

# Scalable Career & Educational Growth Transitions: Developing a Mentoring Network & Engaging with an Online Mentoring Platform

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The National Research Mentoring Network's (NRMN) goal is to increase diversity and provide mentoring, networking, and professional development resources to underrepresented populations in STEM. The virtual, scalable MyNRMN platform includes 15,136 mentees, 7,998 mentors, 3,937 institutions, and 11,832 connections. Our goal was to understand mentee growth and “transitions” alongside engagement with mentoring and networking resources in MyNRMN. In this study, we define transition as the act of a person making a change to their MyNRMN profile that includes one of the following profile fields: institution, education level, degree, or career. We hypothesized that diverse networks and engagement in MyNRMN would be significantly associated with positive transitions. We assessed 7,209 user profiles that indicated an education/career change during the study period. Connections between racially homogenous users were associated with decreased positive transitions ( $b=-0.107$ ,  $p<0.05$ ). Connections with heterogeneous ethnicities were associated with increased positive transitions ( $b=0.105$ ,  $p<0.05$ ). Longevity within MyNRMN platform was associated with increased positive transitions ( $b=0.424$ ,  $p<0.05$ ).

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## Introduction

Developing a network of diverse, supportive mentors can enhance individuals' persistence in the science, technology, engineering, mathematics, and medicine (STEMM) fields (Termini et al., 2021). Providing mentorships to individuals in these fields entails support in many aspects such as psychosocial, career goals, and personal and professional development (National Academies of Sciences, Engineering, and Medicine, 2019). Given these many facets, it is important to encourage STEMM individuals to create mentoring networks in which there is a shared effort to support people in these fields rather than relying on one person to provide support or have all the expertise (Sorcinelli & Yun, 2007; McBride, 2017; Montgomery, 2017). This is supported by Bourdieu's Social Capital Theory which purports that the more people someone has in their network or group, the greater number of resources and opportunities will be at their disposal (Bourdieu, 2002). Creating a mentoring network facilitates broader options to access resources, support, information, and professional opportunities, as well as providing feedback, learning opportunities, and professional interactions (Trube et al., 2015). The structures of mentoring networks should also be inclusive of peer and near-peer mentoring models in which individuals from the same stage (e.g., educational, career) can provide support and encouragement.

## The Importance of Diverse Mentoring Networks

The importance of mentorships and building mentoring networks, especially for those currently underrepresented in STEMM, is to provide individuals the equal opportunity to advance through the ranks in academia and in research (Ahmed et al., 2021). It is also vital for students, post-docs, and early-career researchers to have mentors beyond their immediate supervisors (Lambert et al., 2020). In smaller institutions, less populated areas, or specific areas of interest, it is not always possible to find additional mentors in a person's immediate proximity. As research and discovery progress, it will become increasingly important to diversify the STEMM research workforce to prevent a shortage (Vishwanatha et al., 2019). Additionally, while diversifying the STEMM research workforce is important for these reasons, it's also necessary to provide the resources and opportunities for those currently underrepresented (Black or African American, Hispanic/Latine, American Indian or Alaska Native, Native Hawaiian and other Pacific Islanders, individuals with disabilities, individuals from disadvantaged backgrounds, and women) to advance to leadership and decision-making positions to lessen existing gaps in biomedical discovery and prevent these gaps in the future (National Institutes of Health, November 2019a; Diggs-Andrews, Mayer, & Riggs, 2021).

There is evidence that incorporating racial, cultural, educational, and career diversity into one's mentorship experience is valuable in the short and long term by sharing learned experiences and outside perspectives. The National Academies of Sciences, Engineering, and Medicine (NASEM) issued a consensus study report in 2019 on the science behind effective mentorships. In the report, researchers defined a mentoring relationship as "a professional, working alliance in which individuals work together over time to support the personal and professional growth, development, and success of the relational partners through the provision of career and psychosocial support" (National Academies of Sciences, Engineering, and Medicine, 2019). Findings included an understanding that effective mentorship impacts student retention in the STEM fields and may also produce "a more diverse population of graduates who are ready to take on the role of STEM professionals in the workplace and feel comfortable and accepted in those roles" (National Academies of Sciences, Engineering, and Medicine, 2019). A key aspect of this success is in both mentors and mentees recognizing and encouraging identity.

A researcher's identity as a STEM scientist does not exist in a vacuum — it is shared with how they view themselves and how they feel the world sees them. While STEM is becoming more diverse by the year, the socially accepted, normative identity of a scientist is still a White, middle- to upper-class, able-bodied, heteronormative man (National Academies of Sciences, Engineering, and Medicine, 2019). Promoting a mentorship experience that accepts and acknowledges diversity can reduce the feeling of otherness through "culturally responsive mentoring, whereby mentors show interest in and value students' cultural backgrounds and their non-STEM social identities" (National Academies of Sciences, Engineering, and Medicine, 2019). This enables a sense of belonging in the STEM fields as it creates space for a culture beyond the current homogenized standard.

While one mentor is valuable for a mentee, it is difficult for one person to meet all of the mentee's needs, including helping them feel a sense of belonging and building a science identity. It is also important to acknowledge that diversity extends beyond race and ethnicity. Creating a diverse mentoring network to meet all of a person's needs can include connecting with others who have a different race/ethnicity, gender, career level, education level, field of study, etc. In their report, NASEM researchers included recommendations for mentors and mentees to create additional opportunities (National Academies of Sciences, Engineering, and Medicine, 2019). One suggestion for mentors was to ensure they "provide opportunities and support for mentees in mentoring relationships with other individuals within and outside of their home department, program, or institution...who can provide complementary or supplementary functions that enable mentees to progress and succeed"

(National Academies of Sciences, Engineering, and Medicine, 2019). Providing this multi-faceted approach to mentoring relationships is grounded by previous research and supported by Bourdieu's Social Capital Theory (Bourdieu, 2002, Black et al., 2022, Deanna et al., 2022). Additionally, analysis of mentoring networks supports that a network of mentors has more long-term career outcomes than a singular mentor-mentee approach (Deanna et al., 2022, Markle et al., 2022, McBride et al., 2017, Montgomery, 2017)

The National Research Mentoring Network (NRMN) builds upon NASEM's findings and Bourdieu's Social Capital Theory to provide the space through its robust, online platform, MyNRMN, to curate a network of mentors and mentees from across the United States (Ahmed et al., 2021, Javier et al., 2021, Sorkness et al., 2017). MyNRMN and its recommendation algorithms facilitate and encourage mentees to connect with mentors and grow a personal network of mentors from different backgrounds and institutions, and with varying skill sets and fields of interest, which can contribute significantly to career options and opportunities (Ahmed et al., 2021).

### **The National Research Mentoring Network (NRMN)**

The National Research Mentoring Network (NRMN) was developed in 2015 by the National Institutes of Health (NIH) to diversify the biomedical and STEM research workforce (Sorkness et al., 2016, Javier et al., 2021). In 2016, NRMN's mentoring, networking, and professional development platform, MyNRMN, launched with the goal of enabling engagement and connectivity to build a personal network of mentoring connections (Ahmed et al., 2021). By cultivating a network of mentors who serve to aid and guide mentees in their careers and professional and personal lives, mentees establish and grow their social capital, defined as the resources available to a mentee through membership in social networks (Ahmed et al., 2021, Bourdieu, 2002, Carrillo et al., 2017). Continual "interaction within a mentoring network enables information exchange and knowledge sharing crucial to career and professional growth; thus, social capital can be greatly enriched by those mentee actions facilitated by direct and indirect links to mentors in their social network" (Ahmed et al., 2021). Between May 2016 and June 2019 (Phase 1 of NRMN), MyNRMN "saw 4,197-member network connections, 678 "Find a Mentor" connections, 4,060 comments posted, 108 calendar events created, 345 files shared, 790 CV/resumes uploaded or created, and 156 My Groups created with 1,842 participants in these groups" (Javier et al., 2021). NRMN began Phase 2 in 2019 and has continued to grow steadily, as seen by the metrics stated in the Methods section.

MyNRMN facilitates engagement between users across the spectrum of STEM careers and education levels. Users can browse profiles of

mentors and mentees alike to grow their network and ask questions on topics ranging from research to professional development. NRMN also offers a free monthly Career Development Webinar Series, where representatives from various organizations communicate on mentorship, diversity in STEM, succeeding in graduate school, etc. Through these webinars, participants have an opportunity to meet with new researchers and learn more about their diverse perspectives. Mentors, mentees, and partners also have the opportunity to participate in the NRMN Ambassadors program to help recruit new mentors and mentees to the platform. Ambassadors gain extra networking training and resources, enhance their social capital, and represent NRMN at conferences (Javier et al., 2021). Additionally, NRMN also invites partners to collectively introduce their groups to MyNRMN's resources and utilize the communications tools to enhance their offerings. Partners can include educational institutions, classrooms, professional societies and organizations, or others who are interested in engaging their STEM teams with mentoring, networking, and professional development resources.

The overarching objective of MyNRMN is to create a sustainable digital infrastructure to support and facilitate culturally responsive mentorship, networking, and professional development. MyNRMN is built on the Social Capital Theory which supports that creating a wide social network will create greater opportunities for career progression and persistence within the biomedical research fields (Ahmed et al., 2021, Bourdieu, 2002). By understanding the importance of Social Capital Theory and how that can be translated into an online capacity, MyNRMN can provide the benefits of social capital beyond the confines of an individual's immediate location and learn the true power of a vast, virtual network.

Building off the prior research of the MyNRMN network to explore how mentorships contribute to transitions in education and career (Thompson et al., 2024), this study explored the diversity of a person's network within the virtual mentoring platform. By accessing a user's profile data and the changes they make to their profile over time, we studied how the diversity of a user's network correlates to their education and career transitions. In this study, transition is defined as the act of a person making a change to their MyNRMN profile. Further, a positive transition is defined as when a person makes a change to their MyNRMN profile that includes one of the following profile fields: institution, education level, degree, or career. We hypothesized that having a more diverse network in MyNRMN, participating in MyNRMN Groups, and engaging on the platform would be significantly associated with a positive transition. Findings from this study could inform future investments in mentoring platforms and strategies to enhance the diversity of the biomedical workforce.

## Methods

This study builds upon a previous study of MyNRMN analyzing transitions based on a user's engagement in the network (Thompson et al., 2024). This study examined the network of the users who updated their profiles to indicate a transition from one education or career stage to the next and/or changed their role from a mentee to a mentor. MyNRMN is a robust, open, online platform, including 15,136 mentees and 7,998 mentors from over 3,937 institutions across the United States and has facilitated over 11,832 connections as of Dec. 27, 2023. Upon joining MyNRMN, each user creates a profile to self-identify in various fields, including but not limited to name, role, email, current institution, city, state, zip code, citizenship, education level, career level, degrees, major/field of study, parent/legal guardian attended college, gender, race, ethnicity, sexual identity, and disability. Although everyone is encouraged to complete all of the fields in their profile, users may decide to leave the demographic fields blank or select "prefer not to report". The data was collected over the period of March 2, 2020 through May 23, 2023 and contains data from 7,209 active users who indicated a change in their MyNRMN profile.

As described by Ahmed and colleagues (2021), MyNRMN uses the open-source graph database software Neo4j (Wikipedia contributors, 2024) to perform analysis of an individual's network within the platform. This software enables nodes to represent institutions and groups while connecting lines display the edges (links) between the nodes. This allows mapping of relationships within the platform to study how the strength of a person's network can influence positive transitions in education and/or career (Ahmed et al., 2021).

The MyNRMN platform sends reminder emails to members with incomplete profiles after 1-day, 2-day, 1-week, and 6-month increments, from the time the user creates their profile. The profile is considered incomplete if one of the following fields is missing: first name, last name, role, zip code, education, career, institution, citizenship, race, ethnicity, gender, or parent/legal guardian attended college. The user needs to log in to the platform to access and update their profile. Every time a user updates their profile; the platform logs the old and the new values of the changed fields. We only studied data within the designated time period (March 3, 2020 to May 23, 2022) where there are valid old and new values, and we excluded the changes where any of the old or the new values are blank. Although we only studied data containing transitions within this time period, we were able to include the longitudinal data from when each individual first joined MyNRMN in our analysis. All data for this study were de-identified and analysis was approved by the North Texas Regional Institutional Review Board.

## Measures

The primary outcome variable was an education or career transition as described on the MyNRMN platform. Users are able to enter new profile information, which informs the content for this variable. A positive transition included: a change in institution, change in educational level, change in degree, or change in career. This variable was constructed as a latent variable and will be described in the data analysis section.

The independent variables were related to the engagement and networking on the MyNRMN platform. Variables were created for the number of mentoring connections on the MyNRMN platform that were of the same race, ethnicity, or gender, respectively. Similarly, variables were created for the number of mentoring connections on the MyNRMN platform that were of a different race, ethnicity, or gender, respectively. Additionally, MyNRMN contains a feature called Groups, enabling a user to create and/or join like-minded individuals for special interests, professional societies/organizations, course discussions, etc. We measured the number of Groups a user was engaged with on the MyNRMN platform. Engagement on the platform was also measured by MyNRMN gamification points and length of membership on the platform. The more engaged a user is on the platform (e.g., making connections, creating a CV, etc.), the higher the MyNRMN point total.

Background variables included demographic factors. Gender was categorized as male or female; other genders were excluded due to small sample size ( $n < 1\%$ ). The first-generation college student option was operationalized as yes or no and self-reported by the user. Ethnicity was categorized as Hispanic and Non-Hispanic. Race was operationalized as White, Black, or Asian. Other race options were provided, but not included in the analysis due to small sample size ( $n < 1\%$ ). Career level included faculty, staff/other, scientist, and postdoc. Education level was undergraduate/post-baccalaureate, graduate, or post-doctoral. Finally, the degree option was categorized as less than a bachelor's, bachelor's degree, master's degree, and doctorate.

## Data Analysis

First, we used a confirmatory factor analysis (CFA) to create the outcome variable, career and education transition. The effects of independent variables on an education or career transition were examined using structural equation modeling by adding the respective regression models in the confirmatory factor analysis for transitions. We then performed structural equation modeling to directly regress the latent factor for a career or education transition on the background variables. All statistical analyses were performed through the use of the computer program Mplus (Muthén & Muthén, 2009/2022). In the Mplus syntax for CFA

modeling of 'career and education transition' as a latent factor, we specified that the indicators of the latent factor are 'categorical' to ensure the use of tetrachoric correlations.

## Results

### Sample Demographics

The frequencies of demographic characteristics are provided in Table 1. Of those with identified background variables, most were female. Just under half of users were White, followed by Black/African American, and Asian. Approximately 9% of users identified as Hispanic. First-generation college students comprised 10% of the sample population. Approximately 20% of users identified as faculty and 30% having a doctorate. Users enrolled in education programs were in undergraduate, graduate, or postdoctoral programs. Over half of the sample were mentee users on the platform.

### Career and Education Transition as a Latent Factor

We examined if the targeted outcome 'Transition' could be measured as a latent variable (latent factor), using a CFA model, based on four indicators of positive education or career transition reported by MyNRMN platform users, (a) change of institution, (b) change of educational level, (c) change of degree, and (d) change of career. These four indicators were coded as binary variables (1 = change reported, 0 = change not reported). The resulting latent factor is a continuous variable representation of the four indicators (binary variables) for positive education or career transition. Higher values of the latent factor reflect higher levels of positive transition.

Under commonly used criteria based on goodness-fit-indices, chi-square test, root-mean square error of approximation (RMSEA), comparative fit index (CFI), and standardized root mean square (SRMR), a reasonable fit of a CFA model to the data supported when (a) the chi-square value is statistically nonsignificant ( $p > .05$ ) (b) RMSEA  $> 0.06$ , with its 90% confidence interval entirely below 0.08; (c) CFI  $> 0.95$ , and (d) SRM  $< 0.08$  (Dimitrov, 2012). Based on these criteria, the results in this study indicated an excellent data fit of the one-factor CFA model, with (a) statistically nonsignificant chi-square value, = 1.683,  $df = 2$ ,  $p = 0.431$ ; (b) RMSEA = 0.000, with 90%CI = [0.000, 0.020], (c) CFI = 1.000, and (d) SRMR = 0.018. Furthermore, the factor loadings of all four variables of transition were statistically significant and very substantial in magnitude (see Table 2). The factor loadings of the four 'transition' indicators in Table 2 being positive and statistically significant indicate that reporting a change in any of these indicators is associated with a higher level of positive transition.

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**Table 1**

*Background Variables*

	<b>Background variable</b>	<b>Count</b>	<b>Percent</b>
<b>Gender</b>	Male	1,114	15.5
	Female	2,716	37.7
	Other	18	0.2
	missing	3,361	46.6
<b>Ethnicity</b>	Non-Hispanic	2,618	36.3
	Hispanic	633	8.8
	missing	3,958	54.9
<b>Race</b>	White	3,253	45.1
	Black/African American	1,599	22.2
	Asian	1,066	14.8
	American Indian/Alaskan Native	106	1.5
	Native Hawaiian/Pacific Islander	32	0.4
	Two or More Races	130	1.8
	Other	384	5.3
	missing	639	8.9
<b>First Generation College</b>	No	2,240	31.1
	Yes	766	10.6
	missing	4,203	58.3
<b>Career</b>	Faculty	1,467	20.3
	Staff or Other	618	8.6
	Postdoc	369	5.1
	Student	91	1.3
	Scientist	208	2.9
	Admin	121	1.7
	missing	4,335	60.1
<b>Degree</b>	Less than Bachelors	18	0.2
	Bachelors	542	7.5
	Masters	372	5.2
	Doctorate	2,143	29.7
	missing	4,134	57.3
<b>Education</b>	Undergraduate or PostBac	689	9.6
	Graduate (includes Graduate + Doctoral)	617	8.6
	Postdoc	516	7.2
	missing	5,387	74.7
<b>Role</b>	Mentee	4,052	56.2
	Mentor	2,557	35.5
	Member	600	8.3
	TOTAL	7,209	100%

**Table 2**  
*Standardized Factor Loadings of 'Transition'*

Transition type	Loading, $\lambda$	SE( $\lambda$ )	p-value*
Institution	0.780	0.040	< .001
Education	0.966	0.030	< .001
Degree	0.792	0.042	< .001
Career	0.808	0.037	< .001

Notes: 1. SE( $\lambda$ ) = Standard error of the factor loading,  $\lambda$ .

2. The standardized loading,  $\lambda$ , shows the correlation between the respective type of transition and the latent factor of 'Transition' as a general outcome variable.

\*Statistical significance at the  $p < 0.001$  level.

**Table 3.**  
*Standardized Regression Effects on Transition*

Independent variable	Regression coefficient	SE	p-value*
$X_1$ = Same Race Conn.	-0.107	0.047	0.021
$X_2$ = Diff Race Conn.	0.052	0.031	0.091
$X_3$ = Group Member	-0.053	4.925	0.991
$X_4$ = Engagement Points	0.133	0.045	0.003
$X_5$ = Months as User	0.399	0.058	< 0.001
$X_6$ = Same Gender Conn.	0.082	0.050	0.104
$X_7$ = Diff Gender Conn.	0.002	0.058	0.970
$X_8$ = Same Ethn Conn.	0.036	0.054	0.509
$X_9$ = Diff Ethn Conn.	0.105	0.051	0.039

Notes. SE = Standard error of the regression coefficient.

\*  $p < .05$  signals statistical significance.

### Effects of MyNRMN Platform Engagement on Transition

Effects on transition (as a general latent factor) were examined for nine independent variables. The results indicated an excellent fit of the SEM model, = 29.625,  $df = 17$ ,  $p = 0.030$ ; (b) RMSEA = 0.010, with 90%CI = [0.003, 0.016], (c) CFI = 0.986, and (d) SRMR = 0.034. The regression effects on transition are presented in Table 3. The statistically significant negative coefficient (-0.107) for  $X_1$  indicates that a higher number of connections on the MyNRMN platform with users of the same race is associated with a decrease in transition likelihood. The statistically significant positive coefficient (0.105) for  $X_9$  indicates that a higher number of connections on the MyNRMN platform with users of different ethnicity is associated with an increase in transition. The statistically significant positive coefficient (0.424) for  $X_5$  indicates that the higher number of months the user has been an NRMN member is associated with an increase in transition. The statistically significant positive coefficients for engagement points (0.133) and

months as a user (0.399) indicates a positive association with transition. The level of transition did not depend on the number of different race connections, same gender connections, different gender connections, and same ethnicity connections. Participating in Groups membership was also not statistically significant. It should be noted that the regression coefficients in Table 3 indicate the 'unique' contribution of the respective independent variable to the prediction of 'transition' (that is, "over and above" the effects of all other independent variables).

### Background Differences on Transition

The Background Variables' direct effects on transition were also examined for groups with adequate sample size and sufficient data on categories of indicator variables for the latent factor transition. The standardized regression coefficients, summarized in Table 4, indicate that the only statistically significant difference on transition for the background variable 'Ethnicity' is in favor of Hispanic (vs. Non-Hispanic) users of the

**Table 4**

*Background Differences on Transition*

Background variable (coding)	Regression coefficient	SE	p-value
Gender (0 = male, 1 = female)	0.003	0.003	0.245
Ethnicity (0 = Non-Hispanic, 1 = Hispanic)	0.173	0.035	< 0.001
First Generation College (0 = No, 1 = Yes)	-0.011	0.044	0.804
White (for race) (0 = White, 1 = Non-White)	0.070	0.055	0.202
Black (for race) (0 = Black, 1 = Non-Black)	0.018	0.035	0.610
Asian (for race) (0 = Asian, 1 = Non-Asian)	-0.080	0.041	0.053
Role (0 = Mentee, 1 = Mentor)	-0.197	18.391	0.991

Note. SE = Standard error of the regression coefficient.

NRMN platform ( $p < .001$ ). The direct differences on transition between levels of other background variables under this analysis were not statistically significant ( $p > .05$ ).

### Discussion

The objective of this analysis was to see if active engagement on the MyNRMN platform impacted positive transition in education or career. Based on the study data, results from a confirmatory factor analysis indicated that positive transitions reported by MyNRMN platform users can be treated as a latent variable (latent factor) by the four indicators in the analysis: (a) change of institution, (b) change of educational level, (c) change of degree, and (d) change of career. The very high correlations between these observed indicators and the latent factor of ‘transition’ (see the standardized factor loadings  $\lambda$  in Table 2) indicate that each type of change is highly associated with an increase in positive transition, with the strongest association attributed to ‘education’ ( $\lambda = 0.966$ ).

Evidence supported the hypothesis that active engagement on the MyNRMN platform supports a positive transition. The engagement points (0.133) and months as a user (0.399) indicates a positive association with positive transition. Building a mentoring network takes time, which is also noted in that the higher number of months the user has been an NRMN member is associated with an increase in positive transition. However, a surprising finding was that Groups membership was also not statistically significant when predicting positive transition. While Groups is one of the most popular features within MyNRMN (as of Dec. 22, 2023, there are 489 groups with 9,726 total group members), utilization of this feature is not an indicator of a positive transition. While further

analysis is needed to determine why engagement in Groups is not an indicator of positive transition, it is important to note how and why the Groups feature is used. Within MyNRMN, mentees and mentors alike are able to create Groups. These can be special interest groups, coaching/mentoring groups, professional society/organization groups, course completion groups, etc. These groups are often used for sharing information and networking within a group of like-minded individuals. This provides us an opportunity to explore and analyze intra-group networking and developing mechanisms to introduce MyNRMN networking resources within the Groups space.

In terms of direct differences on positive transitions between levels of the background variables, the only statistically significant difference is in ethnicity, in favor of Hispanic versus Non-Hispanic users. There are no positive transition differences among levels of the other demographic variables. The level of positive transition did not depend on the number of different race connections, same gender connections, different gender connections, and same ethnicity connections. There was evidence to support that a diverse network can positively impact positive transition. The number of “same race” connections of MyNRMN platform users has a negative effect on positive transition; that is, the increase of connections with “same race” users decreased the positive transition likelihood. Conversely, the number of “different ethnicity” connections of users has a positive effect on positive transition. However, network diversity is not limited to diversity of race or ethnicity, but rather also consists of people from various backgrounds, in assorted levels in their education and career, and in different fields of study. This evidence supports previous research showing that

diversity in STEM is crucially needed to create a more equitable workforce (National Academies of Sciences, Engineering, and Medicine, 2023).

Multidisciplinary (non-clinical) teams and collaborations are vital across research fields and institutions. The 2019 National Institutes of Health (NIH) statement of diversity recognizes the need for intellect, creativity, and a wide range of skill sets and viewpoints in every aspect of scientific research (National Institutes of Health, 2019a). The benefits of increased diversity among scientists include: “fostering scientific innovation, enhancing global competitiveness, contributing to robust learning environments, improving the quality of the research, advancing the likelihood that underserved or health disparity populations participate in, and benefit from health research, and enhancing public trust” (National Institutes of Health, 2019b). Additionally, mentoring networks enable students to learn from each other (peer mentoring) and each other’s mentors (network of mentoring networks) to gain confidence and success in their educations and careers (Markle et al., 2022). The vast network available in MyNRMN enables a wide array of diversity across the NIH’s statement of diversity (National Institutes of Health, 2019a) and up and down the STEM career spectrum. By providing this space and these resources, MyNRMN is cultivating an expansive network and increasing social capital for underrepresented individuals across the United States, thus creating the opportunity for further interdisciplinary research.

Overall, the study findings are generalizable across levels of the background variables. As the MyNRMN platform grows its membership, it can continue to provide a scalable way to collect data and understand the ever-evolving needs of the STEM community. All data points in this analysis were pulled from passive data collection and can continue as MyNRMN membership increases nationally. These findings should be considered in the context of their limitations. While the data show that the longer an individual has been a member of MyNRMN, the more likely they are to have a positive transition, we must also acknowledge that education and career advancements take time. Further research is needed to determine the causal effects of MyNRMN on the influence of the positive transition. Additionally, these data were collected passively, and users were not required to provide updates. The MyNRMN platform sends reminders to users to update their profile on a biannual basis. However, there is missing data for some of the profile fields related to demographic characteristics, which may contribute to low numbers of those that identify as non-binary or transgender and/or “other” race in this particular dataset. Thus, we could not include aggregate data for these populations without risk of exposing individual’s identities. We hope that as this network continues to grow and as people feel more comfortable sharing their identities, that we will be able to include these populations in future

research. Additionally, this analysis focuses on correlations and cannot infer causality between independent variables and the positive transition outcome. We also did not have a comparison group of non-MyNRMN users to compare positive transitions outside of the platform. Future studies should explore how users in MyNRMN compare to non-users.

## Conclusion

The goal of NRMN is to increase diversity in the STEM research workforce by providing mentoring, networking, and professional development resources to facilitate a person’s transition from one education or career stage to the next. By studying the changes in users’ profile data, it is evident that the more engaged in MyNRMN a user is, the more likely they are to have a positive transition in their educator and/or career. However, this data also shows that having a diverse network of mentors and mentees across racial/ethnic, gender, and career/education level is beneficial for increasing person’s social capital and aids their positive transition through the STEM pipeline.

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