Humanities & Social Sciences Communications

ARTICLE

https://doi.org/10.1057/s41599-025-05072-8 OPEN

The influence of national culture on the initiation of mentoring in a STEMM talent development program: mentors' perspectives

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Formalized mentorship programs are an important tool for developing qualified STEMM professionals. Despite an increasingly global STEMM workforce there is little research on how the power distance dimension of national culture may influence the initiation of mentoring relationships. This study explored differences in how mentors from cultures with different power distance orientations started their mentoring relationships with talented adolescents in an online talent development program focused on STEMM. Thirteen mentors were interviewed using teleconference software for this qualitative study. Analysis of the interview transcripts involved a combination of structural and hypothesis coding methodologies. National power distance influences the initiation of mentoring, who drives the relationship, and some aspects of mentor–mentee collaboration. Contrary to expectations, the initiation of mentoring in this STEMM-focused program did not rely on building rapport. During the first few months of mentoring, mentors from greater power distance countries more frequently made decisions and less frequently sought mentees' opinions than mentors from smaller power distance countries. Notably, mentors did not perceive cultural differences as important or topics worthy of discussion, despite being paired with a mentee from a different country and being asked by the program to address how such differences may influence their mentorship. This study highlights a need for effective education about how cultural differences manifest and influence mentorship and collaboration.

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Introduction

Diversifying and increasing the scientific workforce is a priority for many nations. Formalized mentorship programs are one tool to develop qualified STEMM professionals (Atkins et al., 2020; Robnett et al., 2018; Stoeger et al., in press). For example, the National Research Mentoring Network (NRMN) has become a premier mentoring resource in the United States to bolster the diversity of the biomedical workforce (NRMN, n.d.). Similarly, the Howard Hughes Medical Institute launched a ten-year initiative to improve Scientific Mentorship (HHMI, n.d.). These initiatives draw on research that shows mentoring to be an effective measure to develop talent in science, technology, engineering, mathematics, and medical sciences (STEMM) (e.g., National Academies of Sciences, Engineering, and Medicine, 2019; Rogers et al., 2020; Stoeger et al., 2023).

In accordance with the goal to increase and diversify the STEMM workforce, one concomitant emphasis on mentorship has focused on building skills and increasing awareness in areas such as cultural intelligence, cultural humility, unconscious bias, and anti-racism (Chaudhary & Berhe, 2020; NRMN, n.d.; Sánchez et al., 2021). Scholars call for mentors and mentees to develop skills to embrace cultural differences that may otherwise negatively influence the relationship (National Academies of Sciences, Engineering, and Medicine, 2019). However, we agree with Preston et al., (2019) assertion that much of the literature on culture and mentoring pertains to a U.S.-centric view that attempts to be more inclusive of the demographic characteristics of excluded groups. While important, this perspective has neglected psychological and cultural variables that may influence mentorships involving people from different countries. For example, dimensions of national cultures, such as views on power distance (Hofstede, 2011), may influence such mentorships. This topic is important to examine, especially as more cross-cultural mentoring is possible through online mentoring programs in school and university settings with international students as well as in multinational workplace settings.

The purpose of this study is to explore differences in how mentors from cultures with different power distance views initiate their mentoring relationships in an online talent development program in STEMM. Mentoring scholars have expanded the definition of mentoring relationships to developmental networks that are characterized by different forms (e.g., dyads and triads), types (e.g., peer, supervisory), or modalities (e.g., face-to-face, online) (Dobrow et al., 2012; Higgins et al., 2007; National Academies of Science Engineering, and Medicine, 2019; Stoeger et al., 2021). However, the type of mentoring addressed in the present study is the traditional one-on-one mentorship between a more knowledgeable mentor (i.e., a STEMM professional) and a less experienced mentee (i.e., a highly motivated and talented youth). The questions guiding our study were:

- Do mentors' national power distance influence their approach to initiating a cross-cultural mentorship? If so, in what ways?
- How do mentors perceive cultural differences during the initiation of cross-cultural mentoring?
- Do aspects of mentors' power distance, such as preferences for collaboration, sharing personal information, and delegating, influence the initiation phase (i.e., the first few months) of cross-cultural mentoring?

Mentoring for talent development in STEMM

Bloom's (1985) seminal study of 120 eminent individuals in six domains (i.e., tennis, swimming, sculpture, piano, mathematics, and neurology) revealed the indispensable role of mentoring for talent development. Across domains, talent development takes many years and typically goes through three stages: interest development, skill acquisition, and style formation (Bloom, 1985; Stoeger et al., 2024; Subotnik et al., 2011). As the focus of each stage differs, talented individuals need different types of support, often provided by different mentors.

In addition to the retrospective qualitative inquiries, quantitative research on the effectiveness of mentoring for STEMM talent development emerged as formalized talent mentoring programs in STEMM started to appear (Stoeger et al., 2013, 2019, 2021; Subotnik et al., 2010; Tenenbaum et al., 2014). For instance, a German-wide online mentoring program, CyberMentor, matches high school girls who are interested in science, technology, engineering, and mathematics (STEM) with female college students and professionals in STEM domains. The program goal is to mentor girls to move from Bloom's (1985) interest development stage to the skill acquisition stage (Stoeger et al., 2021, in press). Program evaluation studies have consistently shown that online mentoring promoted girls' STEM-focused activities and certainty about career plans (Stoeger et al., 2013, 2019, 2021). MentorNet (n.d.) is an online STEM mentoring program that supports college students in the U.S. through Bloom's (1985) skill acquisition stage. Started in 1997, the program has been scaled to serve thousands of STEM mentees. Developing confidence in their STEM identity is one of the program's successful outcomes (Dockter et al., 2001).

Although mentoring has been shown to be an effective way to support talent development in STEMM, little research has explored the potential role of national cultures in mentoring. An increasingly diverse composition of learning groups and workforces and the importance of global connectivity in STEMM make it all the more important to understand better how national culture influences cross-cultural mentoring in STEMM. For example, in the United States, international students earned almost half of all STEM masters and doctorate degrees in 2019 and are seen as critical to science innovation (Brimmer, 2022).

Cross-cultural mentoring

Cross-cultural mentoring refers to mentorships that involve individuals from different backgrounds. In the U.S., cross-cultural mentoring has largely been studied in relation to ethnic differences (Byars-Winston, et al., 2023; Kochan et al., 2013) or studies focused only on Western cultures (Blake-Beard, 2009). Consequently, researchers proposed mentoring interventions and practices that may attract underrepresented groups to STEMM fields, including training for mentor cultural self-awareness and effectiveness (Byars-Winston, et al., 2023; Mullen & Klimaitis, 2021; Womack et al., 2020).

Another approach to cross-cultural mentoring is to examine national culture. This is especially relevant at higher levels of talent development in STEMM, when collaboration between research teams in different countries and cultures becomes increasingly important. National culture refers to norms and practices—often implicit—that define a particular group. People from cultures that value training and development are more likely to value mentoring feedback (Gentry et al., 2008). Other researchers suggest that mentoring was developed in Anglo cultures with smaller power distances. Thus, mentoring may not be appropriate in countries with greater power distance preferences (Abbott et al., 2013). Furthermore, different societal and cultural norms influence mentoring programs and practices (see Kent et al., 2013 for a critical review). For example, Swedish female mentees did not find it difficult to relate to their male mentor in

an academic mentoring program, perhaps due to Swedish gender ideology (Eliasson et al., 2000).

Hofstede (1980) developed a widely accepted framework to understand national culture that includes several dimensions such as individualism/collectivism, masculinity/femininity, power distance, and uncertainty avoidance (Hofstede, 1983). Later, two dimensions—long/short-term orientation and indulgence/restraint—were added, resulting in a six-dimension model of national culture (Hofstede, 2011).

Power distance. Among the six dimensions of Hofstede's (2011) national culture, power distance may be especially relevant in mentorship development. Power distance refers to the extent to which less powerful individuals in society accept and expect unequal distribution of power. Traditionally, mentoring is defined as a developmental relationship between a more experienced adult mentor and a less experienced mentee (Kram, 1983). While scholars believe mentoring is and should be mutual and collaborative, in practice, it is often viewed as a hierarchical relationship between a more and a less powerful individual (Lunsford, 2017). Given the power differential that exists in many mentoring relationships, power distance appears to be understudied in mentoring.

The few studies on power distance in support-focused dyadic relationships report mixed results. On the one hand, a study of a youth support program suggests that adults with higher power distance may negatively influence youth–adult relationships and youth outcomes because such adults may diminish youths' agency to make decisions and intimidate youths from exploring their own ideas or questioning authority (Meyer, 2021). On the other hand, hierarchical mentorships are viewed as favorable when mentees are from countries with greater power distance; mentors are seen as more knowledgeable and mentees are motivated to fulfill the mentor's expectations (Obara et al., 2021). Moreover, students with higher power distance scores preferred to seek feedback from peers rather than from professors (Hwang & Francesco, 2010). Similarly, Blake-Beard (2009) suggests that mentoring may be more challenging in societies with higher power distance as personalization and reciprocity are discouraged.

A study of mentored MBA students and manufacturing employees in the United States and Taiwan found that women who conformed to societal power distance expectations reported greater career attainment than women who were non-conforming (Ramaswami et al., 2014). Similarly, other scholars found that having similarity in power distance improved harmony in dyadic relationships (Graham et al., 2018).

The mixed findings of power distance and support-focused dyadic relationships (and partly mentoring) may be related to how power distance was measured. Hofstede (1983) asserted that the dimensions are measured at the national level. That is, while individuals take the survey, the dimension represents cultural norms and expectations. Under Hofstede's (1983, 2011) framework, one power distance score was assigned to each country, suggesting that individuals from the same country are homogenous when it comes to their views on power distance. The power distance scores range from 0 to 100, with lower scores indicating low power distance and higher scores indicating high power distance. For example, Austria (power distance = 11) and Israel (power distance = 13) are among the countries with the lowest power distance, whereas Malaysia (power distance = 100) and Belarus (power distance = 95) are among the countries with the highest power distance.

Other scholars have argued that power distance can be measured at an individual level and have developed instruments to do so (Hwang & Francesco, 2010; Robertson & Hoffman, 2000; Yoo & Donthu, 2002). For instance, Yoo et al. (2011) developed a 26-item scale to measure the extent to which a person's orientation reflects their national culture on Hofstede's dimensions. The subscale for power distance had reliabilities between 0.79 and 0.84 and had five items that captured the essence of the power distance construct. The power distance items measured the extent to which high-position people should consult with, share personal information with, and delegate to people in lower positions. Further, scholars have used Hofstede's country-level power distance score to assess individual differences (for example, Brockner et al., 2001 and Kirkman et al., 2009). More research is needed to explore the potentially different effects of power distance measured at a national level versus a personal level on mentoring relationships.

Initiation of mentoring. Several stage models for mentoring (e.g., Clutterbuck (2004); Garringer et al., 2015; Kram, 1983) agree about what happens at the beginning of the relationship, i.e., the initiation of mentoring (Haddock-Millar, 2017). The initiation phase involves establishing rapport and aligning expectations for mentoring relationships (Clutterbuck (2004); Kram, 1983) and provides the foundation for a productive collaboration. Therefore, it is recommended that during the initiation phase, the mentor and mentee in a mentoring dyad learn about one another and discuss important aspects of mentoring such as frequency of meetings, intensity and duration of meetings, roles of mentor, responsibilities of the mentee, and goals of mentoring (Garringer et al., 2015). People from countries with high power distance value centralization, formalization, authoritarian rule, and tight control (Yoo et al., 2011). Thus, mentors' power distance may influence how they approach planning mentoring, task delegation, and decision making, whether they seek a mentee's opinions and tolerate different ideas, and whether they share about their personal life with a mentee. Yet, less is known about the initiation stage in cross-cultural mentoring relationships. While these potential influences of power distance could have an impact on mentor–mentee interactions in other phases of mentoring, there is evidence that challenges were experienced differently in early versus later stages (Ensher & Murphy, 2011). Therefore, in the present study, we chose to focus on the influence of power distance on the initiation of mentoring.

Study context

The present study examines how the initiation of mentoring is influenced by mentors' power distance in a worldwide online mentoring program, *Global Talent Mentoring* (GTM). The program uses long-term, online mentoring and networking to support students' talent development and pursuit of excellence in STEMM from upper-secondary through advanced tertiary education (e.g., a Ph.D.) (Global Talent Mentoring, 2024; Stoeger et al., in press). Mentors in the GTM program are professors or senior researchers in a STEMM field. Mentees are outstanding secondary school students who are passionate about a STEMM field and have advanced domain knowledge. Mentors are matched with mentees who have interests in their STEMM field in a one-on-one mentorship. The program aims to support mentees in their skill acquisition stage of talent development (Stage 2) and onto style formation (Stage 3).

By design, the mentee and mentor in a dyad are from different countries (and ideally speak different native languages), so everyone must communicate in English within their mentoring dyad and the larger community. More than 100 mentor–mentee dyads from 60 countries participate in GTM. Therefore, GTM

Table 1 Parent Code by Description.

Parent Code	Description
Initiation	Who made the first contact.
Decision-making	Who made most of the decisions about what to discuss.
Opinion-seeking	How often the mentor sought the mentee's opinion.
Feedback	If mentee provided feedback and if the mentor encouraged such feedback.
Social life	How often the mentor shared about their social life and if they wished for more or less sharing.
Disagreements	How often mentee disagreed with the mentor.
Mentee self-directed	How self-directed the mentee was.
Discussion of cultural differences	If they ever discussed cultural differences and how such differences may affect their mentorship.
Mentor experience	Mentor experience with mentoring and any reflections about that experience.

provided a unique opportunity for us to study the initiation of cross-cultural mentorships.

Methods

Sampling and participants. The interview data were drawn from a larger study of GTM participants, from which mentor–mentee dyads were selected from the extremes of greater or smaller power distance countries. In the larger study, GTM participants' power distance scores were identified according to their country of origin (Hofstede Insights, n.d.). We chose mentors and mentees based on the power distance of their country. Our goal was to recruit participants with low and high power distance scores. Mentors and mentees in the same dyad who had a power distance score of 40 or below (smaller power distance) or 60 or higher (greater power distance) were invited to participate. GTM program staff emailed the mentors and mentees in 23 dyads (46 people) to participate in the larger study. In total, 23 participants (13 mentors and 10 mentees) agreed to participate in the larger study. This study uses the data of the 13 mentors who agreed to participate to explore mentors' perspectives of national culture on mentoring.

Five mentors were identified as male and eight as female. Seven mentors were from countries with greater power distance, and six from countries with smaller power distance. The mentors were from countries in Africa, Asia, Europe, the Middle East, and South and North America. The specific countries are not provided to ensure confidentiality. All of the mentors spoke English in the mentoring program. Most of them had been in the program for one year at the time of the study. Only one mentor had been recently matched and was participating for three months.

Data collection. The data was collected through the GTM program, under the research regulation provided by the third author's Institutional Data Privacy and Protection office. Ethics approval was received by the first author's Institutional Research Board (Determination #803). Informed consent was obtained prior to interviews from all participants. The study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

GTM staff emailed an invitation to participate in the larger study to the sample identified above. Two reminder emails were sent to non-respondents. Password-protected Zoom interviews were set up with individuals who were interested in participating in the study.

A semi-structured interview protocol was developed in the larger study to explore how mentors from different national cultures approached mentoring for STEMM talent development, and especially whether their national power distance influenced mentoring. Fifteen questions were categorized into three sections: initiating the mentorship, collaboration in the initial phase, and mentoring experience/relationship change. In the first section, a representative question is "Tell me about your first interactions or two with your mentee." In the second section, "In your early interactions with your mentee, who made most of the decisions about what to do in your mentoring relationship, you or your mentee?" is a representative question. A representative question in the third section is, "We have talked about the first stage of your mentoring relationship. Did things change compared to the beginning?" The full interview protocol is available through Open Science (Lunsford et al., 2024).

Interviews were conducted and recorded in 2022. The interviews lasted between 27 and 60 minutes, with an average of 38 minutes. Zoom provided transcription of each interview, and the researchers verified the transcripts and removed identifying information.

Analysis. The interview transcripts were coded and analyzed in two rounds by two individuals independently. The first round used an eclectic coding approach with a combination of structural coding and hypothesis coding (Saldaña, 2021). The first round of predetermined codes related to our research questions and fell into these categories: discussion of cultural differences, who directed aspects of the conversation, and power distance indicators. Additional codes were identified, such as meeting routines, relationship satisfaction, topics discussed, and prior mentoring experiences. Each question was coded using structural coding. Eighty-two codes were generated, and the two researchers discussed the emerging codes and coded segments.

The second round of coding focused specifically on the questions related to national culture and power distance. The two researchers organized the codes into nine parent codes, such as cultural differences and power distance, and decision-making, and discussed what they meant to ensure validity (see Table 1). Each person independently recorded the data.

The researchers used Dedoose and MAXQDA to code the themes, as they had access to different software. The first researcher qualitatively inspected interrater reliability by independently coding key themes in a Google spreadsheet. Discrepancies in coding were in one code, decision-making. These three discrepancies were resolved after a discussion between the researchers, which revealed that a new child code was needed that reflected mentor-mentee collaboration.

Findings

Below, we present the findings by research question. The reported findings were responses to the first two sections of interview questions, as they best align with the study focus on initiation of mentoring. Note that the initiation of mentoring was somewhat shaped by the GTM program's protocol. Following the matching, the program asked mentees to contact their mentor. Mentors were told to expect their mentee to initiate contact.

Table 2 Frequency of Mentors by Power Distance (PD) and Initiation.

Initiation of Mentoring	Mentors from Greater PD Countries ($n = 7$)	Mentors from Smaller PD Countries ($n = 6$)
Contacted mentee first	4	2
Set the agenda for discussion	5	2
Focus of first session(s)		
• Mostly STEMM	5	3
• STEMM and personal information	2	3

Initiation of mentoring. Our interest is in how power distance may influence the initiation of mentorship. Thus, we examined who appeared to control the relationship by analyzing who initiated contact, how the meeting agendas were decided, and what topics were discussed during the relationship's initiation.

Who contacts first. Although the GTM program specified that mentees should contact their mentor first, six mentors still initiated contact despite the "instruction" from the program. Among these six mentors, four were from greater power distance countries (see Table 2). Another mentor from a greater power distance country did wait for their mentee to reach out first but felt the need to tell us they waited only because the program had asked them to wait, "I was told that the mentee should be proactive."

Setting agenda for initial phase. Most mentors had their first video meeting with their mentee after a few exchanges of messages. Five of seven mentors from greater power distance countries decided the agenda for the first meeting, as shown in Table 2. One such mentor noted:

In the first two or three meetings, I think I kind of decided what to discuss because she was a bit shy, she did not know how to start the conversation, and she was kind of stressed about how this would all start.

Similarly, another mentor was guided by the GTM program directions and said, "I remember that I said to her, 'Did you receive such a message from the [program] organizer?' She said, 'Yes, I received it.' So, I asked, 'What do you think about that? Let's discuss that…' something like that." One of the remaining mentors noted the topics for discussion emerged from the mentee's interest, "I was speaking about my professional experience, she easily demonstrated the interests she had, so I could understand where I should go." The other mentor noted the mentee had a clear direction to publish a scientific paper, and so the mentor selected topics related to that goal.

Only two of the six mentors from smaller power distance countries decided on the agenda for the first meeting. Even so, these mentors talked about these decisions in a less directive, more collaborative manner:

> I think it was kind of that I proposed some things, and he could choose, or he would also kind of let me know what he would be interested in, which direction, and so on, so it's always kind of mutual, I would say.

The other mentor set directions but seemed frustrated to be needing to seek mentee feedback, "We also discussed how to proceed… I'm always actively asking, 'How can I support you? Is there anything I can help you? And how do we want to proceed?'" This mentor then expressed:

> I think personal-wise, it was… we still have a good relationship, but I'm not sure what she's getting out of it and whether it is of any value for her … So overall, I think the outcome might be lower than initially expected.

The other mentors from smaller power distance countries let their mentee decide on the agenda in the initial meetings and responded to their mentee's needs. One said, for example, "I'm just doing whatever she wants…. So, she will always initiate because I want to make sure that I'm meeting her expectation. She would initiate, but then I would shape it. So that's the way how we have operated."

Focus of initial phase. Power distance seemed to influence the focus of the conversations during the initial phase. Five of seven mentors from greater power distance countries recalled that the focus of the first meeting was mainly on STEMM (e.g., goals, interests, and achievements). As one mentor said, the first meeting "was about STEMM for sure… only later on [in later meetings] was it more personal." Another mentor noted the first meeting was "… already focused on STEMM, on her goals related to her career." The remaining two mentors reported it was a mixture of STEMM and personal information (e.g., hobbies, family background). One mentor reported:

> I think half of the discussion was based on her STEMM interests and topics, and the other half of the hour would be on her school and personal questions like what else she likes to do, besides studying and doing the STEMM activities because I wanted to see how much focus she has on her studies or maybe she has other activities.

Mentors from smaller power-distance countries also focused on STEMM or a mixture of STEMM and personal information during the first few meetings. Interestingly, for these mentors, the focus of the first one or two meetings seemed to be influenced by their mentee's power distance. Half of the six mentors from smaller power-distance countries, whose mentees were from greater power-distance countries, focused on STEMM for their first meetings. In one case, the mentor noted there would not have been any sharing of personal information if the mentor had not asked for it, "… he probably wouldn't have provided me a lot of personal information if I hadn't asked him for that." The other three mentors, whose mentees were from smaller power distance countries, focused on discussing STEMM and personal information at their first meetings. These mentors felt that sharing some personal information and getting to know the mentee was important, as one stated:

> We already talked about topics he would be interested in within the field and kind of determined the way we wanted to go, but, of course, at the beginning, it's also some personal things to get to know each other.

In summary, mentors' national power distance influenced how mentors initiated mentoring. Mentors from greater power distance countries were more directive in establishing contact

Table 3 Frequency of Mentors by Power Distance (PD) and Initial Collaboration.

Initial Collaboration	Mentors from Greater PD Countries ($n = 7$)	Mentors from Smaller PD Countries ($n = 6$)
Who made most decisions?		
• *Mentor*	6	0
• *Mentee*	1	0
• *Mentor and mentee together*	0	6
Mentor sought mentee's opinion		
• *Regularly*	3	5
• *As needed*	2	0
• *Never*	2	1
Mentor regularly shared social life with mentee	1	1
Mentee disagreed with mentor	6	3
Who provided direction?		
• *Mentee self-directed*	4	2
• *Mentor provided*	1	2
• *Mixed*	2	2

and setting the agenda for discussion compared to mentors from smaller power distance countries. Mentors from greater power distance countries were more likely to focus on STEMM topics right from the beginning. Whereas mentors from smaller power distance countries adapted to what their mentee's focus is: if the mentees wanted to focus on STEMM, the discussion was focused on STEMM; but if the mentees wanted a mixture of both STEMM discussion and personal information sharing, the mentors also went along.

Perception of cultural differences. In general, mentors did not recall discussing cultural differences with their mentee. In fact, mentors did not seem to view cultural differences as worthy of attention in their mentoring relationship, as one remarked, "It's not the culture that makes so much difference in mentoring, it's the ability to be open-minded and to include all people in your life in any good way they can help you to improve…" Other mentors felt both they and the mentees were international, so cultural differences were insignificant, "I considered both of us very international, to be honest…. I don't think any culturally specific topics come up really, not in our conversation. I don't think they really affect us that much, our conversations I mean."

Even for the few mentors who did share some observations of cultural differences, they never brought up power distance as a cultural difference. When we compared mentors' responses by their national power distance, we noticed that mentors from smaller power distance countries did not perceive cultural differences. The pattern was more nuanced for mentors from greater power distance countries: Mentors from greater power distance countries did not perceive cultural differences if they were matched with a mentee from a smaller power distance country. One European mentor commented about her mentee from another European country, "To be honest, I couldn't find any difference in my culture with my mentee's culture. She's a typical European girl," although the difference between their two countries' power distance score was 42. Mentors from greater power distance countries, when matched with mentees from greater power distance countries, noticed cultural differences more. One South American mentor noticed that her East Asian mentee was shyer and more respectful compared to the students of her age in the mentor's country, but the mentor did not think this difference affected their mentoring. Another European mentor observed differences between her and her mentee's country regarding their educational systems and infrastructural resources but thought "it would be diminishing to bring it up" as her mentee was from a less developed country.

It is surprising that most mentors did not perceive cultural differences as important or topics worthy of discussion, especially given that one of GTM's features was cross-cultural mentoring and that GTM prompted participants to discuss how cultural differences might influence communication preferences. Furthermore, national power distance did not seem to influence mentors' views or practices on cultural differences. However, several mentors did observe differences between their GTM mentees and students in their own country, which suggests that perhaps some other cultural factors, instead of power distance, would be more suitable to explain the perceived cultural differences.

Initial collaboration in mentoring. The early mentoring interactions described above suggest that mentors from greater power distance countries more frequently initiated contact and directed the topics discussed in the first meeting or two. Although most mentors did not perceive any cultural differences between their mentee and themselves, we were interested in whether their collaboration approaches and behaviors matched their perception (see Table 3). Derived from Yoo et al. (2011)'s survey, we asked questions to examine how mentors' national power distance may influence five areas of collaboration in the initiation phase of collaboration in mentorship: decision-making, seeking the mentee's opinion, sharing social life, disagreeing with a mentor, and providing directions.

Decision-making. Mentors were asked who made the most of the decisions about what to do during the initial phase of the mentoring relationship. All the mentors pointed out that their mentees were extremely motivated and talented youth with STEMM interests; thus, responding to their mentee's interests was a big part of the decision-making process. For example, one mentor answered, "I suggested most of the topics, but I tried to leave the final decision to him." Still, there seemed to be a difference in how mentors responded to this question that was related to their national power distance. All mentors from greater power distance countries, except one, made decisions in the beginning. As one mentor described, "I made the decision because I felt that he believed that he was not very experienced, and he considered me as an expert. So, I felt that I had the authority." However, in two of these cases, the mentors noted the mentee's interest informed them. For example, one of these mentors said:

> I don't think we set it out in the way you are asking the question … I personally needed to know what he wanted to achieve out of the relationship. And he was very clear from

> the onset that he wanted to publish a paper, I mean… it was one-sided, we just concentrated on what he wanted to achieve.

In contrast, all the mentors from smaller power distance countries described the decision-making process to be more mutual and collaborative, as one mentor responded in this way:

> I always kind of treated him like a colleague or friend from the beginning on, so … we decided together, I would make the proposals because I mean I guess, I have a bit more experience with things, so I would suggest a few things, and [he] would then decide what he would find more interesting….

Similarly, another mentor said:

> Actually, I tried just to react [to] what he seemed to want. And then, of course, ask him if it is fine with you, then you do this now, what we want you to do, and he said that's perfectly fine. I will do my best.

Seeking mentee's opinions. Most mentors sought mentee's opinions in the initial phase of their mentoring. Five mentors from smaller power distance countries seemed especially intentional about seeking mentee's opinions and wanted to make sure the mentoring sessions were meeting their mentee's expectations, although mentors had different frequencies of seeking opinions, ranging from occasionally to often, and even every meeting. The remaining mentor, who did not ask his mentee's opinions much, reflected on this and thought he might not have sought the mentee's opinions often enough.

With respect to the mentors from greater power distance countries, the pattern looked slightly different. About half of these mentors sought their mentee's opinions at every meeting, but the other half did not do so regularly. One such mentor said, "I don't think the conversation went in that direction." The other two mentors would only ask when they noticed a change in the mentee's behaviors, such as canceling two meetings in a row. Therefore, seeking the mentee's opinions appears to be more of a reactive measure for these mentors.

Sharing social life. In general, mentors did not share much of their personal or social life with their mentee, nor did they consider it as a necessary component for building a rapport at the beginning of the mentoring relationship. Some of them did not mind sharing a little if their mentee asked. As one mentor recalled:

> [My mentee] asked me when we first met, or maybe during the first or the second meeting about my family, if I have kids. And I told her that I also have a son and a daughter, and my son is also interested in STEMM. And we talked about it for some time. I don't know much about her family because I didn't ask.

Mentors from greater power distance countries seemed to be less willing to share social life with the mentee. Only one of these mentors shared any social information. Mentors either did not feel comfortable sharing the information or they did not see it as relevant. One mentor answered, "Never, never" to the question and elaborated, "In my culture, we don't talk about personal [topics] …" Similarly, another mentor said, "We meet only as a matter of necessity, so it's not really been social at all." Another mentor did not mind sharing but focused on other topics during their meetings:

> I think we do as we feel comfortable, [we have] a very trustworthy relationship already, so I think everybody is comfortable speaking about personal things too, but it doesn't come up so often, because we have other topics to talk about.

Although mentors from smaller power-distance countries also did not share much about their social life, they seemed to be more intrigued about this thought. One mentor recalled that his mentee did not ask about his social life much, although he would have liked to share more. The mentor thought the mentee might have been shy, so he wondered whether he should bring up the social life more. Only one of these mentors noted they regularly shared social information in their meetings.

Mentee disagreeing with mentor. All except one mentor from greater power distance countries recalled that their mentee had disagreed with them, and they considered it "part of a healthy relationship" in the scientific discourse. Even the one mentor who did not recall any disagreements from her mentee said, "It would be okay if [the mentee] disagrees with me in the future."

Interestingly, only half of the mentors from smaller power distance countries recalled incidences of their mentee disagreeing. Mentees' disagreements were also well-received. One mentor invited the mentee to express her opinions and disagreements as she viewed it as part of the preparation for scientific training:

> She will because I said, "Listen, you gotta tell me, you know, you have to tell me is this good? Is it appropriate for you? [Do] you think you should have a little bit more? Do you think it's still difficult? … So, it's always a negotiation." And she told me, "You know what I think we better do, let's do this, let's do that…" So, it is a negotiation. Isn't it interesting to operate with her? … I told her that my goal for her is, in a few years, she would already have her doctorate.

Another mentor recalled a disagreement and was delighted that the mentee convinced him to change his own idea. Even among the remaining three mentors who did not recall their mentee disagreeing, one mentor commented, "I would not say it's disagreement but a scientific discourse where he actually knew more about a topic than me. So, I would rather ask him, rather than disagree." This mentor also viewed the mentee as relaxed, so their scientific discourse never ended up being a "heated argument."

Providing direction. There was not a clear pattern of power distance on how mentors provided direction. Six mentors, two from smaller power distance countries and four from greater power distance countries, noted that their mentees were self-directed. A representative response is the mentor, who said, "I would say, he's very self-directed. I am only trying to help. He often tries my ideas, but I think these are things he would have figured out anyways."

One mentor from a greater power distance country and two from a smaller power distance country reported that their mentee followed the mentor's instructions. Two mentors from a greater power distance country and two mentors from a smaller power distance country reported that it was mixed. A representative comment is as follows:

> I guess I give most of the tasks, but he can then very independently fulfill them and understand them. So, we have discussed papers, for example, and he finds his own way through to understand them, and most places or in most cases, but yeah the tasks are mostly, I guess, provided by me what he should do.

In summary, national power distance influenced mentors' collaboration approach at the beginning of mentoring, especially with respect to decision-making, perception of disagreement, and seeking mentees' opinions. Mentors from greater power distance countries were more likely to make decisions in the initial collaboration phase, whereas mentors from smaller power distance countries described the decision-making process to be a collaborative process, where they explored different options and reached an agreement. Similarly, mentors from greater power distance countries were less likely to seek mentees' opinions about how the collaboration was going, whereas mentors from smaller power distance countries sought their mentee's opinions regularly. These findings were in accordance with the literature on national power distance (Yoo et al., 2011).

The prediction from the power distance literature would suggest that mentors from greater power distance countries would not welcome or expect their mentee to disagree with them. However, the opposite was true in this study. Most of the mentors from countries with greater power distance recalled that their mentee disagreed at some point with them, whereas only half of the mentors from countries with smaller power distance recalled any disagreements. All the mentors considered disagreeing a part of normal scientific discourse. It is possible that mentors from greater power distance countries have more heightened awareness of disagreement due to the emphasis on hierarchy, so they would notice and remember the disagreement incidences more. However, their educational training in scientific discourse allowed them to embrace disagreements as a means to advance science. In contrast, mentors from smaller power distance countries might have viewed some similar incidents as discussions rather than disagreements or did not recall many. Regardless of mentors' national power distance, mentors are creating a safe space for mentees to disagree and explore different options in their collaboration, which is critical for talent development in STEMM.

Finally, national power distance did not seem to influence how much mentors share their social life and personal information with mentees, nor mentors providing directions for mentees. Given the mentoring program is focused on STEMM talent development on Stage 2 and 3, it is possible that participants – both mentors and mentees – wanted to spend most of their meeting time to discuss STEMM-related topics. The differences in age or that the program was online might have inhibited sharing a great deal in this area. However, there were nuances in how they responded to this question. Mentors from countries with greater power distance more clearly drew a boundary on sharing this information. Nonetheless, neither group of mentors viewed this as a hindrance to effective mentoring. These findings indicate that for goal-oriented mentoring relationships that focus on academic subjects and talent development on advanced levels, mentoring can be effective without spending a lot of time on personal sharing. This could be related to the mentees' level of drive and focus in achieving their STEMM goals. In addition, regardless of whether mentors provided directions, mentors reported their mentee to be self-directed to accomplish tasks. Given that the application program was very rigorous, it is likely only highly self-directed mentees were selected to participate.

Table 4 Mentor PD by Ratings of Self and Country.

Country PD	PD-Self Rating	PD-Culture
60	2.4	2.8
63	1.2	2.6
63	1.6	3
69	1.2	2.4
80	1.6	2.4
92	2	2.8

Perceptions of power distance. At the end of the interviews, mentors were orally presented the five power distance questions from Yoo and colleagues' (2011) survey, as we initially wanted to use these questions to validate mentors' national power distance. After several interviews, we realized that the mentors' responses reflected their individual beliefs, which sometimes varied from their national power distance according to Hofstede's index for their country. Thus, we emailed a survey to ask the mentors to provide their individual responses as well as how they believed most people in their country would respond. Interestingly, national power distance seemed to influence who responded to the follow-up survey: All but one mentor from a greater power distance country responded to this request, and they all reported lower power distance scores for themselves than for people from their country. No mentors from countries with smaller power distance responded (see Table 4). Given the lack of representation from the survey responses from mentors from low power distance countries, we did not rely on this measure. Our research questions concern how national power distance, rather than individuals' power distance beliefs, influences cross-cultural mentoring. Therefore, we rely on the qualitative data we collected, which suggests mentors' national power distance scores influence many aspects of the initiation of mentorship in a STEM mentoring program.

Discussion

The study explored the role of mentors' national power distance on the initiation of cross-cultural mentoring relationships and aspects of mentor–mentee collaboration in an online STEMM talent mentoring program. We were specifically interested in if mentors' power distance influenced how they initiated mentorship and how they perceived cultural differences. The findings advance the literature in three areas, discussed next.

First, national power distance does appear to influence the initiation of mentoring and who drives the relationship, as well as some aspects of mentor–mentee collaboration. For example, mentors from greater power distance countries more frequently set the agenda for meetings than did mentors from smaller power distance countries, where agenda setting was viewed as collaborative. Mentors' national power distance influenced decision making and seeking mentee's opinions in the mentor–mentee collaboration during the first few months of mentoring. Further, mentors from greater power distance countries were more likely to make decisions and less likely to seek mentees' opinions.

These findings could potentially help with the matching and rematching process for long-term talent mentoring programs in Stage 2 of talent development like the GTM program. For example, mentees at the beginning of Stage 2 of talent development, where they are learning advanced domain knowledge and honing techniques and skills (Bloom, 1985; Subotnik et al., 2021), might benefit more from the increased direction mentors from greater power distance countries may provide. But, mentees who are more developed and perhaps in the middle of Stage 2 of talent development or entering Stage 3, where they are forming their own style (Bloom, 1985; Subotnik et al., 2021), may benefit more a mentor from a smaller power distance country who may have a more cooperative discussion-style and decision making. We note that our study examined mentors' collaboration style at the beginning of the first year of a 10-year long-term mentoring program. Mentors from both power distance groups may change and adapt their style as the mentee grows and mentorship develops.

Second, in a goal-oriented mentoring program for students in Stage 2 of talent development in STEMM, the initiation of mentoring did not rely heavily on building rapport. It appeared that both mentors and mentees discussed STEMM-related topics right from the beginning. Mentors, especially those from greater power distance countries, set the agenda for the first few meetings to be focused on STEMM topics. Mentees, especially those who were matched with mentors from smaller power distance countries, also chose to focus on STEMM or at least a mixture of STEMM and personal information in the beginning. Some scholars and practitioners assert that developing rapport provides the foundation for effective mentorship (e.g., Clutterbuck, 2005). Our findings suggest that effective relationships in STEMM may put less emphasis on building rapport in favor of goal setting. This finding has implications for mentorship education in STEM mentoring programs. There may need to be a greater emphasis on goal setting first. However, it is unclear to us whether this goal-oriented initiation approach was related to mentees being in Stage 2 of talent development. It would be interesting to compare the initiation approach of mentors and mentees from other talent development programs that target different stages of talent development.

Third, it is surprising that most mentors did not perceive cultural differences as important or topics worthy of discussion, especially given that one of GTM's features was cross-cultural mentoring and that GTM prompted participants to discuss how cultural differences might influence communication preferences. Mentors from countries with greater power distance did notice cultural differences when their mentee was from a country with a greater power distance. Yet, none of the mentors discussed cultural differences. It is as if they viewed any such differences as insignificant. One mentor felt discussing cultural differences would not be honoring to the mentee, who was from a less developed country. In other cases, mentors viewed themselves, and sometimes their mentees, as internationals who were could easily overcome or adapt to cultural differences. These findings mirror previous investigations on racial and ethnical cultures in research mentoring in the U.S. where mentors often viewed cultural backgrounds as insignificant topics in mentoring (Byars-Winston et al., 2020). Although mentors did not seem to notice many cultural differences or their potential impact, national power distance did influence the initiation of the mentoring relationship and some aspects of how they collaborated with their mentee.

This finding points to a possible need for enhanced mentor education. Therefore, more training on how to start a conversation about potential areas of cultural differences, including power distance, may be useful for both mentors and mentees. Such training could help people form a correct view of cultural differences in that acknowledging the differences does not equal discrimination or a bad characteristic. Furthermore, during the mentor recruitment process, program staff could ask questions to learn about mentors' international experience, their own mentoring experience, as well as their personal perception of power distance, to better understand mentors' level of readiness to engage in cultural discussions.

Limitations. The interview protocol was structured to enhance recall, but it is possible that social desirability influenced participant responses, or they might have been reluctant to share negative information. Participants did note when they could not remember some items, but it is possible they did not recall early interactions accurately. It is also possible that the mentees experienced the relationship differently than reported by the mentors. The online nature of the program might have influenced how power distance manifested in a cross-cultural relationship. For instance, it might be less "natural" to share personal information with a "stranger" online until later in the mentoring relationship, thus even mentors from smaller power distance countries were less inclined to share personal information. However, none of the mentors noted the online platform as the reason why they refrained from sharing personal information. While the present study aimed to investigate the initiation of the mentorships, a follow-up longitudinal study examining the outcomes of these mentorships, particularly how power distance may have influenced these outcomes, could provide deeper insights into the dynamic of national culture and cross-cultural mentoring. Nonetheless, this study serves as an important first step in understanding the intersection of power distance and cross-cultural mentoring.

Conclusion

This study extends the literature on cross-cultural mentoring by examining the role of national culture in the initiation of mentorships in a talent development program in STEMM in Stage 2. Power distance appears to be worthy of further study, as some aspects matter more than others. For example, decision-making and opinion seeking are important behaviors in mentoring varied for mentors from greater and smaller power distance countries, whereas the role of power distance on self-direction was not influential. There may be differences in mentorship based on the power distance of the mentee. Thus, more work is needed to study concordant and discordant dyads in power distance and to extend the examination of the role of cultural differences in other stages of the mentoring relationship.

Data availability

The personal data that support the findings of this study are not freely available due to data-privacy restrictions. The dataset used for this study is available from the third author upon reasonable request.

Received: 13 May 2024; Accepted: 19 May 2025;
Published online: 19 August 2025

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Acknowledgements

We thank Hamdan Bin Rashid Al Maktoum Foundation for Medical and Educational Sciences (Hamdan Foundation) for providing access to the program participants and research data. The Hamdan Foundation is the funder of the research project and owner of the Global Talent Mentoring Program, which provided the setting for this study. This material is based upon work completed while the first author was serving at the National Science Foundation (NSF). Any opinion, findings, and conclusions or recommendations expressed in this material are those of the first author and do not reflect the views of the

NSF. The first author acknowledges financial support from the Fulbright U.S. Scholar Program and the German-American Fulbright Commission to collaborate with colleagues in Germany on this study. Its contents are solely the responsibility of the author and do not represent the official views of the Fulbright Program, the Government of the United States, or the German-American Fulbright Commission. Open Access funding enabled and organized by Projekt DEAL.

Author contributions

The study authors contributed equally to the conceptual design of the research study. The first two authors conducted the initial data analysis, with the third author reviewing and assisting in resolving questions. The first two authors were the major contributors in writing the manuscript, with the third author providing substantial contributions to the theory and clarifying the results and discussion. All authors read and approved the final manuscript.

Competing interests

The authors declare no competing interests.

Ethical approval

The data was collected through the GTM program, under the research regulation provided by the third author's Institutional Data Privacy and Protection office. This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Institutional Research Board at Campbell University (Approval #803 on February 22, 2023).

Informed consent

Informed consent was received from all participants and/or their legal guardians to participate in the study and to have de-identified data published. This consent was received when participants agreed to participate in the mentoring program. In addition, each participant was read the study consent statement and provided verbal consent at the beginning of their virtual, password-protected interview. The interviewer reconfirmed the consent when starting the interview recording so that it was also part of the interview transcript.

Additional information

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