitative pandemic-related research.

1.2. Resilience in the face of adversity

Resilience, as expressed by individuals identifying positive experiences even in difficult times, is not foreign to Veterans. Exposures to extreme stress and adversity are common in military service, especially during combat operations, and military personnel are trained to build personal resilience [19]. The pandemic brought rapid change and great uncertainty, and the challenges were novel in many ways. Psychological resilience allows an individual to adapt and recover from difficult experiences and has been found to be important in reducing negative effects associated with periods of struggle or crisis [20]. While empirical evidence of the effectiveness of many of the U.S. military's resiliency programs is still being evaluated [21], resiliency is common among trauma-exposed U.S. Veterans and deployed service members [22,23]. Resiliency is multi-dimensional and can manifest in multiple ways for military personnel, with positive affect and positive thinking being found as individual factors that can promote resiliency [24,25]. Post-traumatic growth, which is psychological and personal growth following exposure to traumatic events, has been found in combat exposed Veterans [26,27] and found to be positively associated with better mental functioning and quality of life [28]. The studies highlighting both positive and negative outcomes on people's lived experiences during the pandemic, coupled with the spontaneous conversations initiated by Veterans in the overall larger health study prior to developing our instrument, prompted us to hypothesize that Veterans in our study group (with more exposures to combat and advanced military training) would report positive and negative outcomes associated with the pandemic, even if they have complex health conditions.

2. Methods

2.1. Instruments

This study uses data from two instruments. The Veteran's Rand 12 (VR-12) is a validated measure of health status in the previous month or as compared to one year prior. Items within the VR-12 create an overall score and distinct mental and physical health component scores (MCS and PCS respectively) with each summary score mean average of 50 ($\mu = 50$) and standard variation of 10 ($\sigma = 10$). Variation by 1–2 points is considered clinically and/or socially significant [1,28]. The second instrument is a short semi-structured five-item questionnaire our team developed to collect Veteran self-reports of how the pandemic affected their lives, included as part of the larger health study (COVID-impact instrument; see Appendix). The interview instrument was developed to assess how COVID-19 might 1) affect Veteran responses to questions about their current health status from the health experiences interview; and 2) to assess how the pandemic is affecting daily life in various ways. The instrument included two scaled questions using a five-point Likert-scale (1 “not at all” to 5 “extremely”) to assess the potential impact of the pandemic on their answers to health assessments included in the structured health interview, and whether they felt the pandemic impacted their daily life. The interview instrument also included

three open-ended questions, two as follow-up to the two scaled questions allowing Veterans to describe how the pandemic was affecting them or their answers, and one asking Veterans to identify any potential positive impacts of the pandemic. The COVID-impact instrument was approved for use in the larger study by the University of Utah IRB and the Human Research Protections Office of the Department of Defense in August 2020.

2.2. Data collection

Interviews were conducted with 131 Post-9/11 Veterans between August 27, 2020 through February 4, 2021, representing a sub-sample of those interviewed for the larger study (total N = 350). The health interview including the COVID-impact instrument was conducted by phone from a Veteran Affairs (VA) research office and were not audio recorded. The research team was comprised of an interviewer and a scribe, who documented Veteran’s responses to the interview instruments. After each interview, research staff entered interview data into an electronic capture form on a secure online survey Research Electronic Data Capture (REDCap) database. Open-ended items were recorded as a summary of the scribe’s notes, occasionally capturing a direct quote but mostly providing an overall summary of what was discussed.

2.3. Analyses

Descriptive and statistical analyses were performed on the quantitative data gathered through the two Likert-scale questions. First, mean scores were calculated on both scaled questions. After scoring the question asking if the health interview had been impacted, our team examined the open-ended follow up question to determine which part of the interview had potentially been affected. The majority of the 63 Veterans who said the interview may have been impacted by COVID-19 (score of 3 or higher: pandemic impact) indicated that their responses to the VR-12 (physical and mental health over the last month and compared to one year prior) may have been different. To examine the degree to which this was true or significant, we calculated VR-12 MCS and PCS scores for all interviewees for the VR-12 administered on the original online survey prior to the pandemic, and the VR-12 administered during the interview. We then calculated change between survey and interview PCS and MCS scores and used independent group t-tests to compare the mean change scores for those who indicated pandemic impact on the health interview versus those who did not.

Open-ended interview data were analyzed using thematic analyses which are useful for coding semi-structured health interviews [29,30]. The analysts first coded a sample of interview responses independently with the initial dataset to identify overall themes and draft initial codes. They met to review identified themes and to refine a codebook for final analysis using simplified, discreet categories as suggested to improve inter-rater reliability in qualitative descriptive methods [29]. After the codebook was developed, one analyst coded the full set of data using the software package Atlas.ti and the second reviewed the coding to ensure full agreement.

3. Results

3.1. Interview sample

Most Veteran interviewees (n = 102) reported having traumatic brain injury (TBI), and a minority had epilepsy (n = 10), or epilepsy and TBI (n = 20). Nineteen had neither TBI nor epilepsy. Approximately 64% of interviewees were male, and the dominant racial background was white (69.5%). See Table 1.

3.2. COVID-19 impact on the health interview

Fewer than half of all interviewees (n = 63, 48%) indicated the pandemic had “a little bit” or more, of an impact (M = 1.8, SD = 0.95) on current health responses. When examining VR-12 scores obtained pre-

Table 1
Veteran interviewee characteristics.

N = 131	n	%
<i>TBI and Epilepsy</i>		
No TBI + Epilepsy	10	7.6
No TBI - No epilepsy	19	14.5
TBI + Epilepsy	20	15.3
TBI - No epilepsy	82	62.6
<i>Sex</i>		
Female	47	35.9
Male	84	64.1
<i>Age Groups</i>		
23–29	<10	<5%*
30–39	56	42.8
40–49	30	22.9
50 +	42	32.1
<i>Race/Ethnicity</i>		
White	91	69.5
Black	22	16.8
Hispanic	14	10.7
AI/AN	<10	<5%*
Unknown	<10	<5%*

Data source: The Epidemiology of Epilepsy and Traumatic Brain Injury: Severity, Mechanism, and Outcomes (USAMRDC: W81XWH-16-2-0046).

* Redacted per Department of Defense reporting requirements.

pandemic via survey to those collected at the time of interview, all Veterans interviewed indicated improved mental health and reduced physical health but differences between groups were not significant. See Table 2.

3.3. COVID-19 impact on veteran's lives

In response to the question about the degree COVID-19 had impacted their lives, respondents indicated moderate impact (M = 3.2, SD 1.26). Although most of the interview sample had TBI or were PWE, Veterans did not describe impacts on their health conditions. Rather they described how the pandemic was affecting their overall lives. Eight major areas of impact were identified: mental health, family, social, work/employment, access to resources, physical health, finances, and education. Veterans described both negative (n = 104, 79%) and positive outcomes (n = 94, 72%) in all areas. Veterans also described specific behavior changes related to adapting to the pandemic (n = 93, 71%) such as wearing masks and changing their behavior to follow health recommendations (e.g., stopped going to gyms, churches, events, and social meetups with friends) to protect themselves, their families, or because it was mandated. A few Veterans mentioned an increase in drinking and smoking, however, that was not commonly reported. Others described positive behavior changes, often attributed to specific areas of impact. Some Veterans described spending more time with families and children. Others spent more time on hobbies, their own learning, organization projects and home improvement, and accomplishing goals they did not previously prioritize. Overall, behavior changes were related to adapting actively to each of the areas of impact, which we describe next.

Table 2
VR-12 mental and physical health change scores by reported impact.

	No covid impact = 0 (N = 68)	Yes covid impact = 1 (N = 63)	P-value
MCS change	5.08	4.25	0.68
PCS change	-2.73	-3.86	0.48

Data source: The Epidemiology of Epilepsy and Traumatic Brain Injury: Severity, Mechanism, and Outcomes (USAMRDC: W81XWH-16-2-0046).

3.3.1. Mental health

Mental health was recognized by most Veterans ($n = 92$, 70%) as the most important area of pandemic impact, often interacting with other areas of impact such as work, social, physical health, and family life. Many Veterans reported increased stress, anxiety, sense of helplessness, frustration, and depression. One Veteran stated that *“COVID changes everything.”* This Veteran described being afraid to go anywhere, touch anything, or be around people. The Veteran described being anxious around other people prior to COVID-19, and the pandemic made that worse. While many stated negative mental health effects, some Veterans reported that the change in work environment and the ability to spend more time with family improved their mental health, alleviating stress and anxiety. For instance, one Veteran indicated how working from home has been a huge blessing and saving grace, especially for a person with PTSD and anxiety. Working from home decreased this Veteran's stress, and they were not as *“wiped out”* at the end of the week.

3.3.2. Family

The second largest area of impact identified by Veterans was regarding family ($n = 76$, 58%). In many cases, the same effect (e.g., increased time with family) was viewed as positive for some and as negative for others. Veterans often described an inverse relationship between what could be understood as negative effects in this area and positive effects on mental health. For instance, decreased time with extended family or unwelcome social connections increased their positive moods. Most Veterans who identified family as an area of impact stated that being able to spend more time with their family, usually immediate family who lived with them, was positive. However, a few stated that increased time had a negative impact, especially regarding spousal relationships, which then affected their overall sense of well-being. One Veteran stated, *“It is affecting my marriage. After 25 years, we are hanging on by a shoestring. The constant enclosed contact has been hard.”* Less time with extended family was often described as negative, but some Veterans described reduced time with extended family positively, stating that they enjoyed the decreased interaction with certain family members. Many Veterans described an overall increased concern for family members' well-being, which led to more personal stress and changes in their familial role, such as increasing the support they provided to family members to help them cope. For example, one Veteran stated that their spouse was struggling with the pandemic more than the Veteran and had been having bad anxiety. This Veteran described helping their spouse with day-to-day anxieties in practical ways such as going to the grocery store in their place.

3.3.3. Social

The third largest area of impact was related to the ability to be social ($n = 76$, 58%). Veterans reported reduced socialization and increased isolation as challenges affecting mental health and well-being for them and their family. Reduced time with friends, family and coworkers led to increased loneliness, fear, and stress. One Veteran stated that their social life was non-existent, making them more depressed. Some Veteran parents of young children mentioned concerns about balancing out the risk of COVID-19 exposure versus the repercussions of social isolation on their children's development. However, some positive impacts described by Veterans included welcoming the decrease in social obligations. One stated, *“Socially, a lot has been canceled, but it is nice to have canceled plans.”* Others mentioned that they enjoy the isolation and the reduction in crowd sizes, especially those with PTSD whose stress might be exacerbated in large crowds. While in-person socialization might have declined, some Veterans stated the isolation provided the time to join hobby clubs and to reconnect with old friends online.

3.3.4. Work

Just under half of Veterans indicated their work was impacted by the pandemic ($n = 57$, 44%). These Veterans stated many negative effects on work such as increased safety protocols related to COVID, decreased hours, reduced work quality, reduced pay, and for some, unemployment. A few Veterans were frustrated working from home and described how

this negatively affected their mental health. One Veteran stated they were used to being *“out and about”* driving for work, but now, they are at home having to make calls which caused them stress and anxiety. However, working from home was predominately mentioned as a positive change, especially in relation to Veterans' mental health, due to decreased commute time and decreased interactions with coworkers. Other positive outcomes included reduction in workloads, improved technology capabilities provided by employers, and the ability to pursue new job opportunities. One Veteran reported they were able to apply for a new job and were accepted, which is something they would not have pursued prior to the pandemic.

3.3.5. Access to resources

While less than a third of Veterans interviewed ($n = 38$, 29%) identified access to resources as an area of impact, the descriptions of these impacts tended to lean more negatively. Veterans described decreased access to essential supplies and medications, lack of childcare, reduced access to help from family and support groups, gym, and church closures, canceled surgeries and lack of in-person medical care as negative impacts affecting their physical health and mental well-being. One Veteran described how getting groceries and medications was difficult and that they couldn't go to the store when the elderly or sick go, though they would like to. However, a few Veterans described positive experiences. One Veteran's community rallied together to provide the essentials they needed, and a few Veterans mentioned they began utilizing telehealth. One Veteran stated they had more time to research and speak with doctors about their own personal health situation since they were able to network with them online.

3.3.6. Physical health

A small group of Veterans ($n = 36$, 27%) described how their physical health was affected by the pandemic. Some mentioned their exercise routines were disrupted due to gym and park closures, and some mentioned an increase in overeating. These changes caused Veterans to gain weight and exacerbated physical issues such as posture and muscle tension. Descriptions of physical health were often intertwined with descriptions of reduced access to resources like gyms and parks. Some Veterans connected their physical health to an outcome related to their mental health. One Veteran reported how COVID-related gym closures affected both physical and mental health, *“The biggest thing is the lack of exercise. I am dependent on the base gym. Because I can't maintain my health, I have gained 15-20lbs, and that has led to anxiety, feeling down and sleep problems.”* Not all physical health impacts were negative. A few Veterans mentioned they were able to improve their physical health by incorporating more activity into their day and by focusing on their health issues. One Veteran stated that their entire family had been eating healthier, exercising more, and focusing on mental health.

3.3.7. Finances

While less prevalent, Veterans identified finances as another area of impact ($n = 21$, 16%). Many Veterans described negative effects such as higher utility bills, less household income, lack of employment, inability to work due to full-time parenting/home schooling or illness, which led to increased worry and stress. One Veteran stated they were planning to go back to work after being a stay-at-home parent but have been unable to, causing a continued financial strain. Four Veterans mentioned positive impacts such as being able to save money by not going to events, working from home, not traveling, and from receiving the stimulus checks. One Veteran stated, *“I have more money in the bank. I am a big movie, concert, sporting events person. I am saving money by not attending.”*

3.3.8. Education

Lastly, some ($n = 20$, 15%) Veterans identified education as an area impacted by the pandemic – for themselves and for their families. Veterans who were also students reported the transition to online learning reduced teacher feedback and interaction, affecting their education negatively. A few Veterans were concerned about their child's transition to online schooling and some mentioned that their children had increased emotional distress because of this change. One Veteran described the challenges of

handling their child's frustration with elementary school distance learning. Many Veteran parents described concerns about whether to send their children to in-person school once re-opened. One Veteran mentioned increased concern about the quality of education their children were receiving. In addition, Veterans faced the increased burden of having to become their children's teacher if they chose to homeschool. Only three Veterans mentioned positives in this domain: one reported that they were able to pursue a new training certificate through work, one stated that their child's general health improved being home for school (since they were prone to sickness), and the other stated, "I am trying to get closer to my kids. I am more involved in their schoolwork because of virtual days and that is nice."

3.4. Summary

Overall, Veterans in this study indicated the pandemic affected their lives at least to some extent and were explicit in identifying how. While about half felt the pandemic impacted their answers to the larger health interview, their results were not substantially different than Veterans who reported no impact. Rather more revealing was how Veterans identified other areas of impact on their well-being. These areas often overlapped or were entwined with each other and their overall health, highlighting the role of SDOH in overall well-being. Table 3 summarizes examples of positive and negative impacts listed in each of the eight areas.

Table 3
Summary of positive and negative impacts by impact area.

Impact Area	Positive Impacts	Negative Impacts
Mental Health	<ul style="list-style-type: none"> Decreased anxiety & stress (due to work from home environment, no commute/traffic, unspecified cause) Increased joy (due to being home and/or spending more time with family and/or new hobbies) Increased gratitude for circumstances 	<ul style="list-style-type: none"> Increased anxiety & stress, helplessness, anger, frustration, resentment, discomfort, distrust, paranoia, fear, worry, depression, loneliness, draining (due to negatives in each area of impact) Decreased joy (due to missed life events, decreased socialization, nothing to look forward to) General negative impact on emotional & mental health (unspecified) Exacerbated mental health issues & episodes
Family	<ul style="list-style-type: none"> Increased time/socialization with family (includes increased activities, healthy habits, and hobbies) > decreased stress and/or increased joy Decreased time/socialization with family > decreased stress and/or increased joy Improved relationship with spouse (includes improved communication & increased respect for spouse) Child homeschooled > physical health improved 	<ul style="list-style-type: none"> Increased time/socialization with family > increased stress and/or decreased joy Decreased time/socialization with family > increased stress and/or decreased joy Increased family/spousal arguments Child homeschooled > increased parental burden, concerns about quality of education, unable to return to work/negatively affected income Increased familial responsibilities (due to less support) Increased stress about family's COVID exposure > less socialization/unable to visit relatives prior to death Increased emotional distress and mental health issues of family members > more personal stress Increased concerns about children's social well-being
Social	<ul style="list-style-type: none"> Decreased socialization (includes coworkers, family) > increased joy (due to enjoy isolation, reduced social obligations, reduced crowd size) Increased socialization & appreciation for socialization (includes reconnect with old friends via phone or online platforms, community support, time to join hobby clubs/groups) 	<ul style="list-style-type: none"> Decreased socialization & social well-being (includes friends, family, coworkers, support groups, neighbors, dating) > increased isolation, loneliness, fear of being around people & stress (includes balancing risk vs. isolation for self & family)
Work	<ul style="list-style-type: none"> Work from home (includes no traffic/commute, save money on gas, less interaction with coworkers, better environment, able to see family more) > increased mental well-being, decreased stress & anxiety (due to no traffic & home environment) New career opportunity/pivot/training Increased workload/demand Decreased workload Company increased work's internet strength & technology capabilities Family member able to get job (due to less competition because of pandemic) 	<ul style="list-style-type: none"> Work from home > harder to balance work/life, frustrated with change, increased isolation, increased stress/anxiety Job/income loss (includes self or family - due to decreased hours/schedule, pay, workload, demand, in-person staffing, work travel, stay at home parent) Increased COVID exposure concerns & protocols at work Decrease in work quality & friendliness to customers
Access to Resources	<ul style="list-style-type: none"> Community support - gifted food and gift cards Increased access to/utilization of telehealth > time to focus on health in general 	<ul style="list-style-type: none"> Shopping/essentials limited (due to limited hours, reduced access to supplies/groceries) Limited access to healthcare (due to inability to get doctor appointments, healthcare/treatments, canceled surgeries, medications) Churches, gyms, parks, outdoor spaces closed > negative mental and physical effects Unable to get childcare Reduced access to support groups Increase in sedentary lifestyle > increased muscle tension, poorer back posture, strength & cardio Increased snacking/binge eating (due to stress) & decreased physical activity > weight gain > decreased mental health Missed appointments > deteriorating health & difficulty with pain management Decreased energy and/or increased fatigued/exhausted Symptoms/contraction of COVID (includes coughs, lung pain) Allergic to mask, can't breathe in mask
Physical Health	<ul style="list-style-type: none"> Increased physical exercise (self and/or with family) Eating healthier (self and/or with family) Time to research/work on health issues (includes general health, anger problems & sleep) 	<ul style="list-style-type: none"> Increase in sedentary lifestyle > increased muscle tension, poorer back posture, strength & cardio Increased snacking/binge eating (due to stress) & decreased physical activity > weight gain > decreased mental health Missed appointments > deteriorating health & difficulty with pain management Decreased energy and/or increased fatigued/exhausted Symptoms/contraction of COVID (includes coughs, lung pain) Allergic to mask, can't breathe in mask
Finances	<ul style="list-style-type: none"> Save more money (due to work from home, reduced travel or less expensive to travel, no longer attends sporting events, concerts) Stimulus check 	<ul style="list-style-type: none"> Financial loss for self or family member (due to more time at home & higher utility bills, decreased pay, permanent hours lost, job loss, unable to work due to stay at home parenting, contracted COVID) > increased financial worry & stress
Education	<ul style="list-style-type: none"> Increased involvement in child's life Child now homeschooled > improved physical health of child New educational/career training opportunity 	<ul style="list-style-type: none"> Children's education (homeschool, online) > concerns about quality of education, emotionally distressing for child, co-parenting challenges due to changed routine, missed life events (1st day of school), increased stress about child exposure at school and balancing social/education vs. health risk Adult education (online) (includes more difficult, no teacher feedback, missed life event (graduation))

Data source: The Epidemiology of Epilepsy and Traumatic Brain Injury: Severity, Mechanism, and Outcomes (USAMRDC: W81XWH-16-2-0046).

4. Discussion and conclusion

4.1. Discussion

The eight areas of impact identified by Post-9/11 Veterans in our sample highlight how nuanced and varied Veterans experiences of the pandemic have been and how SDOH play a role in overall well-being. VR-12 analyses indicated that while Veterans' mental health improved from time of survey and physical health declined, these were not significant and may not be specifically attributed to the pandemic. Instead, the qualitative results indicate that while mental health, socialization, and physical health may have been more challenging during the pandemic, many Veterans identified opportunities for growth and development in these areas. Many Veterans described positive outcomes and behavior changes that may illustrate resiliency, facing and adapting to a difficult situation. This type of growth and resiliency is consistent with Veteran studies of psychological resiliency [22,23] and adaptivity to challenges [26].

Many described positive as well as negative outcomes similar to other studies of adaptations to the pandemic (e.g., 12, 15, 17). Positive impacts described by Veterans regarding family, social, and work often contributed to improved mental health (the largest area of impact). Yet in some cases, positive impacts in one area might have contributed to negative impacts in another (such as the ability to stay home as positive, but reduced wages as negative). This could also be reversed. For instance, while social isolation was often described as negative, some Veterans described how decreased pressure to socialize improved their mental health by reducing social anxiety or social-related stress such as not having to participate in large-scale family functions or social settings that could trigger negative emotions. This may be an important finding for clinicians and researchers to explore as pandemic conditions shift, as some Veterans, especially with PTSD, might exacerbate tendencies to isolate.

One unique finding was that Veterans often expressed more concerns for their children and family's well-being than their own, which was also found in pandemic studies of other populations [14,17,18]. Our instrument did not specifically ask about family impacts, so the fact Veterans expressed concern for their families and children in key areas (mental health, social isolation, education, physical health) highlights the importance family factors on Veteran well-being.

While a few Veterans linked pandemic experiences to experiences in military service, this was not common, and there was no clear evidence that their military experience increased their resiliency to pandemic conditions. As this was not the purpose of the study, without data from a comparison group (e.g., civilian group), we are unable to determine what factors are unique to Veterans. However, the areas of impact Veterans identified were similar to negative and positive impacts detected in other studies [12,13,15,16]. While the extant literature may have included individuals who had a history of military service, that was not a focus of those studies nor reported. More importantly, this overlap in findings highlight how Veterans encompass many roles (e.g., parent, spouse, student, caregiver, younger or older adult) and those roles have significant impact on health and well-being.

A few study limitations are worth noting. First, the qualitative data was not audio-recorded and transcribed verbatim. Inadvertent omissions, biases, or inaccurate re-wording of statements by the scribe when summarizing the respondents' comments may have occurred. In addition, no prior information on family or work life for these Veterans was collected, and the interview period spanned many months. The longer interview time frame may have contributed to the lower rates of Veterans indicating the pandemic impacted their responses, as over the course of time, they may have had time to adapt.

4.2. Innovation

At the start of the pandemic, many social science and health research teams across the nation mobilized efforts to support public health. At the same time, studies were being shuttered through local, state, and national

restrictions aimed to quell the pandemic. Our team realized an opportunity and reopened a study that had been halted by the pandemic, devising a new instrument and adding a qualitative component to collect data that otherwise would have been lost. The questionnaire developed by our team was accepted to a COVID-19 social science repository [2] hosted by the Social Interventions Research & Evaluation Network (SIREN) which compiles and shares study instruments and results connecting the pandemic with social determinants, health equity, policy, and social risk. *The COVID-19 Impact Questionnaire for Veteran Interviews* was the first submission of an instrument used in a study specifically for Veterans. Most studies and instruments assembled in the repository at the time were applied to the general public and associated papers describing outcomes did not describe how they might differ for groups such as Veterans. However, the instrument was designed for broader application, and our hope was that other study teams who were attempting to assess the impact of the pandemic would also use the instrument in other studies. At a minimum, by being included in the COVID-19 repository, we hoped other researchers would consider Veterans as a unique population worth identifying in addition to more generally identified groups based on race, ethnicity, or location (e.g. rural versus urban). Importantly, developing the instrument allowed our study team to reflect on how best to serve Veterans in our larger study by allowing them to discuss the impact of the pandemic on their lives, which they were eager to do, and which is not standard for structured health interviews. Asking Veterans to describe their experiences of the pandemic became a motivating factor for our team to reflect on how various SDOH impacted by the pandemic may be affecting specific health conditions. As such, our study team developed separate studies specifically to study pandemic effects on health outcomes such as epilepsy, accounting for the experiences of caregivers and other family members and collecting data on SDOH that often are not collected in standard health measures. We have continued to use the COVID Impact Questionnaire in other studies as COVID-19 moves from pandemic to endemic to assess how the impacts may shift over time.

This study also demonstrates the importance of flexibility in research to ensure rigor of data collection. The data collection described here was developed in response to the organic descriptions from Veterans about how the pandemic was affecting their health and well-being, and our belief that it was critical to the integrity of the study to collect the effects of the pandemic in a standardized way across all participants, and to use that information to better understand the Veterans' mental and physical status, for that specific moment in time. Adapting the larger study to collect pertinent pandemic related data and the important aspects the data revealed how vital it is for researchers to be prepared to pivot when research conditions change. This could mean adding study elements, when a study is already underway, to collect data that hadn't been relevant until that moment. The key aspect to the instrument and data reported here was that we adapted the original study to collect information and details the Veterans deemed important, a distinction other researchers may want to consider when designing and revising research studies to account for participants needs, concerns, and wants. As revealed through our study, accounting for these elements and adapting the study accordingly yielded surprising results. Thus, this study provides context to results of the larger study and data that can be used to inform VA research and clinical practice.

5. Conclusion

The findings from this study may help situate emerging research and concern with treating health conditions within the context of syndemics [31], where health and social issues collide and produce exacerbated negative outcomes. The instrument allowed us to identify key pandemic-related areas of impact on health and well-being for the Veterans in our study.

The findings indicate the importance of expanding our knowledge and understanding of how different SDOH can impact overall health and well-being and highlight the value of collecting related life-impact data when assessing health issues of concern more broadly. Veterans described family and social life, personal and professional economy, as all having

contributions on their overall health trajectory. For these Veterans, who were also coping with health impacts related to TBI and epilepsy, the stories emphasized the context in which they were living and operating. These data provide rich evidence that health factors are often intertwined with other life factors, and we encourage clinicians and researchers to consider how information on life conditions as well as health conditions are important for understanding how people fare over time. As the pandemic continues to evolve, these findings may also be valuable to promote resilience in Veteran and other populations, which may increase adaptability to stressful life events [22,23].

Lastly, while the instrument was created to capture conditions of Veterans' lives in our study, we encourage widespread use of this instrument to identify unique challenges, impacts, or adaptive behaviors for different groups. This will be especially important as COVID-19 evolves over time.

Disclaimer

The contents do not represent the views of the U.S. Department of Veteran Affairs or the United States Government.

Author acknowledgements

Funding. This study was funded by the Congressionally Directed Medical Research Program, Epilepsy Research Program W81XWH-16-2-0046. Dr. Kalvesmaki was supported by a VA Advanced Fellowship Program in Medical Informatics. Dr. Pugh received support from a VA Health Services Research and Development Service Research Career Scientist Award, (RCS 17-297, Award No IK6HX002608). The study team received resources and the use of facilities at the Veteran Affairs Informatics, Decision-Enhancement and Analytic Sciences (IDEAS) Center of Innovation, Salt Lake City, Utah.

Special acknowledgements. In addition to the listed authors, we acknowledge members of the PTE study team including Brice Terpstra, MS, who contributed to developing the COVID-19 Impact Assessment Questionnaire; and Elizabeth Pulsipher, MPH and Sarah Leonhart, who contributed to testing and administering the instrument.

Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Andrea Kalvesmaki reports financial support was provided by Congressionally Directed Medical Research Program, Epilepsy Research Program.

Appendix

COVID-19 Impact Questionnaire for Veteran Interviews

Directions: Use these questions to gauge potential impact of the coronavirus on an individual's daily life. Can be added/included in other interview scripts.

Introduction:

"As you know, our nation and the world are all dealing with the COVID-19 pandemic. We recognize that these are unique times to be asking you how you are doing, and we are curious how these recent times may have impacted you."

- | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. All things considered how much do you think Coronavirus has affected your answers today? For example, how different would your answers have been if we were not experiencing this pandemic? | <input type="radio"/> Not at all
<input type="radio"/> A little bit
<input type="radio"/> Moderately
<input type="radio"/> Quite a bit
<input type="radio"/> Extremely |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

<If any answer besides 'not at all', ask follow up question>

How do you think your answers would have been different?

- | | |
|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2. How much has the Coronavirus (COVID-19) pandemic impacted your daily life? | <input type="radio"/> Not at all
<input type="radio"/> A little bit
<input type="radio"/> Moderately
<input type="radio"/> Quite a bit
<input type="radio"/> Extremely |
| 3. What challenges are you facing now related to Coronavirus and in what ways are they impacting your physical, mental, and social well-being? | |

(continued)

COVID-19 Impact Questionnaire for Veteran Interviews

4. Lastly, are there any positive outcomes that you have experienced due to Coronavirus? (e.g., new hobbies, spending more time with family, you enjoy the social isolation, etc.)

References

- [1] Kazis LE, Miller DR, Clark J, Skinner K, Lee A, Rogers W, et al. Health-related quality of life in patients served by the Department of Veterans Affairs: results from the Veteran's health study. *Arch Intern Med.* 1998;158(6):626–32. <https://doi.org/10.1001/archinte.158.6.626>.
- [2] COVID-19 Research Question Bank. Social interventions research & evaluation network. <https://sirennetwork.ucsf.edu/covid-19-research-question-bank>; 2020. (last accessed January 12, 2022).
- [3] U.S. Department of Veterans Affairs. PREVENTS: The President's roadmap to empower veterans and end a national tragedy of suicide. https://www.va.gov/PREVENTS/docs/PRE-007-The-PREVENTS-Roadmap-1-2_508.pdf; 2020, June 17.
- [4] Pirrone I, Dielman M, Reis R, Pell C. Syndemic contexts: findings from a review of research on non-communicable diseases and interviews with experts. *Glob Health Action.* 2021;14(1):1927332. <https://doi.org/10.1080/16549716.2021.1927332>.
- [5] Pugh MJ, Swan AA, Amuan ME, Eapen BC, Jaramillo CA, Delgado R, et al. Deployment, suicide, and overdose among comorbidity phenotypes following mild traumatic brain injury: a retrospective cohort study from the chronic effects of neurotrauma consortium. *PLoS One.* 2019;14(9). <https://doi.org/10.1371/journal.pone.0222674>.
- [6] Pugh MJ, Orman JA, Jaramillo CA, Salinsky MC, Eapen BC, Towne AR, et al. The prevalence of epilepsy and association with traumatic brain injury in veterans of the Afghanistan and Iraq wars. *J Head Trauma Rehabil.* 2015;30(1):29–37. <https://doi.org/10.1097/htr.0000000000000045>.
- [7] Pugh MJ, Kennedy E, Gugger JJ, Mayo J, Tate D, Swan A, et al. The military injuries: understanding post-traumatic epilepsy study: understanding relationships among lifetime traumatic brain injury history, epilepsy, and quality of life. *J Neurotrauma.* 2021;38(20):2841–50. <https://doi.org/10.1089/neu.2021.0015>.
- [8] Bosak M, Mazurkiewicz I, Weżyk K, Słowik A, Turaj W. Covid-19 among patients with epilepsy: risk factors and course of the disease. *Epilepsy Behav.* 2021;120:107996. <https://doi.org/10.1016/j.yebeh.2021.107996>.
- [9] Sureka RK, Gaur V, Gupta M. Impact of covid-19 on people suffering with epilepsy. *Ann Indian Acad Neurol.* 2021;24(1):51–5. https://doi.org/10.4103/aian.aian_623_20.
- [10] Koh MY, Lim KS, Fong SL, Khor SB, Tan CT. Impact of COVID-19 on quality of life in people with epilepsy, and a multinational comparison of clinical and psychological impacts. *Epilepsy Behav.* 2021;117:107849. <https://doi.org/10.1016/j.yebeh.2021.107849>.
- [11] Thorpe J, Ashby S, Hallab A, Ding D, Andraus M, Dugan P, et al. Evaluating risk to people with epilepsy during the COVID-19 pandemic: preliminary findings from the cov-E study. *Epilepsy Behav.* 2021;115:107658. <https://doi.org/10.1016/j.yebeh.2020.107658>.
- [12] Ibvijaro G, Brooks C, Kolkiewicz L, Sunkel C, Long A. Psychological impact and psychosocial consequences of the COVID 19 pandemic resilience, mental well-being, and the coronavirus pandemic. *Indian J Psychiatry.* 2020;62(9):395–403. https://doi.org/10.4103/psychiatry.indianjpsychiatry_1031_20.
- [13] Mazumder A, Kalanidhi KB, Sarkar S, Ranjan P, Sahu A, Kaur T, et al. Psycho-social and behavioural impact of COVID 19 on young adults: qualitative research comprising focused group discussion and in-depth interviews. *Diabetes Metab Syndr Clin Res Rev.* 2021;15(1):309–12. <https://doi.org/10.1016/j.dsx.2020.12.039>.
- [14] Dhillon M, Mishra V. Life in lockdown: the psycho-social impacts of the COVID-19 pandemic on young Indians. *Indian J Health Well Being.* 2020;11(7–9):324–30.
- [15] Branquinho C, Kelly C, Arevalo LC, Santos A, Gaspar de Matos M. "Hey, we also have something to say": a qualitative study of Portuguese adolescents' and young people's experiences under COVID-19. *J Community Psychol.* 2020;48(8):2740–52. <https://doi.org/10.1002/jcop.22453>.
- [16] Günther-Bel C, Vilaregut A, Carratala E, Torras-Garat S, Pérez-Testor C. A mixed-method study of individual, couple, and parental functioning during the state-regulated COVID-19 lockdown in Spain. *Fam Process.* 2020;59(3):1060–79. <https://doi.org/10.1111/famp.12585>.
- [17] Brooke J, Clark M. Older people's early experience of household isolation and social distancing during COVID-19. *J Clin Nurs.* 2020;29(21–22):4387–402. <https://doi.org/10.1111/jocn.15485>.
- [18] Bhamani S, Makhdoom AZ, Bharuchi V, Ali N, Kaleem S, Ahmed D. Home learning in times of COVID: experiences of parents. *J Educ Educ Dev.* 2020;7(1):9–26. <https://doi.org/10.22555/joed.v7i1.3260>.
- [19] Bowles SV, Bates MJ. Military organizations and programs contributing to resilience building. *Mil Med.* 2010;175(6):382–5. <https://doi.org/10.7205/milmed-d-10-00099>.
- [20] American Psychological Association. Building your resilience. <https://www.apa.org/topics/resilience>; 2012, January 1. Last accessed December 1, 2021.
- [21] Morgan BJ, Garmon Bibb SC. Assessment of military population-based psychological resilience programs. *Mil Med.* 2011;176(9):976–85. <https://doi.org/10.7205/milmed-d-10-00433>.
- [22] Bonanno GA, Mancini AD, Horton JL, Powell TM, LeardMann CA, Boyko EJ, et al. Trajectories of trauma symptoms and resilience in deployed US military service members: prospective cohort study. *Br J Psychiatry.* 2018;200(4):317–23. <https://doi.org/10.1192/bjp.bp.111.096552>.
- [23] Isaacs K, Mota NP, Tsai J, Harpaz-Rotem I, Cook JM, Kirwin PD, et al. Psychological resilience in U.S. military veterans: a 2-year, nationally representative prospective cohort

- study. *J Psychiatr Res.* 2017;84:301–9. <https://doi.org/10.1016/j.jpsychires.2016.10.017>.
- [24] Litz BT. Resilience in the aftermath of war trauma: a critical review and commentary. *Interface Focus.* 2014;4(5):20140008. <https://doi.org/10.1098/rsfs.2014.0008>.
- [25] Meredith LS, Sherbourne CD, Gaillot SJ, Hansell L, Ritschard HV, Parker AM, et al. Promoting psychological resilience in the U.S. military. *Rand Health Q.* 2011;1(2):2. <https://www.rand.org/pubs/monographs/MG996.html>. (Last accessed September 30, 2021).
- [26] Greenberg J, Tsai J, Southwick SM, Pietrzak RH. Can military trauma promote psychological growth in combat veterans? Results from the national health and resilience in veterans study. *J Affect Disord.* 2021;282:732–9. <https://doi.org/10.1016/j.jad.2020.12.077>.
- [27] Hawker ME, Nino A. Factors contributing to posttraumatic growth in Iraq and Afghanistan combat veterans. *J Aggress Maltreat Trauma.* 2017;26(10):1104–16. <https://doi.org/10.1080/10926771.2017.1341442>.
- [28] Iqbal SU, Rogers W, Selim A, Qian S, Lee A, Ren XS, et al. The Veterans RAND 12 Item Health Survey (VR-12): what it is and how it is used. https://www.bu.edu/sph/files/2015/01/veterans_rand_12_item_health_survey_vr-12_2007.pdf.
- [29] Colorafi KJ, Evans B. Qualitative descriptive methods in health science research. *Health Environ Res Des J.* 2016;9(4):16–25. <https://doi.org/10.1177/1937586715614171>.
- [30] Sandelowski M. Whatever happened to qualitative description? *Res Nurs Health.* 2000;23(4):334–40. [https://doi.org/10.1002/1098-240x\(200008\)23:4%3C334::aid-nur9%3E3.0.co;2-g](https://doi.org/10.1002/1098-240x(200008)23:4%3C334::aid-nur9%3E3.0.co;2-g).
- [31] Holmes SM, Hansen H, Jenks A, Stonington SD, Morse M, Greene JA, et al. Misdiagnosis, mistreatment, and harm — when medical care ignores social forces. *N Engl J Med.* 2020;382(12):1083–6. <https://doi.org/10.1056/nejmp1916269>.