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## Computing faculty internationalization perceptions: The impact of country and COVID-19

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### Abstract

This article chronicles the third phase of a project investigating computing faculty internationalization perceptions. Our research focused on the following research question: Do significant differences exist amongst computing faculty members' perceptions of support for internationalization? The results of this phase are particularly interesting as the data of a pre-COVID-19 survey instrument are compared with a dataset collected during the pandemic. Specifically, this article focuses on whether the respondents' perceptions varied based on country of origin. ANOVA testing did not reveal any significant differences based on country of origin; however, when respondents were grouped into two groups (USA and outside USA) a difference was detected in financial support at 0.1 alpha level, [ $t(68) = -1.952, p = 0.0551$ ], with the USA mean of 10.833 and the Outside USA mean of 8.972. Although it is impossible to state definitively that any factor caused the pattern of responses observed in our data, it seems plausible that the combination of vaccine rollouts, economic aid, and culture may have played a role in steering American respondents toward a more positive view of institutional support for internationalization.

**Keywords:** Computing, Internationalization, Faculty, Perception, COVID-19

### Introduction

This research builds on the work of Dr. John Criswell (2014) who developed the Faculty Internationalization Perceptions Survey (FIPS) to measure university faculty members' perceptions of internationalization at their institutions. Internationalization in higher education may be described as “The process of integrating an international, intercultural or global dimension into the purpose, functions or delivery of post-secondary education” (Knight, 2003, p. 2). International activities can include study abroad programs, international research, and enrollment of international students, among many others. Initial testing by Criswell verified the utility of the instrument in identifying differences in perception within and between institutions examined. Criswell's work led to an instrument that included four key components (institutional support, financial support, faculty expectations, and faculty rewards). The first two components (institutional support and financial support) were initially a single factor; however, financial support was split off from institutional support based on question scope, revealing the nuances of the “disconnect between what the institution says, and what kinds of tangible support the faculty members receive” (Criswell, 2014, p. 90).

Criswell's initial research determined that faculty perceptions of institutional support were significant:  $F(2,283) = 4.777, p = 0.009$ . Financial support similarly showed the perception of an institution's financial support to be significant:  $F(2,283) = 5.360, p = 0.005$ . Further analysis of variance affirmed that the other

two facts—faculty expectations and rewards— “showed that there were no significant differences between them” (Criswell, 2014, p. 102). Our initial research built on Criswell’s work by exploring the perceptions of computing faculty, which includes faculty who teach in information technology, information systems, computer science, or other related domains (Girard, Thomason, & Tsavatewa, 2020). This grouping is similar to how the Joint Task Force for Computing Curricula 2005 viewed the field. (Joint Task Force on Computing Curricula, 2005).

In the first phase of our project, we focused on data visualization and hypothesis generation using a data exploration methodology. Our research focused on the following research question: Do significant differences exist amongst computing faculty members’ perceptions of support for internationalization? Specifically, we were interested in exploring whether demographic characteristics or professional experiences might account for any differences. Such differences were initially highlighted by Criswell (2014) in his pioneering research. After receiving Institutional Review Board approval, we hosted our instrument online using Google Forms in early 2020. Key to this project were three statements related to faculty perceptions of institutional support (InstSp) and three questions about financial support (FinSp). Respondents were asked to indicate to what extent they agreed with the following statements concerning the campus where they were currently working:

- InstSp1:** Top leaders express verbal and written support for internationalization.
- InstSp2:** Institutional mission/vision statements specifically reference an international dimension.
- InstSp3:** Top leaders express support for faculty participation in international activities.
- FinSp1:** Adequate funding for international teaching is available.
- FinSp2:** Adequate funding for international research is available.
- FinSp3:** Adequate funding for international conferences is available.

Table 1 summarizes the areas explored and the generated hypotheses based on significance.

**Table 1. Hypotheses Generated (Phase 1)**

	Demographic Characteristic					Professional Experience			
	Gender	Country	LiveOut	Lang	Fac Status	StuEx	FacEx	IntRes	IntTea
InstSp	N	N	N	N	N	N	N	N	Y *
FinSp	Y .	N	N	Y **	N	N	N	N	N
Significance codes: ** = 0.01    * = 0.05    . = 0.1									

The resultant hypotheses were:

H<sub>1</sub>: Faculty who have international teaching experience and faculty who do not have international teaching experience have the same perception of institutional support.

H<sub>2</sub>: Female faculty and male faculty have the same perception of financial support.

H<sub>3</sub>: Unilingual faculty and multilingual faculty have the same perception of financial support.

By the time we had analyzed our initial data, the COVID-19 pandemic was the new reality. We decided to collect a second set of data to determine whether the impact of COVID-19 changed faculty perceptions. The population and instrument were identical to our Phase 1 research (Girard, Thomason, & Tsavatewa,

2020). We hosted our instrument online using Google Forms. The instrument consisted of three statements related to faculty perceptions of institutional support (IsntSp) and three questions about financial support (FinSp). The major change was the timeframe (November – December 2020). For each of the three hypotheses the same testing was conducted. In each case an ANOVA was conducted to determine whether a statistically significant difference existed at 0.5 alpha level. A statistically significant difference would confirm the hypotheses generated during Phase 1. The ANOVA results for each hypothesis were:

- There was a not significant difference in mean Institutional Support [ $F(1,72) = 1.701, p = 0.196$ ] between reported International Teaching categories.
- There was a not significant difference in mean Financial Support [ $F(1,72) = 0.595, p = 0.443$ ] between reported Language categories.
- There was a not significant difference in mean Financial Support [ $F(2,71) = 0.91, p = 0.407$ ] between Gender categories

The lack of a statistically significant difference existing at 0.5 alpha level was not anticipated. Nevertheless, this is an important finding as it is counter to what was discovered in Phase 1 (Girard, Thomason, & Tsavatewa, 2020).

### Methodology

Following the analysis of the Phase 2 data, a discussion ensued about whether the impact of COVID may have varied by country. Our plan for Phase 2 had not included a detailed analysis of country data because country data had not proved statistically significant during Phase 1 (see boxplots for Figure 1 and Figure 2).

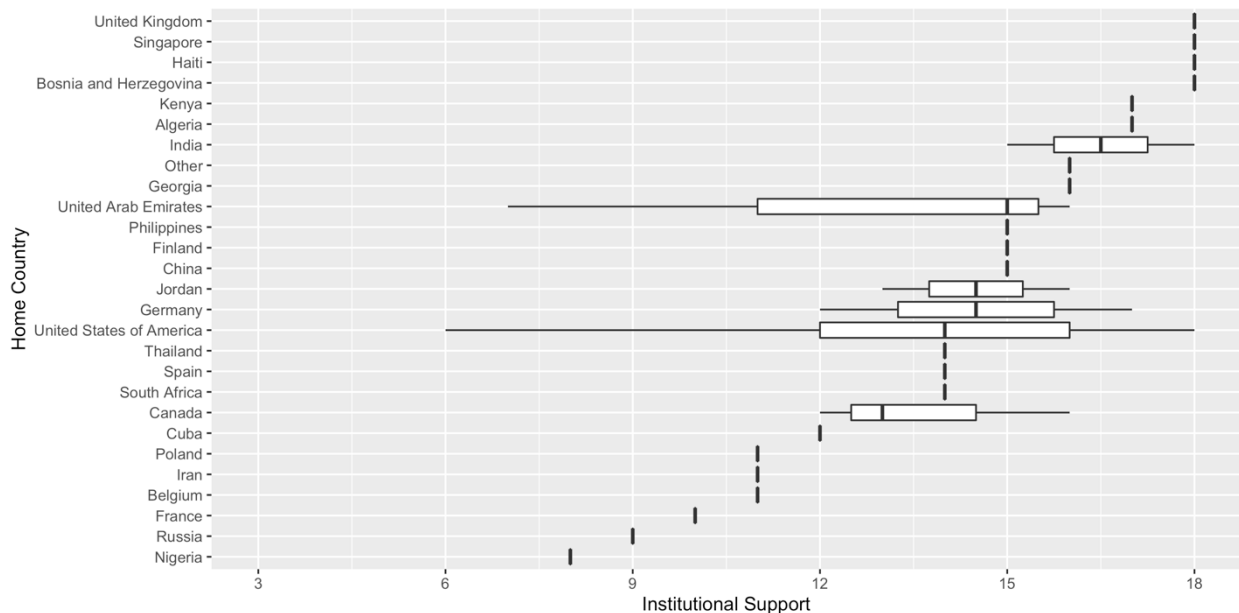


Figure 1. Institutional Support - Country of Origin (Phase 1)

The ANOVAs suggested there was a not significant difference in mean Institutional Support [ $F(26,43) = 0.74, p = 0.791$ ] between countries and there was a not significant difference in mean Financial Support [ $F(26,43) = 0.92, p = 0.579$ ] between countries.

Nevertheless, the impact of COVID and country seemed like reasonable post hoc analysis. Specifically, we hypothesized that faculty perceptions of internationalization could be impacted based on faculty members' country of origin. Continuing with the visualization theme that was used in Phase 1, we opted to use R to plot the Phase 2 data with a view to determining whether differences might exist (Girard, Thomason, & Tsavatewa, 2021).

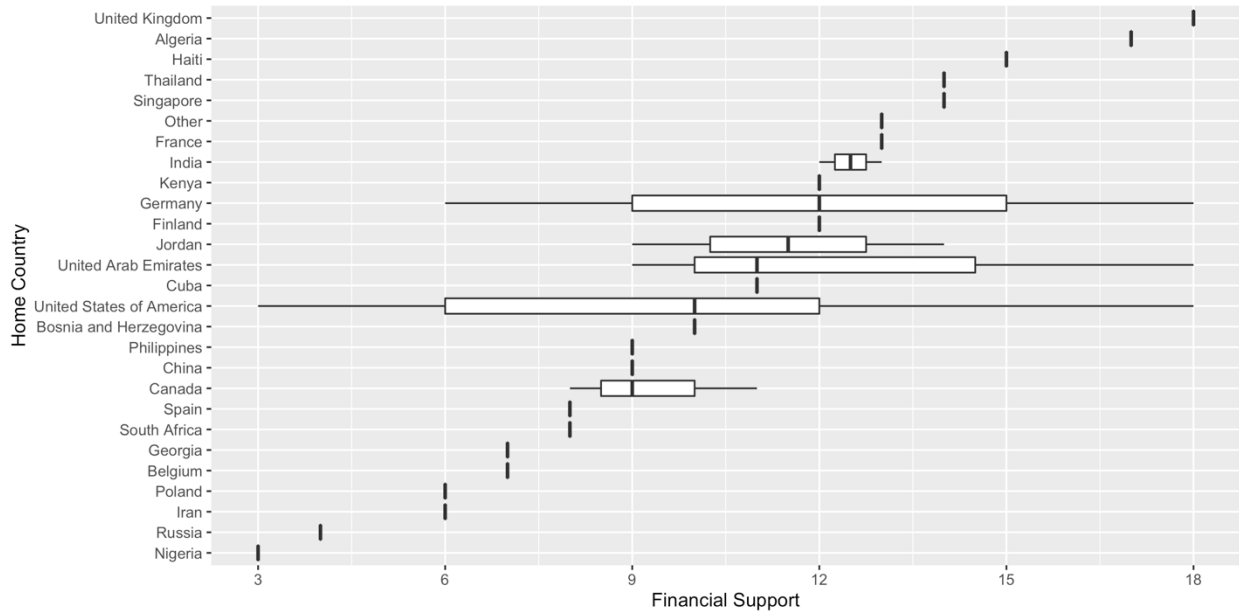


Figure 2. Financial Support - Country of Origin (Phase 1)

### Results

A total of 74 usable responses were collected during Phase 2. The country of origin of the sample population is shown in Table 1, the demographic characteristics are shown in Table 2, and the professional experiences are shown in Table 3.

**Table 2. Demographic Characteristics**

Characteristic	Count	Percent
<i>Gender</i>		
Female	26	35%
Male	47	64%
Prefer not to answer	1	1%
<i>Faculty Status (FacStatus)</i>		
Fulltime Non-tenure Track	11	15%
Fulltime Tenure Track	12	16%
Fulltime Tenured	36	49%
Part-time	9	12%
Other	6	8%
<i>Speak Second Language (Lang)</i>		
No	23	31%
Yes	51	69%
<i>Lived Outside Country (LiveOut)</i>		
Yes	44	59%
No	30	41%

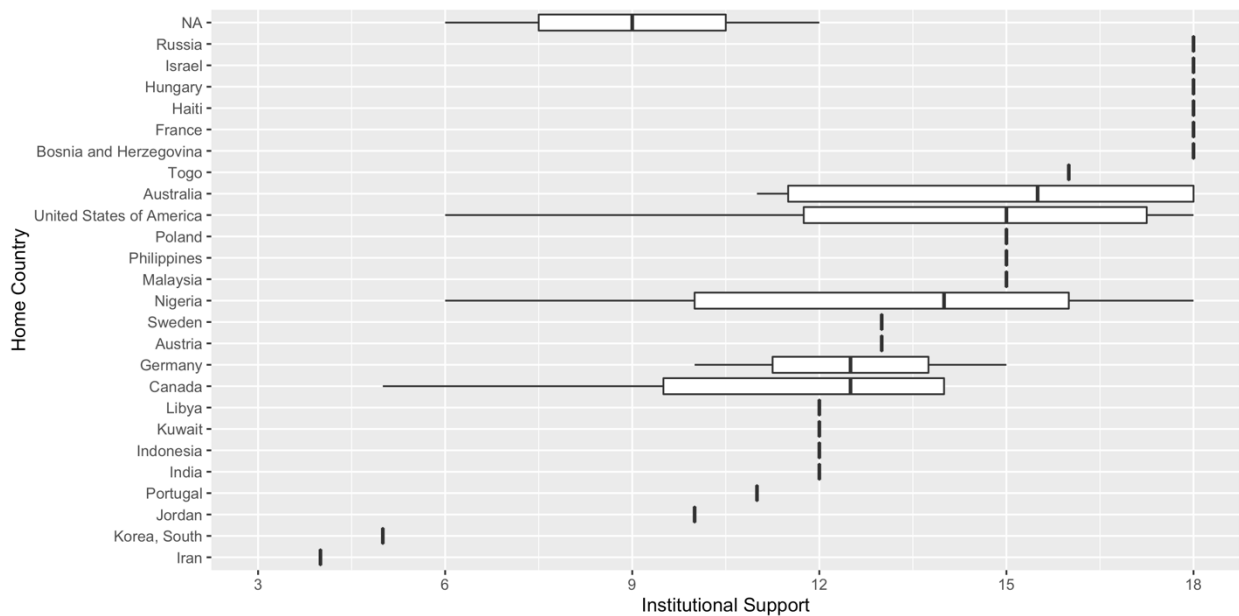
**Table 3. Country of Origin**

Country	Count	Percent
United States of America	36	49%
Australia	6	8%
Canada	4	5%
Nigeria	3	4%
Germany	2	3%
Philippines	2	3%
Unreported	2	3%
Austria	1	1%
Bosnia and Herzegovina	1	1%
France	1	1%
Haiti	1	1%
Hungary	1	1%
India	1	1%
Indonesia	1	1%
Iran	1	1%
Israel	1	1%
Jordan	1	1%
Korea, South	1	1%
Kuwait	1	1%
Libya	1	1%
Malaysia	1	1%
Poland	1	1%
Portugal	1	1%
Russia	1	1%
Sweden	1	1%
Togo	1	1%

**Table 4. Professional Experiences**

Experiences	Count	Percent
<i>Student Exchange (StuExch)</i>		
No	53	72%
Yes	21	28%
<i>Faculty Exchange (FacExch)</i>		
No	57	77%
Yes	17	23%
<i>International Research (IntRes)</i>		
No	29	39%
Yes	45	61%
<i>International Teaching (IntTea)</i>		
No	30	41%
Yes	44	59%

Figure 3 visualizes the Phase 2 respondents’ perception of institutional support based on country of origin and Figure 4 visualizes Phase 2 respondents’ perception of financial support based on country of origin.



**Figure 3. Institutional Support - Country of Origin (Phase 2)**

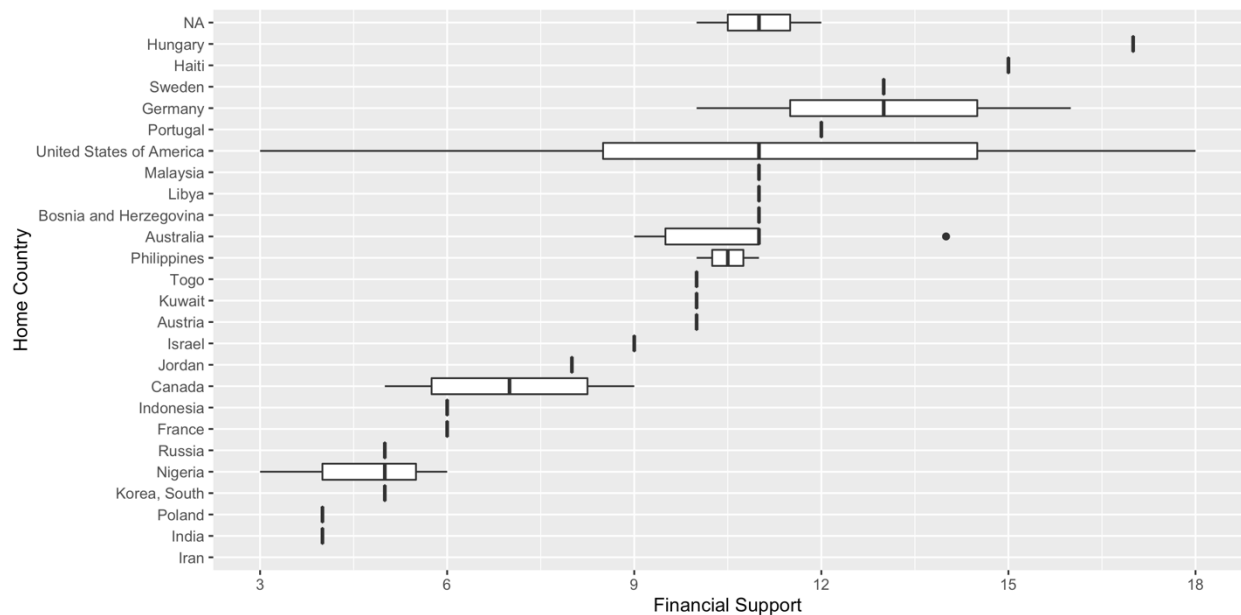


Figure 4. Financial Support - Country of Origin (Phase 2)

Subsequent ANOVAs suggested there was a not significant difference in mean Institutional Support [ $F(24,47) = 1.16, p = 0.325$ ] between countries during Phase 2 and there was a not significant difference in mean Financial Support [ $F(24,47) = 1.297, p = 0.219$ ] between countries during Phase 2. Despite the lack of a statistically significant difference, the research team remained intrigued by the visualizations. The sample data is clearly slanted by the large number of respondents from the USA (53% in Phase 1 and 49% Phase 2). Equally, as was highlighted in our Phase 1 results, there were many countries with a single respondent. As a result, we opted to segment the country data as USA or Outside USA.

Once the data was segmented a series of t-tests were executed. The t-tests indicated there was not a significant difference in Phase 1 for either institutional support [ $t(68) = 0.684, p = 0.4962$ ] or financial support [ $t(67) = 1.431, p = 0.157$ ]. Similarly, our examination of the Phase 2 data determined there was not a significant difference in Phase 1 for institutional support [ $t(69) = -0.871, p = 0.390$ ]; however, there was a difference detected in financial support at 0.1 alpha level, [ $t(68) = -1.952, p = 0.0551$ ], with the USA mean of 10.833 and the Outside USA mean of 8.972.

## Discussion

### Impact of COVID-19

During the Phase 2 data collection period (November – December 2020), the global community was more than nine months into a protracted public health crisis conclusively classified as a pandemic. The end of December 2020 would mark the one-year anniversary of the identification of the novel coronavirus that would be named COVID-19. By late 2020, the World Health Organization (WHO), along with domestic health agencies such as the CDC, had established guidelines and campaigns to counter COVID-19: hand washing, mask wearing, coughing and sneezing safety, and social distancing. Despite these coordinated efforts, total case counts (67,010,113) and total fatalities (1,528,512) reported at the end of November 2020 were substantial and still on the rise worldwide (WHO, 2021). December also marked the emergence of the first two COVID-19 variants, one from the United Kingdom and the other from South Africa. Efforts to find, test, isolate, and treat every case and trace every contact were regionally inconsistent, revealing

international variability and vulnerability in healthcare infrastructure, resource availability, funding, access to care, and logistics support. Scientists, government leaders, healthcare workers, and citizens worldwide found themselves either preparing for another wave of COVID-19 or holding on to the hope signaled by multinational vaccine development and distribution planning.

Domestically, the United States found itself at year's end besieged by COVID-19, having crossed the critical threshold of 100,000 new cases per day in early November and reaching nearly 300,000 deaths by month's end (CDC, 2021). The nation's leading infectious disease official, Dr. Anthony Fauci, routinely commented in late fall press briefings and interviews that a surge was inevitable and that the country "could not possibly be positioned more poorly" (Dawset & Abutalen, 2020). Despite the existence of the White House Coronavirus Task Force, the complexities of federalism and state self-determination contributed to a fragmented federal and state response. Inconsistencies in testing protocols, mask mandates, PPE availability, purchasing power, reopening standards, and more impacted the national response trajectory. These inconsistencies also revealed the shortcomings of a market-driven healthcare system, an underinvestment in public health, and the partisan strategies adopted in response to an international crisis. Because the pandemic struck during an election year, Americans saw the campaign narrative shift and social debate heighten around things like the origin of the virus, epidemiology, outcomes ownership, and economic recovery. Most alarming, by the fall, COVID-19 had confirmed again the existence of institutional inequalities resulting in health disparities among our citizens. Minority populations, particularly African Americans and Native Americans, bore the burden of the virus's adverse effects. At the time, age-adjusted COVID-19-associated mortality among Native Americans was 1.8 times higher than among non-Hispanic Whites, while African American mortality was 3.5 times higher, a staggering finding given their population size (Gross, et al., 2020) (Arrazola, et al., 2020). The combination of institutionalized inequalities and uneven, confused governmental responses suggested that the U.S. would struggle to get past the pandemic.

That struggle was playing out acutely in American colleges and universities. COVID-19's impact on higher education worldwide has been well documented in the popular press as institutions of learning saw not only unprecedented disruptions in operations but also novel pedagogical challenges in the wake of the global pandemic (Deloitte Center for Higher Education Excellence, 2020) (Nietzel, 2020) (Salmi, 2020). The Lumina Foundation estimated that more than 200 million college and university students around the world were impacted by the closing of campuses and the shift to e-learning as institutions sought to mitigate risk while maintaining continuity of instruction (Salmi, 2020). Education stakeholders like the *Chronicle of Higher Education* (The Chronicle of Higher Education, 2020), the National Conference of State Legislators (Smalley, 2021), and others documented the impact of the pandemic on the sector in real time, providing resources and repositories of information around shared struggles whose costs exceeded \$120 billion domestically. As many institutions dealt with the challenges of enrollment shortfalls, unanticipated costs, preventative actions, and budget uncertainty, the pandemic would reveal shortcomings in risk analysis and contingency planning. Hundreds of institutions, many in already precarious financial health, either closed or were forced significantly to adapt as a result of the pandemic (Aslanian, 2020) (Aspegren, 2021). But despite the cascading negative consequences of the pandemic, higher education also saw positive change. Driven by necessity, institutions succeeded at rapidly embracing and expanding online learning. The United Nations in their 2020 *Policy Brief on Education during COVID-19 and Beyond* characterized these successful pivots to online education as a "promising future of learning" (United Nations, 2020). With investments in resources like digital infrastructure and the emergence of "pandemic pedagogy" as an educational approach, the consensus that higher education is changing and will change dramatically as a result of the pandemic has been cemented. However, in late 2020 it was not yet clear how international education would emerge from these changes. Internationalization was and is an important source of



enrollment as well as enrichment, yet international education is often regarded as a peripheral function--especially at times when travel is risky and uncertain if not impossible.

By late 2020, institutions of higher education were emerging from the active crisis management efforts of spring and summer terms and pivoting to an adaptability approach to international education. While some schools and programs had begun to revisit the possibility of post-pandemic planning, others were much more cautious, recognizing that consequences from the pandemic could persist for months and even years. Faculty and staff found their personal and professional lives adversely impacted as they navigated teleworking arrangements, conference cancellations, program and travel defunding, virtual conferences, childcare shortages, work reassignments and much more. The actions of a few major national programs and organizations are representative of the many institution-level decisions taken in the wake of the pandemic: the Fulbright Program suspended its activities in March 2020, then announced in October 2020 that it was “tailoring its plans on a country-by-country basis to resume in-person exchanges for U.S. participants after January 1, 2021” (ECA, 2020). Similarly, the Benjamin Gilman scholarship program, which funds student travel for study abroad, announced in late November that after ceasing student travel support from March through December 2020, it would resume its scholarship awards beginning January 2021, but only to destinations with State Department travel advisories level 1 or 2 (Benjamin A. Gilman International Scholarship Program, 2020). At the time of the survey administration, such destinations were few and far between as most of the globe remained under level 3 advisory due to Covid-19 (CDC, 2021). In the December 2020 publication of their *Considerations for Institutions of Higher Education*, the CDC continued their recommendation that institutions “consider postponing or canceling upcoming student international travel programs” (CDC, 2021). The impact of COVID-19 on enrollment became evident in Fall of 2020 when the annual report of the Institute for International Education (2020) detailed a 43% decrease in international enrollment in the United States and online outside the United States. Institutions responding to the IIE survey reported that nearly 40,000 students had deferred enrollment to a future term (Baer & Martel, 2020).

### Conclusions

It is impossible to state definitively that any factor caused the pattern of responses observed in our data. But in the U.S., vaccine rollouts, economic aid, and an optimistic culture may have steered American respondents toward a more positive view of institutional support for internationalization.

Pandemic conditions and their consequences seemed to offer few reasons for hope in late 2020. As the negative effects noted above persisted, U.S. COVID cases were rising steeply and would not peak until early January 2021. Nevertheless, and perhaps in spite of the facts on the ground, the phase 2 data collection period still offered Americans some reasons for optimism. A way out of pandemic conditions appeared within reach as Operation Warp Speed, launched in May 2020 by the U.S. Department of Defense, promised an accelerated vaccine development process that would produce its first doses in January 2021 (DoD, 2021). Some of the unfamiliar stresses of early pandemic life—masking and distancing, telework, remote learning—had become routine and thus less stressful. Other anxieties, especially economic insecurity, would be relieved or at least lessened. The March 2020 CARES Act authorized \$2 trillion in aid to individuals, businesses, state and local governments, and the education sector. Higher education received \$14.25 billion from the CARES Act, important assistance that would keep students enrolled and institutions on their feet as they continued to adjust operations under COVID conditions (NPR, 2020).

In addition to the initiatives mentioned above, Americans perhaps were choosing to apply our typically forward-looking mindset to the situation. The holidays were coming, and with them, a much-needed break for stressed-out university faculty. The *annus horribilis* that was 2020 was nearly at an end. While we

recognized that COVID would not magically disappear at midnight on December 31, the opportunity to literally turn the (calendar) page was welcome and eagerly anticipated. Americans' combination of individualism and desire for certainty might have made us resistant to public health measures that other countries tolerated. But that same combination of qualities prepared us to seize any opportunity to "get back to normal" or at least closer to it (Hofstede Insights, 2021).

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