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Research capability of Filipino teacher educators: insights from a criterion-referenced test

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ABSTRACT

The research capability of Filipino teacher educators has been found to be lacking, which limits their ability to contribute effectively to academic research. This study aims to assess their foundational knowledge in research, as understanding their capability is essential for improvement. A quantitative approach was employed, evaluating 100 teacher educators from a state university in Northern Philippines using the research capability test (RCT), a validated criterion-referenced tool. Results showed that teacher educators generally possess average research capability, with significant differences based on educational attainment, field of specialization, and research teaching experience. Those with doctoral degrees, specializations in natural sciences and mathematics, and experience teaching research demonstrate higher capability. These findings suggest that, while basic research knowledge exists, there is a critical need for focused professional development programs to address specific gaps. Strengthening research capability not only improves the teacher educators' performance but also enhances the overall quality of research outputs in the Philippine education system, ensuring long-term academic growth and global competitiveness.

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1. INTRODUCTION

Teacher educators' research capability is a critical area of focus specifically in teacher education programs at the global educational landscape. The advancement of educational outcomes and teaching practices is significantly influenced by the capability of teacher educators to conduct, apply, and disseminate research [1]–[3]. This underscores the importance of research capability in the education sector. Research capability is influenced by factors such as institutional support [4], [5], access to research resources [6], [7], and opportunities for professional development [8], [9], to name a few. These elements are essential in determining the proficiency and effectiveness of teacher educators in conducting meaningful research [10], [11].

Research has established that a variety of personal and professional characteristics influence the complex concept of research capability. These attributes encompass an individual's educational background, experience, skill set, and access to resources. A comprehensive study of research capability necessitates an understanding of these diverse profiles. Ultimately, this comprehension facilitates the identification of areas

for improvement and strengths, thereby improving the overall research capability. However, the results of research on gender differences in research productivity and capability have been inconsistent. Although some studies have discovered that male educators have a higher research output [12], others have not observed any significant differences [13], [14]. In contrast, the presence of structural and systemic discriminatory practices [14] and the evolving dynamics of gender in academia [15] may also be factors. Additionally, research on the impact of age on research capability has produced inconsistent outcomes. Caingcoy [16] observes a negative correlation between age and research ability. It implies that as teachers age and gain more experience, their research capabilities decline. Nevertheless, Badke [17] emphasizes the deficiencies in the research capabilities of both students and faculty, implying that age may not always be a determining factor.

The relationship between research capability and years of service is intricate and is influenced by a variety of factors. For instance, Jones *et al.* [18] suggest that experience may lead to a broader network, enhanced research skills, and a better understanding of funding opportunities. However, research by Otid-Vallescas and Oxillo-Oted [19] found no significant association between years of service and research engagement. This discrepancy indicates that while experience can contribute to improved research capability, the progression may not always follow a linear pattern. Moreover, higher educational attainment, such as obtaining a doctoral degree, significantly improves the capacity to conduct research [20], [21]. A profound comprehension of research methodologies, essential research skills, and critical thinking abilities are all provided by doctoral training [22]. Likewise, research capability is influenced by the field of specialization; non-science, technology, engineering or mathematics (STEM) educators often require support in areas such as critical evaluation, research methods, and academic writing [23]. On the contrary, productivity and interdisciplinary collaboration are not necessarily influenced by the scope of research fields [24]. In addition, methodological research skills can be substantially enhanced by teaching experience, particularly in STEM [25]. Also, academic performance and interest in science can be improved through participation in undergraduate STEM research [26]. Notably, interdisciplinary researchers may initially have a lower impact, but they will eventually surpass subject specialists in terms of funding performance [27].

Further research shows that higher faculty ranks, such as associate or full professor, are typically associated with research capability. These ranks frequently reflect an educator's research experience, publication record, and contributions to the field. Emphatically, senior faculty typically have greater access to research resources, mentorship opportunities, and leadership roles in research projects. On similar note, higher academic rank, such as being a professor, can provide more opportunities and resources for research [6]. Comparably, educators who have a significant amount of teaching research experience are typically associated with a higher level of research capability. Furthermore, educators can enhance their research abilities by teaching research courses and remaining informed about research trends and methodologies [28]. Providing students with hands-on experience through research project mentoring can be also beneficial. Along this view, Adeosun [29] emphasizes the importance of research courses and hands-on experience in developing research skills. Furthermore, participating in relevant research seminars and training sessions can significantly enhance one's research capability. In fact, one study found that teachers who attended research seminars and training programs were more likely to engage in research activities and publish their findings [30]. Another study found a positive correlation between teachers' research capabilities and the number of seminars they attended, suggesting that frequent exposure to research-oriented events can enhance their skills [21].

Research literature likewise provides that a complex interplay of personal and professional factors influences the research capability of teacher educators. Accordingly, the research capability of teacher educators can be improved by institutions that develop targeted strategies that are informed by these factors. Educational institutions can foster a more robust research culture among their faculty by providing tailored support to these diverse factors. Specifically, the research capability of teacher educators in the Philippines is a microcosm of the global scenario, highlighting both progress and persistent challenges. Filipino teacher educators frequently encounter challenges such as inadequate research infrastructure, inadequate funding, and insufficient professional development programs that are specifically designed to improve research skills [16], [31]–[34]. Notwithstanding these challenges, there are ongoing efforts to enhance research capability through collaborative research initiatives and targeted training programs. This emphasizes a dedication to the development of a healthy and dynamic research culture within the educational sector.

In the light of all aforecited literature reviews underscoring an extensive investigation on research capability, a significant gap in the literature is established relative to the use of objective, criterion-referenced assessments to measure research capability. This research gap is premised on majority of studies which have primarily utilized perceptual survey questionnaires [16], [21], [32]–[40]. While these questionnaires are insightful, they may not fully capture the actual research skills and competencies of teacher educators. This highlights the necessity of alternative assessment methodologies that can offer a more thorough and precise assessment of research capability. To address this gap, this study used the research capability test (RCT), a criterion-referenced assessment tool, to assess the research capability of teacher educators at a state

university with eight campuses in the Northern Philippines. It is the goal of this study to provide a more comprehensive understanding of the current state of research capability and identify specific areas that require targeted improvement and intervention which is achieved by employing an objective measure. The researchers' objective is to improve the research capability of teacher educators as aspirant authorities in the field of educational research. By identifying specific areas of need and providing targeted professional development, the quality of education is hence ensured. As such, this study specifically aims to determine the teacher educators' research capability using the RCT and compare their research capability when grouped according to personal and professional profiles.

2. METHOD

2.1. Research type and participants

The research was conducted using quantitative analysis, as it aimed to evaluate the research capability and profile of teacher educators as well as compare their research capability based on their profile variables. The faculty members (N=135) of the College of Teacher Education from the eight campuses (A-H) of a state university in the Northern Philippines are the participants of the study. Only faculty members who are currently holding teaching plantilla items at the university were taken into account. Lynch's formula was employed to determine the study's sample size (n=100). The number of representatives from each campus was then determined using stratified random sampling with a proportional distribution, as shown in Table 1.

The personal and professional profiles of the teacher educators were initially gathered, with results presented in Table 2. These profiles are crucial variables that may influence research capability. Examining these profiles helps provide context for the study's findings.

Table 1. Participants' distribution per campus

Campus	Population	Sample
A	55	41
B	13	10
C	10	7
D	15	11
E	16	12
F	11	8
G	10	7
H	5	4
Total	135	100

Table 2. Teacher educators' profile

Type	Profile	Specific profile	Frequency (n=100)	Percent (%)
Personal	Gender	Male	36	36.00
		Female	64	64.00
	Age	25-40	46	46.00
	Mean=41.84 y/o	41-56	44	44.00
		57-62	10	10.00
Professional	Years in the service	5 and below	27	27.00
	Mean=12.50 years	6-10	26	26.00
		11-15	14	14.00
		16-20	8	8.00
		21-39	25	25.00
	Educational attainment	Bachelor	4	4.00
		Masters	42	42.00
		Doctorate	54	54.00
	Field of specialization	Humanities and social sciences	68	68.00
		Natural sciences and mathematics	32	32.00
	Faculty rank	Instructor	23	23.00
		Assistant Professor	28	28.00
		Associate Professor	37	37.00
		Professor	12	12.00
	Teaching research experience	With experience	27	27.00
		Without experience	73	73.00
	Number of seminars	0	25	25.00
		1-2	32	32.00
		3 or more	43	43.00

2.2. Research instrument

The study utilized two research instruments. First is the profile questionnaire (PQ), which includes teacher educators' personal and professional profiles. Second is the RCT, which was developed by a team of experts with the objective of assessing the level of expertise that teacher educators possess in research.

The RCT was subjected to a series of critiquing, content validation from experts, and pilot testing. The validity and reliability of the test have been established through the results of the reliability test and item analysis. The test contains 80 items with a desirable difficulty index (50.76), a reasonably good discrimination index (0.28), and large functioning distractors (78.97% distractor efficiency). It likewise exhibits an exceptional inter-item consistency of α=0.904. The following topics are included in the RCT: i) research title; ii) introduction; iii) research problems; iv) conceptual framework; v) literature review; vi) research designs; vii) research methods; viii) data collection; ix) research instrument; x) sampling techniques; xi) data analysis; xi) research ethics; xiii) research abstract; xiv) results and discussion; xv) conclusion and recommendation; and xvi) referencing. The development and validation procedures that the RCT underwent are shown in Figure 1.

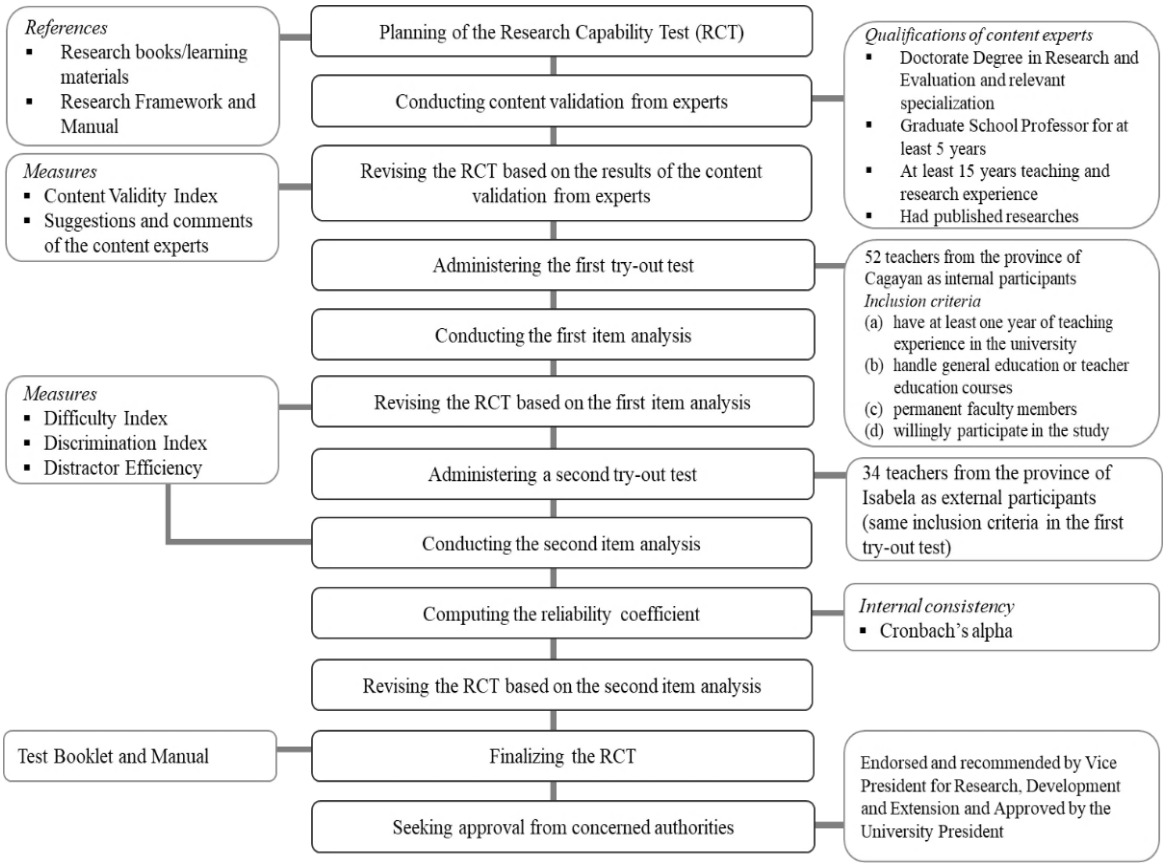

Figure 1. RCT's development and validation phases

2.3. Data collection procedure

Initially, a letter was forwarded to the university president to seek approval for the conduct of the research. Subsequently, copies of the approved letter were sent to the campus executive officers and deans of all eight campuses of the university that offer teacher education courses. Once the approved request was considered on the level of the campus and college administrators, the deans scheduled the RCT's administration. The proctors adhered to a set of guidelines to oversee effectively the study's proceedings. Participants were instructed to carefully read, sign, and complete the forms and research instruments in the prescribed sequence: i) free and prior informed consent form; ii) attendance sheet; iii) PQ; iv) RCT and answer sheet; and v) returned test materials form. Examinees were explicitly cautioned against capturing any visual or audio recordings of the research instruments.

2.4. Ethical considerations

The administration of the RCT was subject to the approval of the University President. Participants were provided with written information regarding the objectives and methodologies of the investigation. Consent was obtained and explained to the participants in a free, prior, and informed manner. The participants were informed that their participation was voluntary, and that any information they provided would be treated with utmost confidentiality and anonymity.

2.5. Data analysis

Before the formal analysis, the data was assessed for normality as part of the data analysis protocol. Table 3 shows that the data is normal, as the significance values for both the Shapiro-Wilk and Kolmogorov-Smirnov tests are greater than 0.05. This confirms the data's suitability for further analysis. Moreover, the mean percentage score (MPS) was used to interpret the teacher educators' scores in the RCT. The following guideline was utilized: 0% to 34% (low capability)-limited mastery of research concepts; 35% to 85% (average capability)-moving towards mastery of research concepts; and 86% to 100% (high capability)-mastered research concepts. Parametric tests such as the independent sample t-test and analysis of variance (ANOVA) were employed to compare the teacher educators' research capability when grouped according to personal and professional profiles.

Table 3. Tests of normality of the RCT score

Kolmogorov-Smirnov[a]			Shapiro-Wilk		
Statistic	df	Sig.	Statistic	df	Sig.
0.073	100	0.200*	0.981	100	0.160

3. RESULTS AND DISCUSSION

3.1. Teacher educators' research capability as revealed by the RCT

Table 4 presents the research capability of Filipino teacher educators across various content areas, revealing that 89% of participants demonstrate an average level of research capability, with an overall mean score of $\bar{x}$=53.84. This score is significantly lower than the target mean percentage of 86, which is the threshold for categorizing educators as having high research capability. While many educators are developing essential research skills, the overall performance indicates that further advancement is needed.

Table 4. Teacher educators' research capability as revealed by the RCT

Research content areas	Percentage (n=100)			Overall capability	
	High capability	Average capability	Low capability	Mean	Descriptive value
Research title	6	58	36	49.50	Average
Introduction	4	74	22	49.00	Average
Research problems	15	71	14	56.13	Average
Conceptual framework	17	64	19	57.71	Average
Literature review	0	64	36	47.83	Average
Research designs	47	36	17	75.67	Average
Research methods	12	65	23	55.00	Average
Data collection	23	63	14	62.50	Average
Research instrument	21	55	24	63.33	Average
Sampling techniques	3	55	42	46.83	Average
Data analysis	11	48	41	50.67	Average
Research ethics	12	35	53	48.00	Average
Research abstract	27	30	43	58.33	Average
Results and discussion	5	61	34	52.67	Average
Conclusion and recommendation	6	59	35	45.25	Average
Referencing	3	61	36	47.75	Average
Overall	1	89	10	53.84	Average

The distribution of scores shows that although some educators demonstrate capability in specific areas, most fall within the average range. This indicates that, despite some progress, their research capability fall short of necessary standards for effective contributions in today's dynamic educational landscape. As a result, there remains a significant gap that must be addressed to enhance overall research capability.

Previous studies have pointed out that Filipino educators tend to exhibit moderate research capabilities [16], [32]–[34]. This trend indicates a consistent challenge within the education system, highlighting the necessity for educational institutions to enhance their support for teacher development in

research. Given the rapid advancements in technology and the evolving demands in education, it is crucial for teachers to elevate their research performance to keep pace with these changes.

The findings underscore the importance of implementing comprehensive professional development programs tailored to strengthen research capability among teacher educators. With targeted training and resources provided by educational institutions, teacher educators' research capabilities are enhanced which not only benefits them but also enriches their academic community as a whole. Ultimately, the findings reveal that Filipino teacher educators have a foundational understanding of research concepts. However, the findings similarly highlight the urgent need for improvement to achieve the high research capability benchmark for teacher educators. This calls for an investment in targeted professional development which significantly enhance teacher educators' research capability ensuring that they are well-equipped to face research challenges and seize research opportunities presented by advancements in technology and education.

3.2. Comparison of teacher educators' research capability when grouped according to profiles

Table 5 provides a comprehensive comparison of teacher educators' research capability when grouped according to various personal and professional profiles. This is to highlight how different profiles influence research knowledge among Filipino teacher educators. This comparison allows for a clearer understanding of the strengths and weaknesses in research capability across these profiles, informing future professional development initiatives.

Table 5. Comparison of teacher educators' research capability when grouped according to profiles

Type	Profile	Specific profile	Mean	SD	Computed value	p-value
Personal	Gender	Male	57.22	16.77	t=1.630	0.106^{ns}
		Female	51.93	14.88		
	Age	25-40	55.24	17.34	F=0.875	0.420^{ns}
		41-56	53.69	15.01		
		57-62	48.00	9.30		
Professional	Years in the service	5 and below	50.74	18.02	F=1.692	0.158^{ns}
		6-10	55.91	14.92		
		11-15	55.63	13.72		
		16-20	43.28	13.59		
		21-39	57.40	14.51		
	Educational attainment	Masters	49.23	16.56	t=2.440	0.017*
		Doctorate	56.90	14.22		
	Field of specialization	Humanities and Social Sciences	51.31	14.49	t=2.406	0.018*
		Natural Sciences and Mathematics	59.22	17.03		
	Faculty rank	Instructor	48.91	18.32	F=1.252	0.295^{ns}
		Assistant Professor	53.26	14.98		
		Associate Professor	56.22	14.50		
		Professor	57.29	15.05		
	Teaching research experience	With experience	60.93	14.31	t=2.841	0.005**
		Without experience	51.22	15.48		
	Number of seminars	None	50.35	17.42	F=1.641	0.199^{ns}
		1 to 2 seminars	52.34	15.75		
		3 or more seminars	56.98	14.35		

**significant at 0.01 significance level; *significant at 0.05 significance level; ^{ns}not significant

It shows that teacher educators who are doctorate degree holders (p=0.017) are more knowledgeable in research than the master's degree holders. Teacher educators holding doctorate degrees are generally more knowledgeable in research than those with a master's degree due to the extensive research training and experience they receive during their doctoral programs [20], [21]. It is claimed that doctoral programs prepare students to become independent researchers and knowledge producers. This specialized training and mentorship contribute to their advanced research skills and knowledge [22], [41].

Notably, the teacher educators who specialized in natural sciences and mathematics (p=0.018) demonstrated a higher level of research knowledge than their counterparts in humanities and social sciences. This difference might stem from their increased familiarity with quantitative and empirical research methodologies requiring precise technical expertise during their undergraduate studies [42]. Consequently, their specialization likely provided greater exposure to these research designs, approaches, and competencies [25], which were possibly measured by the RCT.

Significantly, the teacher educators' research knowledge varies in terms of teaching research experience (p=0.005). This finding suggests that those who have taught research tend to possess greater knowledge in this field compared to those without teaching experience in research. This stands to reason as research shows that educators can enhance their research abilities by teaching research courses, staying

current with trends and methodologies, and engaging in research projects [28]. Similarly, according to Kini and Podolsky [43], teaching necessitates a thorough grasp of the subject matter, and this task often deepens understanding through explanations, clarifications, and addressing questions. As a result, this active engagement may enhance the faculty's knowledge base, as they need to navigate various perspectives and queries, fostering a more nuanced comprehension of research concepts.

Meanwhile, other profiles, such as gender and age, do not differ in research capability, aligning with existing literature [13]–[15], [17]. However, some profiles also show no significant differences, contradicting some findings in the literature. These profiles include years in service [18], faculty rank [6], and the number of research-related seminars or trainings attended [21], [30].

The results suggest that individuals with doctorate degrees possess a considerably higher degree of research expertise than those with master's degrees, which can be attributed to their extensive training and experience in doctoral programs. Higher research knowledge is also linked with specialization in natural sciences and mathematics at the undergraduate level, which is likely due to the technical and empirical focus of these fields. The research knowledge is further enhanced by the teaching experience in research, which involves active learning through instruction and deep engagement with the subject matter.

The results of this study hold significant implications for the field of teacher education as identification of the profiles that provides educational institutions with baseline reference to tailor their professional development programs that contribute to higher research capability among teacher educators. Such improvements are vital for cultivating a more competent teaching workforce capable of contributing to the evolving educational landscape, especially in light of technological advancements and the need for evidence-based practices. The findings further underscore the imperative for targeted interventions aimed at enhancing the research capability of teacher educators and creating a supportive environment for their professional growth and development.

3.3. Limitation of the study

The assessment of this study is limited to the content of the basic research competencies of teacher educators within public higher education institutions (HEIs), and its interpretation relies solely on test scores, which presents some limitations. Similarly, the RCT is limited on the assessment of research capability in social science research and does not cover research capability of teacher educators in both applied and pure sciences. Additionally, the narrow focus on basic research competencies may overlook other essential skills pertinent to effective research engagement, such as applied research methodologies and interdisciplinary collaboration. Likewise, by exclusively considering test scores, the assessment may not capture the nuanced aspects of research capabilities in terms of teacher educators' research outputs, potentially overlooking strengths or weaknesses not reflected in numerical data. Furthermore, the sole inclusion of teacher educators in public HEIs restricts the generalizability of findings, as it disregards the diversity of institutional contexts and populations across different types of HEIs, including private institutions.

To address these limitations, future research endeavors should broaden the scope of competencies assessed to encompass a wider range of research-related skills and integrate qualitative data alongside quantitative measures for a more holistic interpretation. Additionally, efforts to include diverse HEIs in the assessment process are crucial for ensuring the generalizability and applicability of findings across various educational settings. Furthermore, evaluating the effectiveness of institutional support structures, such as funding opportunities and mentorship programs, and exploring the implications of research capability assessments for policy-making contributes to the enhancement of the relevance and impact of these evaluations in shaping the future landscape of research in education.

4. CONCLUSION

The study has established that teacher educators at a state university in the Northern Philippines possess an average level of research capability, as determined by the RCT. Notably, the evidence indicates significant differences in research capability based on educational attainment, field of specialization, and experience in teaching research. Teacher educators with doctoral degrees typically demonstrate higher research capabilities than those holding master's degrees. Furthermore, individuals who completed their bachelor's degrees in natural sciences and mathematics show higher research capability compared to those with backgrounds in the humanities and social sciences. Additionally, teacher educators with experience in teaching research exhibit higher research capabilities than their counterparts without such experience. These findings suggest a foundational knowledge base but also highlight opportunities for further improvement. The results underscore the importance of continuous professional development programs, specifically designed to address areas where teacher educators may need additional assistance and professional development.

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AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

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C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
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Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

INFORMED CONSENT

We have obtained informed consent from all individuals included in this study.

DATA AVAILABILITY

The data that support the findings of this study are available on request from the corresponding author, [JTA]. The data, which contain information that could compromise the privacy of research participants, are not publicly available due to certain restrictions.

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