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The self-reported impacts of the COVID-19 pandemic on psychological health of U.S. Air Force cyber personnel

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ABSTRACT

U.S. Air Force cyber personnel were faced with changes in their workplace, fitness routines, and personal lives during the COVID19 pandemic. Adjusting to COVID-19-related requirements likely increased the stress of already stressful jobs for military members and their families, which could have resounding impacts on emotional, social, and physical well-being. Therefore, it is important to evaluate psychological health outcomes and self-perceived impacts of the changes presented to cyber personnel because of the COVID-19 pandemic. An online occupational health assessment that included demographics, standardized measures of burnout, psychological distress, and work role strain; health behaviors; and perceived impacts of the COVID-19 pandemic was administered to 1488 cyber personnel. Thirty-two negative themes and 13 positive themes were created from qualitative coding for "How has the COVID-19 pandemic impacted you as an individual?" Of the themes created, 966 (68.5%) reported at least one negative impact and 440 (31.2%) reported at least one positive impact. Top-reported negative impacts were *limited face-to-face interactions* and *loss of personal activities*. Negative impacts were associated with negative psychological health outcomes (e.g., psychological distress, exhaustion, cynicism) and work role strain. Action-oriented recommendations are given in the event of another pandemic.

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What is the public significance of this article?—Self-perceived impacts of the COVID-19 pandemic on USAF cyber personnel pertained to negative impacts on their work, fitness, and relationships. Negative impacts were associated with negative psychological health outcomes, and action-oriented recommendations are provided to alleviate commonly reported negative impacts in the event of another pandemic.

The COVID-19 pandemic has posed unprecedented challenges to individuals and communities around the globe. COVID-19 was declared a global pandemic by the World Health Organization on March 11, 2020, and the resulting effects are varied, widespread, and ongoing. Adjusting to COVID-19-related requirements likely increased the stress of already stressful jobs for military members and their families, which could have resounding impacts on emotional, social, and physical well-being. The United States (U.S.) Department of Defense implemented mitigation strategies to continue operations during the pandemic. Cyber personnel in the U.S. Air Force (USAF) have faced workplace transitions to remote work for a portion of its workforce, while maintaining the continuation of mission essential workers in the workplace during COVID-19 pandemic restrictions.

Psychological impacts

COVID-19 pandemic stressors such as social isolation and loneliness, uncertainty, socioeconomic distress, contracting the virus, and bereavement may have contributed to adverse psychological outcomes for individuals. Early pandemic comparisons with pre-pandemic numbers show increased rates of anxiety (Tull et al., 2020; study of U.S. Veterans, Hill et al., 2021) and psychological distress (Aknin et al., 2022; McGinty et al., 2020; Park et al., 2021). In a study of U.S. adults in March-April 2020, prevalence of depression symptoms was reported for 27.8% of the sample, compared to 8.5% from 2017–2018. In addition, experiencing a greater number of COVID-19 stressors was associated with higher rates of depression symptoms (Ettman et al., 2020). Similar prevalence rates were found in another study of U.S. adults in the first few weeks of the pandemic and resulting mitigation measures (27–32% for depression), along with an increase in prevalence of anxiety disorders (30–46%), acute post-traumatic stress

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(15–18%), insomnia (25%), and suicide ideation (18%). Risk factors for adverse psychological outcomes included financial instability, social isolation, and alcohol consumption (Killgore et al., 2021). In the same study, getting outside, perceived social support, and older age were protective factors. Loneliness was also considered a concern with the adverse social impacts of the pandemic, but a study on U.S. military Veterans found a slight decrease in loneliness pre-pandemic (17%) to 1-year into the pandemic (16%; Na et al., 2022).

Work-related impacts

Workplace mitigation strategies to reduce the transmission of COVID-19 were also implemented globally early in the pandemic. When possible, employees were transitioned to working from home as opposed to going into the office. Workers were expected to continue meeting work demands, and communication quality from leadership became ever more essential (Shockley, Allen, et al., 2021). One study on 7,829 U.S. Army soldiers found that high levels of COVID-19 leadership behaviors were associated with more frequent adherence to preventive health guidelines, and less likelihood of new negative health outcomes, such as depression and anxiety (Adler et al., 2022). For occupations that were deemed mission essential or critical to public health, employees continued working in the workplace, and mitigation strategies to reduce or contain the transmission of COVID-19 were created and implemented. Stressors and negative impacts on workers' mental health include perception of reduced safety, threat and risk of contagion, information overload versus the unknown, quarantine and confinement, stigma, social exclusion, financial loss, and job insecurity (Hamouche, 2020). The changes to the working environment, team communications, and limitations posed by working from home in many cases increased experiences of work strain (e.g., role overload, role conflict, role ambiguity), exhaustion, cynicism, and cognitive stress complaints (Kniffin et al., 2021).

Physical fitness impacts

Exercise is a well-founded form of stress relief and has been related to positive physical and emotional health outcomes (Edenfield & Blumenthal, 2011), but mitigation strategies to slow the spread of COVID-19 included temporarily closing gyms and fitness facilities and restricting access to parks and outdoor environments used for fitness. In a study comparing exercise habits pre-pandemic to early pandemic habits, those with reduced exercise habits during the pandemic reported being in a worse mood compared to those who maintained or increased pre-pandemic exercise. Those exercising almost every day self-reported the best mood compared to the other groups, regardless of pre-pandemic exercise habits (Brand et al., 2020). The substitution of pre-pandemic gym attendance with the purchase and use of home exercise equipment or exercise through virtual fitness platforms promoted increases in physical activity during the COVID-19 shutdown (Fearnbach et al., 2021). Regarding psychological outcomes, inactive individuals were more likely to develop psychological distress, depression, and anxiety compared to highly active individuals (Zhang & Velez, 2022).

Relationship impacts

Employees with children experienced unique caregiving challenges because of COVID-19. Schools transitioned to virtual learning when possible or closed for the remainder of the school year, and daycare facilities were closed or restricted to limited capacities. These challenges, coupled with challenges in the workplace and the management of these work and childcare responsibilities, exacerbated work role strain and/or work-life conflict (Eales et al., 2021). At-home employees with children were monitoring and assisting their children with distance learning, at the same time concerned with the impact of the pandemic on their children's mental health (Lemay et al., 2021). The daily impact of the pandemic (changes in family dynamics, school, and routines) has been linked to psychological distress for both children and parents, with stronger effects for older children (Eales et al., 2021).

Current study: USAF cyber personnel

While there is extensive evidence demonstrating the negative psychosocial impact of COVID-19 on the general population, very few studies have examined the impact of the pandemic in unique employment contexts such as USAF cyber personnel. Cyberattacks are on the rise in the United States, and USAF cyber operations are critical to the U.S. Government. In addition, pre-pandemic rates of psychological distress were found to be elevated in the USAF cyber community compared to the general population (Chappelle et al., 2013). Considering this, the aims of the current study were to evaluate (1) the perceived impacts of the changes presented to these personnel because of the COVID-19 pandemic, and (2) the effects of perceived impacts on

psychological health outcomes. Research questions were as follows: (1) "What were the positive and negative experiences of cyber personnel during the COVID-19 pandemic?" and (2) "What were the differences on psychological health outcomes for cyber personnel reporting negative, neutral, and positive experiences across multiple domains – physical fitness, work (i.e., technical proficiency, work effectiveness), and relationships (i.e., as a couple, with their kids)?"

Methods

Participants

The current study included 1488 USAF cyber personnel who responded to the open-ended questions pertaining to impacts of the COVID-19 pandemic from an online occupational health assessment. In the 6-week span from November 23, 2020 to February 2, 2021, participants completed a web-based occupational health assessment. The occupational health assessment study protocol was reviewed and approved by the organization's Institutional Review Board. Demographics are representative of the general cyber population and are presented in Table 1.

Measures

Items in the occupational health assessment included, but were not limited to, demographics; standardized measures of burnout, psychological distress, and work role strain; health behaviors; and perceived impacts of the COVID-19 pandemic.

Burnout

Exhaustion, cynicism, and professional efficacy are the three facets of burnout measured by the 16-item Maslach Burnout Inventory (Maslach et al., 1996). Exhaustion involves feelings of cognitive and physical fatigue (5 items, $\alpha = 0.93$). Cynicism relates to depersonalization and negative attitudes toward other individuals with whom one is working (5 items, $\alpha = 0.88$). Professional inefficacy involves feelings of lack of personal accomplishment or productivity (6 items, $\alpha = 0.84$). Items are rated on a 7-point Likert scale ranging from 0 (*never*) to 6 (*daily*).

Psychological distress

General psychological distress, along with the subscales of symptom distress, interpersonal relations, and social roles, is measured by the Outcome Questionnaire-45 (Lambert et al., 1996). Items are rated on a 5-point scale ranging from 0 (*never*) to 4 (*almost always*).

Table 1. Demographics.

Item	n	%
Gender	1488	
Male	1211	81.4
Female	242	16.3
Prefer not to respond	35	2.4
Age (yr)		
17–20	25	1.7
21–25	175	11.8
26–30	290	19.5
31–35	343	23.1
36–40	222	14.9
41–45	132	8.9
46+	300	20.2
Relationship status		
Single, not in a significant relationship	297	20.0
Single, in a significant relationship	165	11.1
Married	1001	67.4
Other	23	1.6
How many children under the age of 18 live in your household or are regularly cared for by you?		
None	815	54.8
1	229	15.4
2	291	19.6
3	112	7.5
4+	40	2.7
Occupation		
Active-duty cyber	706	47.4
Active-duty intelligence	218	14.7
Active-duty support personnel	43	2.9
Civilian or contractor	476	32.0

Note: Missing data for the following demographics: Age n = 1; Relationship status n = 2; Children n = 1; Occupation = 43.

General psychological distress scores range from 0 to 180 (45 items, α = 0.95).

Work role strain

Role overload, role conflict, and role ambiguity were assessed by a 15-item measure (Glazer & Beehr, 2005). Items are rated on a 7-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*), and the scale is averaged. Role overload relates to the feeling of having more work than one can reasonably accomplish in the allotted time (5 items, α = 0.88). Role conflict involves receiving irreconcilable demands from supervisors or others (5 items, α = 0.84). Role ambiguity involves a lack of clarity of demands and expectations (5 items, α = 0.84).

Health behaviors

Exercise was a health behavior of interest in the current study. Participants were asked to rate the following on a sliding scale ranging from 0 to 500 minutes: "On average, how many minutes per week do you engage in moderate to vigorous cardio exercise (e.g., jogging/running, biking, elliptical, swimming, high intensity interval training, etc.)?"

Perceived impacts of the COVID-19 pandemic

After the standardized measures and health behaviors section, participants responded to a series of six open-ended questions regarding the impact of COVID-19 on them personally and professionally. The questions included how COVID-19 pandemic impacted you as an individual, you and your partner as a couple, your relationship with your kids, your physical fitness, your duty-related technical proficiency, and your mission effectiveness. Participants were given the opportunity to provide as much information in the open response field as they felt captured their experiences. Only participants who indicated having a child at home in the demographics section were given the question about how COVID-19 impacted their relationship with their kids, and only participants who indicated being in a relationship were given the question about how COVID-19 impacted them as a couple.

Procedure

The occupational health assessment was distributed through e-mail, which included a link to the Qualtrics online platform. All items were optional response and participants could exit the assessment at any point. The average length of participation was 30 minutes. The dataset for the subsequent analyses only included participants who answered at least one of the six open-ended items regarding the impacts of the COVID-19 pandemic (74%).

Data analyses

Participants' open-ended responses to "How has the COVID-19 pandemic impacted you as an individual? (positively and/or negatively)" were organized through a content coding process to create an exhaustive list of negative and positive themes (Lindlof & Taylor, 2017). We first developed a codebook of categories based on reported impacts that were prominent in the data. Using that codebook, two members of our evaluation team independently coded each response and compared codes. Coding discrepancies were discussed and resolved until agreement was reached on each code. The interrater reliability for the two coders was considered very good (κ = .83). These data were merged with the occupational assessment dataset.

The coding for the additional five open-ended response items ("How has the COVID-19 pandemic impacted your . . . physical fitness, couple relationship, relationship with child, duty-related technical proficiency, mission effectiveness?") was conducted in Qualtrics Text iQ and reviewed by both coders to account for positive impact, neutral, and negative impact categories within each of the five items. Examples of responses that were coded into the neutral category were "n/a," "neutral," "minimal," "no change," and "no." Responses that included both positive and negative impacts within one item accounted for 2–5% of responses and were removed from the analyses. This resulted in discrete positive, neutral, and negative categories for all 5 items. These data were also merged with the occupational assessment dataset. One-way analyses of variance (ANOVAs) with Tukey-Kramer post hoc group comparisons were utilized to measure the group differences for positive impact, neutral, and negative impact of the COVID-19 pandemic (for relationship as a couple, relationship with kids, physical fitness, technical proficiency, and mission effectiveness) on burnout (exhaustion, cynicism, professional efficacy), psychological distress, and work role strain (work overload, role conflict, and role ambiguity).

Results

Qualitative analysis of COVID-19 individual impact themes

The qualitative coding of the open-ended item "How has the COVID-19 pandemic impacted you as an individual?" resulted in 13 positive and 32 negative themes

within 4 impact categories – work, relationship, personal, and pandemic-specific (e.g., COVID-19 fatigue, illness, and precautions). Table 2 presents the number and percentage of the sample reporting each theme along with the corresponding theme definitions. Out of the 1411 responses, 966 (68.5%) reported at least one negative impact, 440 (31.2%) reported at least one positive impact, and 195 (13.8%) reported a combination of at least one positive and one negative impact. The top-reported themes related to work, relationships, and personal impact categories are discussed below.

Work impacts

With regard to how COVID-19 impacted individuals' work lives, the top-reported negative impact was *reduced productivity and focus*. One respondent indicated that COVID-19 had "complicated work methods to a significant degree" in large part because "people are harder to contact." In addition, respondents who began teleworking had to contend with distractions that arose while working at home, which negatively affected their drive/motivation to accomplish job tasks. Due to the circumstantial constraints of

Table 2. Frequency and definitions of negative and positive impact themes.

Themes (N = 1411)	n	%	Definition
Negative Themes			
General Negative Experiences	175	12.4	Negative experiences/impacts of COVID-19 on individuals
Work Impacts			
Reduced productivity and focus	50	3.5	Reduced ability to do the things they need to do (e.g., less motivation to complete work tasks, less organized, difficulty completing work assignments between home setting and office)
Teleworking Distress	50	3.5	Extent to which individual feels separated from the workplace/coworkers (e.g., forced to or required to work from home, frustration with virtual meetings, determining schedules [who needs to be in the office and who needs to work from home])
Changing work schedule	37	2.6	Changes to work schedule (e.g., longer work hours, shift changes)
Work-life conflict	32	2.3	Difficult to balance work and life responsibilities (e.g., blend into each other)
Relationship Impacts			
Limited face-to-face interactions	166	11.8	Unable to reach out to others face-to-face (FTF); unable to meet new members FTF; barriers to inclusion; feeling isolated; feeling lonely
Separation from family and friends	91	6.5	Unable to see family and friends who are geographically dispersed
Increased family stress	28	2.0	Increased stress surrounding family issues and relationship issues (e.g., separation/divorce, tension with extended family members)
Personal Impacts			
Loss of personal activities	140	9.9	Extent to which individuals feel they cannot perform activities they did pre-COVID-19 pandemic (e.g., vacations, going to a restaurant, date nights, hobbies)
Physical and fitness limitations	65	4.6	Reduced motivation to exercise, limited access to fitness facility (e.g., not able to exercise in public spaces [e.g., gym])
Emotional health	41	2.9	Emotional health issues resulting from COVID-19 (e.g., stress, fear, anxiety)
Pandemic-Specific Impacts			
COVID-19 fatigue	95	6.7	Indicates stress/mental fatigue related to lockdowns or being quarantined (e.g., stuck at home/travel restrictions)
COVID-19 illness	53	3.8	Extent to which individual has been affected by exposure, someone's severe illness or loss of life due to COVID-19
COVID-19 precautions	46	3.3	Feelings surrounding people following or not following COVID precautions (e.g., additional travel requirements, washing hands often, wearing a mask, concern about public events)
Concern for others' well-being	32	2.3	Extent to which one is concerned for loved ones' physical and mental health
Positive Themes			
General Positive Experiences	87	6.2	Positive experiences/impacts of COVID-19 on individuals
Work Impacts			
Teleworking preference	111	7.9	Extent to which individual appreciates ability to telework (e.g., reduced number of meetings, better technology at home, adjust to working more effectively teleworking vs. in the office, improved focus, reduced workplace distractions)
Work-life balance	49	3.5	Improved balance between work and life responsibilities (e.g., take time to breathe/catch up with life; rethink professional and personal priorities)
Improved focus and productivity	28	2.0	Allowed for more or improved focus and productivity (e.g., reduced workplace distractions)
Relationship Impacts			
Improved relationships	120	8.5	More time to spend with immediate family (e.g., spouse, homeschooling children, newborn) and loved ones (e.g., significant others), which may result in improved relationships
Personal Impacts			
Self-care	60	4.3	More time to focus on oneself including having more energy at end of day due to working from home (i.e., focus on mental health; e.g., fitness, healthier diet)

Note: 18 negative (political and economic world climate, annoyance of perceived overreactions, financial strain, general health, spiritual health, lower manning, limited resource access, leadership duties, reduced mission effectiveness, reduced technical proficiency, relationship issues, increased workload, delayed training, increased general work stress, poor handling by USAF leadership, social life, child distance learning or child care issues, and adjusting to change) and 8 positive categories (personality factors, hobbies, gratitude, improved finances, reduced commuting time, skill development, more time at home, and leadership) with <2% were removed from the final table. "NA" or "None."
n = 103, 7.30%; "Neutral" or "Neither" n = 83, 5.88%; "Other/Unable to Categorize" n = 17, 1.20%.

working during COVID-19, respondents reported that "my work has suffered" and COVID-19 has "impacted unit output." Another top-reported negative impact in the work domain was *teleworking distress*. Namely, respondents felt that it was difficult to virtually coordinate with coworkers, saying "no amount of teleconferences makes up for face-to-face conversations," and that it was difficult to keep work life separate from home life. While teleworking was reported to be a negative factor by many respondents, a larger number of respondents reported a *teleworking preference*. For example, one respondent explained, "I like being able to work from home. I am able to focus on admin tasks and people spend less time chatting/interrupting my tasks. Being more efficient gives me time to do other things I enjoy or need to accomplish. I get a lot more sleep and overall have more reasonable work hours." Going hand-in-hand with the preference to telework, respondents expressed a greater *work-life balance* due to the flexibility of determining their own work hours from the comfort of their home.

Relationship impacts

The most reported negative impact across all categories, including relationship impacts, was *limited face-to-face interactions*. Overall, many respondents expressed missing out on human social interaction to the point of feeling isolated from others, as one respondent explained, "The social impacts though have been dramatic and over the last year I've made few new friendships and meaningful connections with people, which leaves me feeling very isolated . . . " The lack of social interaction was reported to have "caused sadness and loneliness from time to time, like a rollercoaster." This was true for both self-reported extroverts and introverts, as one respondent reflected, "Even as an introvert, the social isolation can be crushing at times." Individuals looking to begin a romantic relationship during the pandemic reported difficulty in "meeting someone special" and, as a result, feeling "completely alone." Supervisors reported that COVID-19 made it challenging to build camaraderie among their teams and "degraded the ability to keep a strong culture going." Individuals who changed assignments and moved amid the pandemic encountered additional challenges with meeting their new unit members and "grow[ing] a strong bond with [. . .] coworkers before going into a work-from-home posture." Relatedly, another resounding negative impact that emerged among respondents was the *separation from family and friends*, particularly extended family and friends/family who lived outside of the allowed travel radius for the respondents. One respondent poignantly conveyed, "[COVID-19] has made it impossible to see family and friends. It compounds the isolation that military life already imposes." Although COVID-19 severely hindered relationship-building among many respondents, many others reported that a silver lining of COVID-19 was *improved relationships*, namely, with immediate family members in their household. Due to stay-at-home orders, individuals reported being able to "spend more quality time with family" and "grow closer."

Personal impacts

The second most reported negative impact across all categories was *loss of personal activities*. As a result of pandemic-related restrictions, respondents felt limited in their ability to do recreational activities and hobbies out in public that they previously enjoyed doing before the pandemic (e.g., dining out, attending concerts, traveling). Multiple respondents reported that the restrictions decreased the number of opportunities to decompress and unwind from stress. Another top-reported negative impact in this domain included *physical and fitness limitations*. For many, COVID-19 reduced the number of available exercise activities (e.g., gym access, pickup sports), which made it difficult to remain active, resulting in weight gain for some. For some other respondents, the circumstances surrounding COVID-19 "hindered personal motivation to exercise." A substantial portion of individuals reported negative impacts in this domain, but a select group reported a positive spin on how the pandemic circumstances affected their *self-care*. Specifically, working from home provided several individuals the flexibility to prioritize self-care and their overall physical, mental, and spiritual well-being, as one respondent reported, "My physical condition is the best it has ever been, as are my diet and sleep habits. Working from home has allowed me to [. . .] have time to eat healthy, work out every day, and wake at a reasonable hour." Respondents also reported increased self-reflection/improvement because of working from home, saying "it's afforded me a lot of time to think/slow down and reassess life, in general."

Examining burnout, psychological distress, and work role strain across perceived impacts

ANOVAs were used for the negative, neutral, and positive impact responses to the additional five open-ended response items (e.g., physical fitness, couple relationship, relationship with child, duty-related technical proficiency, mission effectiveness) on negative health behaviors. Descriptive statistics for each of the items and standardized measures (i.e., burnout, psychological

Table 3. Frequencies for COVID-19 impact category groups.

	Negative		Neutral		Positive		Total
Impact Category	n	%	n	%	n	%	n
Work impacts							
Technical proficiency	455	35.0	608	46.8	237	18.2	1300
Mission effectiveness	470	44.2	462	43.5	131	12.3	1063
Physical fitness impacts	819	60.4	296	21.8	241	17.8	1356
Relationship impacts							
Couple	368	37.8	261	26.8	345	35.4	974
Kids	148	27.1	136	24.9	263	48.1	547

Table 4. Descriptive statistics for outcome measures.

Outcome Measure	n	*M*	*SD*
Burnout			
Exhaustion	1483	12.8	8.6
Cynicism	1475	10.9	8.4
Professional efficacy	1475	25.6	7.4
Psychological distress	1464	39.8	22.7
Work role strain			
Role overload	1485	3.6	1.4
Role conflict	1479	3.7	1.4
Role ambiguity	1475	3.3	1.3

distress, and work role strain) used in the ANOVAs are shown in Tables 3 and 4. Results for each of the impact categories are detailed for each of the standardized measures. The Tukey post hoc criterion method controls for the error rate while comparing each of the categories (i.e., negative, positive, neutral) against the other two categories; however, only significant findings are detailed in the results section.

Work impacts

One-way ANOVAs showed a significant effect on exhaustion, cynicism, professional efficacy, psychological distress, role overload, role conflict, and role ambiguity for the three COVID-19 pandemic impact on duty-related technical proficiency groups (see, Table 5). Post hoc analyses using the Tukey-Kramer criterion for significance indicated that those reporting negative impacts on their duty-related technical proficiency had higher exhaustion, cynicism, psychological distress, role overload, role conflict, and role ambiguity and lower professional efficacy compared to those reporting a neutral or positive impact.

One-way ANOVAs showed a significant effect on exhaustion, cynicism, professional efficacy, psychological distress, role overload, role conflict, and role ambiguity for the three COVID-19 pandemic impact on mission effectiveness groups (see, Table 5). Post hoc analyses using the Tukey-Kramer criterion for significance indicated that those reporting negative impacts on mission effectiveness had higher exhaustion, cynicism, psychological distress, role overload, role conflict, and role ambiguity and lower professional efficacy compared to those reporting a neutral or positive impact.

Physical fitness impacts

When first asked about overall impacts of COVID-19, only 65 participants reported a negative physical fitness impact; however, when specifically asked about physical fitness impact, 870 participants reported a negative physical fitness impact. One-way ANOVAs showed a significant effect on exhaustion, cynicism, professional efficacy, psychological distress, role overload, role conflict, and role ambiguity for the three COVID-19 pandemic impact on physical fitness groups (see, Table 6). Post hoc analyses using the Tukey-Kramer criterion for significance indicated that those reporting negative impacts on their physical fitness had higher exhaustion and psychological distress compared to those reporting a neutral or positive impact. Those reporting negative impacts on their physical fitness had higher cynicism,

Table 5. One-way ANOVAs for work impacts on burnout, psychological distress, and work role strain.

	Duty-Related Technical Proficiency				Mission Effectiveness			
		Impact Group Post Hoc Comparison				Impact Group Post Hoc Comparison		
Work Impact Outcome	F	Negative *M* (*SD*)	Neutral *M* (*SD*)	Positive *M* (*SD*)	F	Negative *M* (*SD*)	Neutral *M* (*SD*)	Positive *M* (*SD*)
Exhaustion	11.2*	14.2 (8.7)[a]	12.2 (8.6)[b]	11.4 (7.8)[b]	15.9*	14.2 (8.4)[a]	11.2 (8.6)[b]	11.7 (7.9)[b]
Cynicism	23.8*	13.0 (8.7)[a]	10.0 (8.3)[b]	9.1 (7.6)[b]	8.2*	11.9 (8.5)[a]	10.0 (8.1)[b]	9.5 (7.5)[b]
Professional efficacy	24.5*	23.7 (7.9)[b]	26.7 (7.2)[a]	26.8 (6.4)[a]	10.1*	24.8 (7.5)[b]	26.8 (7.1)[a]	26.9 (6.4)[a]
Psychological distress	17.4*	44.5 (22.5)[a]	37.1 (23.0)[b]	36.1 (20.1)[b]	25.1*	44.3 (23.0)[a]	34.4 (21.4)[b]	35.3 (21.0)[b]
Role Overload	5.1*	3.8 (1.4)[a]	3.5 (1.4)[b]	3.4 (1.4)[b]	26.6*	3.9 (1.4)[a]	3.2 (1.4)[b]	3.5 (1.4)[b]
Role Conflict	7.7*	3.9 (1.4)[a]	3.6 (1.4)[b]	3.5 (1.5)[b]	16.2*	3.9 (1.3)[a]	3.4 (1.4)[b]	3.4 (1.4)[b]
Role Ambiguity	32.0*	3.7 (1.3)[a]	3.1 (1.3)[b]	3.0 (1.3)[b]	16.8*	3.5 (1.3)[a]	3.1 (1.2)[b]	3.1 (1.3)[b]

Note: ANOVA = analysis of variance.
[a,b]Indicate group means that are significantly different.
*$p < .01$. $df = (2, 1042–1295)$.

Table 6. One-way ANOVAs for physical fitness impacts on burnout, psychological distress, and work role strain.

		Impact Group Post Hoc Comparison		
Physical Fitness Impact Outcome	F	Negative *M* (*SD*)	Neutral *M* (*SD*)	Positive *M* (*SD*)
Exhaustion	17.3*	13.9 (8.6)[a]	10.7 (8.6)[b]	11.8 (7.8)[b]
Cynicism	10.2*	11.7 (8.5)[a]	9.2 (8.3)[b]	10.6 (7.9)[a,b]
Professional efficacy	5.3*	25.2 (7.5)[b]	26.8 (7.6)[a]	25.5 (7.0)[a,b]
Psychological distress	19.3*	42.8 (23.0)[a]	34.1 (22.2)[b]	36.5 (20.2)[b]
Role overload	3.4*	3.7 (1.4)[a]	3.4 (1.4)[b]	3.6 (1.3)[a,b]
Role conflict	3.6*	3.7 (1.4)[a]	3.5 (1.4)[b]	3.7 (1.4)[a,b]
Role ambiguity	9.0*	3.4 (1.3)[a]	3.0 (1.2)[b]	3.3 (1.4)[a]
Aerobic exercise per week (min)	11.6*	95.0 (69.9)[a]	102.2 (74.5)[b]	120.9 (75.5)[b]

Note: Overall descriptive statistics for aerobic exercise per week, $M = 101.0$, $SD = 72.3$.
ANOVA = analysis of variance.
[a,b]Indicate group means that are significantly different.
*$p < .01$. $df = (2, 1270–1351)$.

role overload, role conflict, and role ambiguity and lower professional efficacy compared to the neutral impact group. Those who reported a positive physical fitness impact engaged in aerobic exercise 25 more minutes per week, on average, than those reporting a negative physical fitness impact. However, all three impact groups reported less aerobic exercise per week than the Centers for Disease Control and Prevention recommendation of 150 minutes per week of moderate-intensity aerobic exercise.

Relationship impacts

One-way ANOVAs showed a significant effect on exhaustion, cynicism, psychological distress, role overload, and role conflict for the three COVID-19 pandemic impact on couple groups (see, Table 7). Post hoc analyses using the Tukey-Kramer criterion for significance indicated that those reporting negative impacts on the couple had higher exhaustion, cynicism, and psychological distress compared to both the neutral and positive impact groups. Those reporting negative impacts on the couple had higher role overload and role conflict when compared to those reporting a positive impact.

One-way ANOVAs showed a significant effect on psychological distress and role conflict for the three COVID-19 pandemic impact on relationship with their kids groups (see, Table 7). Post hoc analyses using the Tukey-Kramer criterion for significance indicated that those reporting negative impacts on their relationship with their kids had higher psychological distress and role conflict compared to those reporting a positive impact.

Discussion

The COVID-19 pandemic presented individuals everywhere with unexpected challenges, and cyber personnel were no exception. When specifically asked to detail the pandemic's positive and/or negative impacts on the individual, a large majority reported at least one negative impact, with the most reported themes across all impact categories (i.e., work, relationship, personal) being *limited face-to-face interactions* and *loss of personal activities*. This is consistent with recent studies of the general U.S. population. A recent study of U.S. adults found that being under stay-at-home orders was associated with loneliness, and the perceived impacts of COVID-19 on the daily life of individuals was negatively associated with loneliness (Tull et al., 2020). Additionally, when specifically asked about fitness limitations, most participants reported a negative impact on their fitness. From the perspective of most of the participants, COVID-19 threw a wrench into their work, relationship, and fitness plans. These study findings indicate that

Table 7. One-way ANOVAs for relationship impacts on burnout, psychological distress, and work role strain.

	Impact on Relationship as a Couple				Impact on Relationship with Their Kids			
		Impact Group Post Hoc Comparison				Impact Group Post Hoc Comparison		
Relationship Impact Outcome	F	Negative *M* (*SD*)	Neutral *M* (*SD*)	Positive *M* (*SD*)	F	Negative *M* (*SD*)	Neutral *M* (*SD*)	Positive *M* (*SD*)
Exhaustion	5.5*	14.1 (8.6)[a]	11.9 (9.1)[b]	12.5 (8.2)[b]	2.8	14.0 (7.9)	12.7 (9.2)	11.9 (8.5)
Cynicism	4.7**	11.7 (8.6)[a]	10.1 (8.6)[b]	10.0 (7.9)[b]	1.5	11.0 (8.1)	11.1 (9.2)	9.8 (8.0)
Professional efficacy	1.0	25.6 (7.4)	26.3 (7.6)	26.2 (7.1)	1.4	25.6 (7.7)	25.7 (7.4)	26.7 (6.6)
Psychological distress	24.9*	44.3 (22.3)[a]	34.3 (22.6)[b]	34.1 (19.4)[b]	6.1*	43.2 (23.7)[a]	37.5 (23.7)[a,b]	35.3 (19.4)[b]
Role overload	5.7*	3.8 (1.5)[a]	3.6 (1.4)[b]	3.5 (1.4)[b]	1.6	3.9 (1.5)	3.7 (1.5)	3.7 (1.4)
Role conflict	4.9**	3.8 (1.4)[a]	3.6 (1.5)[a,b]	3.5 (1.4)[b]	3.5**	4.0 (1.4)[a]	3.8 (1.5)[a,b]	3.6 (1.4)[b]
Role ambiguity	2.7	3.4 (1.3)	3.3 (1.4)	3.2 (1.3)	0.7	3.4 (1.3)	3.4 (1.4)	3.2 (1.3)

[a,b]Indicate group means that are significantly different.
*$p < .01$. **$p < .05$. $df = (2, 955–970)$ for relationship as a couple. $df = (2, 534–544)$ for relationship with their kids.

COVID-19 had multivariable impacts on the psychological health of cyber personnel. This suggests that emotional, social, and behavioral health are closely intertwined. That is, when even one aspect of life (e.g., work, relationships, fitness) is off kilter, respondents experienced higher levels of psychological distress, burnout, and work role strain as a result.

Work impacts

The cyber population (including active duty cyber, intelligence, and support personnel, as well as cyber civilian and contractor personnel) has unique work stressors, and higher levels of work stress impact psychological health (Chappelle et al., 2013). The findings from the current study provide evidence that COVID-19 heightened perceived work stress for many, which was linked to higher levels of psychological distress, burnout, and work role strain. The USAF cyber work arena was disrupted, and cyber personnel had to adjust accordingly to continue meeting operational demands. When specifically asked to write out the negative and positive impacts of the COVID-19 pandemic on work, a substantial number of "neutral" responses (46.8% for technical proficiency and 43.5% for mission effectiveness) were given.

Self-perceived negative comments related to technical proficiency and mission effectiveness were directly related to higher work role strain (role overload, role conflict, and role ambiguity). To support unit members in an uncertain work environment, unit leadership should work closely with unit members to understand the newfound challenges (e.g., communication issues and concerns with teleworking) to help individuals and their teams maintain duty-related technical proficiency and mission effectiveness. Leader support and effective communication are paramount during a pandemic, especially at the unit or squadron level, where unit members rely on their direct leaders for information and guidance on how to navigate ever-changing pandemic circumstances. Supervisors could lessen the negative effects of COVID-19 on operations by providing accessible resources to unit members to include information regarding work-from-home expectations and COVID-19 precautions, employee assistance programs, mental health support services, timely feedback on work completed, and training opportunities to promote resiliency in the event of another pandemic. In addition, leaders should initiate conversations around job redesign and job crafting to optimize productivity in the event of another transition to working from home.

Physical fitness impacts

Of the six open-ended items asking participants to detail negative and positive impacts of COVID-19, physical fitness received the most negative impact responses of all the items. Individuals who perceived their fitness routine and physical health to be negatively impacted by COVID-19 reported higher levels of psychological distress, burnout, and work role strain, on average. Physical activity is a stress reducer and has been linked to positive mental health outcomes (Edenfield & Blumenthal, 2011). Physical fitness is important to the military, and there are fitness requirements for certain jobs in the Air Force. While 18% of participants reported a positive impact on their fitness, for many cyber personnel, COVID-19 circumstances made it more difficult to meet fitness goals. Results from the current study showed that meeting both Centers for Disease Control and Prevention recommendations for weekly exercise and perceived fitness goals were challenges for this sample during the COVID-19 pandemic.

As this population is more at risk for elevated psychological distress compared to the general population (Chappelle et al., 2013), it is crucial that leadership offer alternative avenues for individuals to pursue self-care and maintain fitness standards. In the future, the availability of alternative fitness programs (i.e., streaming or on-demand fitness services, personal trainer-led exercise routines to complete independently) would benefit this sample in the event of a disruption in normal fitness routines. The camaraderie and accountability that come with virtual competitive fitness teams could be implemented to overcome feelings of loneliness and isolation.

Relationship and personal impacts

Negative couple relationship impacts were associated with higher exhaustion, cynicism, psychological distress, and work role conflict. For many individuals, COVID-19 increased relationship strain and reduced opportunities for forming/maintaining relationships.

Coping mechanisms are pertinent for the well-being of individuals faced with unanticipated changes that may arise from a pandemic. Approach-oriented coping (i.e., active coping, meaning-focused coping), mindfulness, and social support are examples of healthy coping mechanisms, which could be employed by individuals to alleviate negative effects of stressors, pandemic-related or otherwise. Peer social support could include support groups within the cyber community or location-based, and embedded mental health providers could facilitate these peer groups and/or offer one-on-one support.

It appears that relationships with kids were more robust when impact groups were compared and were only associated with higher psychological distress and work role conflict. Special consideration should be given to working mothers who may experience higher psychological distress with juggling multiple roles during a chaotic pandemic (Yavorsky et al., 2021). In a study of remote-working, dual-earning couples, Shockley, Clark, et al. (2021) found seven different types of ways that couples managed these dual roles and commitments and compared these types with well-being and performance. The results suggested that the best management strategy for dual earners that preserved their well-being and job performance consisted of an alternating days approach, where the wife and husband alternated days between childcare and work. The researchers found that the approach with the lowest well-being and job performance for the wife was dubbed the "remote wife does it all" approach.

The two items with the most positive impact responses were relationship as a couple (35.4%) and relationships with their kids (48.1%). To describe the mean comparisons in a way that represents those with positive impact responses for relationship as a couple, these individuals reported lower exhaustion, cynicism, psychological distress, work role overload, and work role conflict than others. For those with positive relationship impacts with their kids, they reported lower psychological distress and work role conflict than others. It is also important to note that for the first open-ended item, the most reported positive impact theme was *improved relationships* with immediate family and loved ones. Recent conceptual models on human and family development suggest that the centrality of family processes such as family beliefs and close relationships may support relationship quality and buffer the risk of well-being to children during a crisis (Prime et al., 2020).

Implications

Although COVID-19 has been a negative event in and of itself, the resulting effects spanned the spectrum from negative to positive, showing there may be lessons learned from the silver linings. Study findings demonstrated a strong link between perceived negative experiences and negative psychological outcomes, but also suggest that there are several positive factors that emerged because of COVID-19 circumstances. It is all in the eye of the beholder. For example, many USAF cyber personnel preferred to be back in the office, but many others appreciated the newfound ability to telework as it offered them greater work-life balance. The work landscape (i.e., in-person and/or virtual) has shifted for society, and the Department of Defense might consider adopting more flexible scheduling when the mission allows for it to potentially improve well-being, recruitment, and retention of the military workforce.

It is important to note that this study represents a snapshot in time, and ongoing changes throughout the pandemic were not a part of the current study. In addition, enduring cumulative impact over time was not a part of the current study. Pandemic-related impact differences in certain demographics (gender, age) were not available nor assessed in the current study. The methodology in the current study utilized ANOVAs, and while significant differences among groups can provide compelling associations, the current methodology does not include analyses of causation. No causation is implied for the impacts or the standardized outcome measures.

Conclusions

Given the wealth of information gleaned from the self-reported impacts of the COVID-19 pandemic to USAF cyber personnel's work, fitness, and relationships, and the findings that negatively reported impacts were associated with negative psychological health outcomes, it is important to provide action-oriented recommendations that can benefit not only the cyber population, but U.S. adults in general, in the event of another pandemic. The positive experiences shared by USAF cyber personnel are doubly informative as they offer solutions for how to mitigate distress during a crisis, but also pointers for how to improve the overall emotional, social, and behavioral well-being and readiness of the U.S. military workforce, during a pandemic or not.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Statement of interest

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Data availability statement

The data are not publicly available due to government restrictions regarding information that could compromise the privacy of participants.

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