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Comparing the Research Contributions of Community Pharmacy Foundation Funding on Practice Innovation Between Non-Academics and Academics

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ABSTRACT

Objective: Evaluate and compare the research contributions of Community Pharmacy Foundation (CPF) funding on community pharmacy practice innovation between non-academic and academic principal investigators (PIs) with respect to the following measurements: 1) "Pharmacy Practice Activity Classifications" (PPAC); 2) CPF "Coordinated Use of Medications"; and 3) CPF Investigator Impact.

Methods: Quantitative data for all 124 CPF-funded grants awarded from 2002-2016 were obtained from the CPF website and personnel, while ethnographic qualitative data was generated from queries of PIs. Grant categorization was conducted by researchers serving as judges trained on the rules and procedures for coding. A threshold level of 90% agreement in scores of independent judging was established a priori. Findings were summarized and groups were compared using descriptive statistics for quantitative data and a thematic analysis of PI ethnographic reflections for qualitative data.

Results: There were no differences between non-academic and academic PI groups for Coordinated Use of Medications and PPAC domains, but non-academics contributed more to two dispensing-related PPAC subclasses: 'Preparing the Product' (10% vs. 2%) and 'Delivering the Medication or Device' (13% vs. 2%). Analysis of investigator reflections revealed similarities between groups regarding impact on practice innovations, expanded collaborations, new practice tools, and patient-care financing models.

Conclusions: CPF funding contributed new knowledge and resources for expanding and enhancing practice innovations as shown by quantitative (PPAC & Coordinated Use of Medications) and qualitative (PI impact) measures. Similarities between PI groups suggest that the CPF has established a funding niche with unique diversity of practice innovation opportunities. This investigation's findings may be useful to the CPF's continuous quality improvement efforts, as well as future grant applicants to assess research gaps in the medication use process and develop sustainable, transferable, and replicable patient-care innovations in community pharmacy practice.

Keywords: Program evaluation; Pharmacy Practice Activity Classification; Investigator Impact; Community Pharmacy; Grants

INTRODUCTION

The Community Pharmacy Foundation (CPF) is a non-profit organization that has awarded over \$7,900,000 in research and development grants for advancing community pharmacy practice and patient care delivery improvement since 2002.¹ In June 2015, the CPF collaborated with University of Minnesota researchers to analyze the scope and impact of all funded grants for use by the Foundation to evaluate its past funding decisions and guide future grant making, as well as for grantees to identify potential enhancements and research gaps.² Defined as Phase 0, the CPF Program Evaluation Project was a global overview of CPF funding and described grants by topic, funding level, and other criteria. It compared the data between two time periods, the 'Initial Years' (2002-2008) and 'Recent Years' (2009-2015), with respect to the Agency for Healthcare Research & Quality (AHRQ) Impact Factor, the Three-Part Aim adopted by the Centers for Medicare & Medicaid Services (CMS), and the CPF 'Coordinated Use of Medications' frameworks. Qualitative data were also generated from principal investigator (PI)

reflections about the influence of CPF funding on practice innovation, career progression, collaborations, and subsequent funding. Results demonstrated that the fulfillment of AHRQ, CMS, and CPF framework measures by projects had increased over time and that CPF funding was very important to the careers and development of the PIs receiving grants. The project is summarized in a CPF Synopsis and American Pharmacists Association 2016 Annual Meeting poster on the [CPF website](#).³

After submission of the CPF Program Evaluation Project report to the CPF Board, two subsequent analyses were requested to identify characteristics of the two main grant applicants – academic primary investigators and non-academics. Phase I included grants *completed* during calendar years of 2002 – 2014 (N=107) for a subgroup analysis of the 58 grants to PIs receiving academic salary support (i.e. academics) to further evaluate the Foundation's past and future funding decisions. Furthermore, investigator impact evaluations were also conducted and included all grantees *awarded* between January 2002 – June 2015. Findings generated from the subgroup were consistent with trends identified in the original report and revealed an equitable distribution of grants with respect to academic

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institution types (i.e. public vs. private) and geographic locations.²

Phase II included a broadened time frame with grants approved and completed between January 2002 – March 2016 (N=124) to capture additional quantitative and qualitative data with an emphasis on both non-academic (n=61) and academic (n=63) primary investigators and their research contribution similarities and differences, particularly with an emphasis on pharmacy practice. This comparison was done to reveal general CPF funding patterns for the benefit of CPF-decision makers for these two predominant applicant types and also for researchers seeking financial support for their work. For this reason, the Pharmacy Practice Activity Classifications (PPAC) was added as a new measure to the Phase II analysis to quantify practice-based patient care and pharmacy administration activities.

Study Objectives

The objectives of this evaluation were to compare non-academic and academic PIs with respect to the following research contribution measures:

1. “Pharmacy Practice Activity Classifications” (PPAC)
2. CPF “Coordinated Use of Medications”
3. CPF Investigator Impact

METHODS

Data Source & Variables

Data originating from grants awarded from January 2002 through March 2016 were obtained from the CPF website, CPF personnel, and CPF grant recipients. PIs for CPF grants were categorized as: 1) non-academic (i.e., do not receive salary support from an academic institution) or 2) academic (i.e., receive salary support from an academic institution). PI categorization for all 124 CPF grants (total number completed at the time of this study) was conducted by one researcher (AO) using information from:

www.communitypharmacyfoundation.org/grants/grants_list.asp.

Pharmacy Practice Activity Classifications (PPAC)

The 124 CPF projects were quantitatively analyzed for contributions made to the PPAC, a taxonomy categorizing all pharmacists’ roles, responsibilities and activities into 14 classes within four domains: 1) Appropriate Therapy and Outcomes, 2) Dispensing Medications and Devices, 3) Health Promotion and Disease Prevention, and 4) Health Systems Management.⁴⁻⁶ A complete description of the PPAC can also be found at:

www.pharmacist.com/sites/default/files/pharmacy_practice_activity_classification.pdf.

Grant categorization within the PPAC framework was completed by three researchers (BI, AO, and JS) serving as

judges trained on the rules and procedures for coding, and each judge independently scored the same 30 grants to establish and evaluate scoring consistency. The coding process utilized a rigid interpretation of PPAC definitions where only grants that directly applied to pharmacists’ tasks and activities were assigned to the four PPAC Domains (i.e., scores of 1, 2, 3, or 4). Grants that were not directly related to specific pharmacist activities in the PPAC taxonomy were labeled as ‘Not Applicable’ (NA). Examples of grants coded ‘NA’ were a manual for how to develop a residency program and a toolkit for selling a community pharmacy. These projects tended to be collaborative projects with national professional associations, thereby negating their classifications into academic and non-academic. After training, a threshold level of 90% agreement in scores of independent judging of these 30 grants was exceeded, and one researcher (AO) completed subsequent coding for this objective.

Coordinated Use of Medications

The 124 CPF projects were quantitatively analyzed for contributions made to the “Coordinated Use of Medications,” which is part of the CPF’s Strategic Interests Plan⁷ and defined as:

1. *Payment reform*- Results that further the understanding, implementation, or evaluation of global or budgeted payment models that standardize and incentivize the indicated, effective, and safe use of medications, as well as engaged or adherent patients, to help meet quality health goals.
2. *Delivery reform*- Results that further the understanding, implementation, or evaluation of new payment models with accreditation or other prerequisites, as well as competitive strategies for delivering medication-related care and services within such systems.
3. *Real-time data integration*- Results that further the understanding, implementation, or evaluation of health information environments that make available standardized, comprehensive, and real-time data at the point of care on the patient’s medication history and adherence that is crucial to effective and efficient medication use.

Grant categorization within this framework was completed by two researchers (AO and JS) serving as judges trained on the rules and procedures for coding, and each judge independently scored the same 30 grants to establish and evaluate scoring consistency. A threshold level of 90% score agreement for independent judging of these 30 grants was exceeded, and one researcher (AO) completed the remainder of coding for this objective.

CPF Investigator Impact

Determination of Investigator Impact from CPF funding using PI reflections was conducted by one researcher (BI) using ethnographic observation methods⁸ utilizing a semi-structured query to elicit PI responses. Data collection sought reflections from the 114 unique PI and co-PIs awarded a CPF grant from 2002 to June 2015 (Phase I) plus 17 PI's awarded a CPF grant after June 2015 (Phase II). It is noted that there were only 99 current e-mail addresses available for the CPF Phase I grantees, with the contact information for the remaining 15 investigators not able to be found. However, all 17 CPF Phase II awardees had current and valid contact information. Phase I queries (administered June 1st-July 20th, 2015 as part of the CPF Program Evaluation Project) began with an emailed invitation asking investigators to reflect on how CPF funding helped them obtain subsequent funding, career advancement, honors and professional development, and influence on practice innovation. Phase I yielded 32 responses from academic PIs and 12 responses from non-academic PIs. Phase II queries (administered October 28th - November 29th, 2016) were initiated specifically for this investigation and began with a new and distinct emailed invitation to the 17 Phase II CPF awardees and the 55 Phase I academic and non-academic non-respondents. The Phase II invitation asked grantees to specifically reflect on how CPF-funding helped them enhance or expand their practices. No additional academic responses were submitted with Phase II, so phases I and II combined to produce a total of 32 academic and 24 non-academic responses.

Data Analysis

Descriptive statistics were used to summarize and compare groups for objectives 1 and 2. Inferential statistics were not used in analysis given the data were a census and not a sample. A thematic analysis of PI reflections was conducted (by BI) using a descriptive and interpretive ethnographic method.^{8,9} The comments were read multiple times and dominant themes were extracted by a single researcher (BI) and then discussed among and affirmed by the University of Minnesota research team (BI, JS, AO).

RESULTS

Pharmacy Practice Activity Classifications (PPAC)

The 61 CPF grants completed by non-academic PIs were compared to 63 grants completed by academic PIs for their contributions toward PPAC domains. **Table 1** shows that 59% of all CPF grants investigated an aspect of health promotion and disease prevention, followed by health systems management (52%), appropriate therapy and outcomes (51%), and dispensing medications and devices (16%). Overall, 24% of projects investigated one PPAC Domain, 26%

investigated two, 23% investigated three, and 8% investigated all four. There were 19% of all CPF grants that were coded as NA because they were not directly related to specific pharmacist activities in the PPAC taxonomy given their focus on topics like education, developing residency programs, implementing training grants, financially supporting the attendance of a conference, etc. rather than specific pharmacist tasks and activities.

Projects with investigators who were academics had a higher percentage of projects that addressed at least one PPAC Domain-related contribution than their non-academic counterparts (i.e., 86% vs. 77%). However, non-academics had a higher proportion of completed grant projects that incorporated all four PPAC Domain-related contributions relative to their academic counterparts (i.e., 13% vs. 3%).

Table 1 also shows slightly higher prevalence of grants from Domains B (i.e., Dispensing Medications & Devices) and C (Health Promotion & Disease Prevention) for non-academics than academics and different types of contributions by these groups within Domain D. The trend in Domain B is due to a higher proportion of non-academics completing projects related to subclasses 'Preparing the Product' & 'Delivering the Medication or Device' than their academic counterparts. Similarly, the difference in Domain C can be attributed primarily to a higher proportion of non-academics completing projects related to 'Promoting Safe Medication Use' than their academic counterparts. For Domain D (i.e., Health Systems Management), projects completed by non-academics more frequently addressed topics related to 'Managing the Practice' and 'Managing Medications in System,' while academics displayed a higher proportion of completed projects that involved 'Research Activities.'

Table 1: PPAC Contributions for Completed CPF Grants by Non-academic and Academic PIs.

PPAC Domains & Subclasses		Non-Academic PIs N = 61 (% Yes)	Academic PIs N = 63 (% Yes)	Overall N = 124 (% Yes)
Domain A:	Appropriate Therapy & Outcomes (Subclasses A1, A2, or A3)	49%	52%	51%
	Subclass A1: Appropriate Pharmacotherapy	46%	43%	44%
	Subclass A2: Patient Understanding & Adherence	39%	40%	40%
	Subclass A3: Monitoring & Reporting Outcomes	38%	32%	35%
Domain B:	Dispensing Medications & Devices (Subclasses B1, B2, or B3)	20%	13%	16%
	Subclass B1: Processing the Prescription or Order	8%	8%	8%
	Subclass B2: Preparing the Product	10%	2%	6%
	Subclass B3: Delivering the Medication or Device	13%	3%	8%
Domain C:	Health Promotion & Disease Prevention (Subclasses C1, C2, or C3)	62%	56%	59%
	Subclass C1: Clinical Preventative Services	46%	46%	46%
	Subclass C2: Pub. Health Surveillance & Reporting	30%	27%	28%
	Subclass C3: Promoting Safe Medication Use	34%	19%	27%
Domain D:	Health Systems Management (Subclasses D1, D2, D3, D4, or D5)	54%	51%	52%
	Subclass D1: Managing the Practice	44%	32%	38%
	Subclass D2: Managing Medications in System	12%	3%	7%
	Subclass D3: Managing Medication Use in System	23%	25%	24%
	Subclass D4: Research Activities	13%	21%	17%
	Subclass D5: Interdisciplinary Collaboration	33%	33%	33%
Total Number of PPAC Domain Contributions (Domains A, B, C, or D)				
	NA	23%	14%	19%
	One	16%	32%	24%
	Two	26%	25%	26%
	Three	21%	25%	23%
	Four	13%	3%	8%

Coordinated Use of Medications

The 61 CPF grants completed by non-academic PIs were compared to the 63 grants completed by academic-PIs for their contributions toward the CPF “Coordinated Use of Medications.” The majority of the 124 completed projects contributed to research on Delivery Reform (68%), with few contributing to Payment Reform (11%) and Real Time Data

Integration (11%) research. Overall 61% of projects contributed to one category, 10% contributed to two, and 3% contributed to all three. **Table 2** shows no remarkable differences between non-academic and academic PIs overall, but there is a slightly higher prevalence of completed grant projects focused on ‘Delivery Reform’ for academics than there are for non-academics.

Table 2: ‘Coordinated Use of Medications’ Contributions for Completed CPF Grants by Academic PIs and Non-Academic PIs.

	Non-Academic PIs N = 61 (% Yes)	Academic PIs N = 63 (% Yes)	Overall N = 124 (% Yes)
Coordinated Use of Medications			
Payment Reform	13%	10%	11%
Delivery Reform	64%	71%	68%
Real Time Data Integration	12%	10%	11%
Total Number of ‘Coordinated Use of Medications’ Contributions			
None	30%	24%	27%
One	57%	64%	61%
Two	8%	11%	10%
Three	5%	2%	3%

CPF Investigator Impact

Table 3 summarizes the categories of investigator impact for non-academic and academic PIs. The academic grantee responses are previously described.² As a result of Phase I and II queries, there were 24 CPF non-academic grantees that provided reflections on how CPF funding helped enhance or expand practice, which resulted in four broad practice innovation themes:

1. New and expanded patient care services,
2. New and expanded collaborations,
3. New tools/approaches to improve workflow and patient understanding of services, and
4. New data/information supporting the business case for pharmacists’ practice innovations.

Some respondents provided reflections that were categorized into multiple themes, producing 47 different practice innovation observations. A descriptive response summary of the non-academics for each theme with the number of reflections noted in parentheses included:

New and expanded patient care services (16/24)

Specific examples of new and expanded patient care services facilitated through CPF funding included, pediatric immunizations, osteoporosis screening, remote monitoring of patients’ blood pressure and blood glucose readings, smoking cessation, diabetes care services, prenatal care, Lyme Disease prophylaxis, and team-based comprehensive medication management services.

New and expanded collaborations (12/24)

New and expanded collaborations facilitated through CPF funding included, health system and clinic-based collaborative practice agreements, managed care and health insurance partnerships, creation of educational materials to assist in advocacy for legislative initiatives, employer-based programs, and local and state health departments.

New tools and approaches to improve workflow and patient understanding of services (11/24)

New tools and approaches to improve workflow and patient understanding of services included: community outreach resources, marketing plans, documentation standards, appointment scheduling communications, quality metrics, and a practice readiness inventory to guide service implementation.

New data/information supporting the business case for pharmacists' practice innovations (8/24)

New data and information supporting the business case for pharmacist integration in care delivery and reimbursement reform included, a payer credentialing program, payment protocols for medication management services, community pharmacist integration in Accountable Care Organizations, a community-based medication management bundled payment, and a national campaign providing information influencing payers and policy-makers to get the medications right.

Table 3: 'CPF Investigator Impact' for Completed CPF Grants by Academic PIs and Non-Academic PIs.

	Non-Academic PIs Respondents N = 24	Academic PIs Respondents N = 32*
New and Expanded Patient Care Services/Practice Development	66%	59%
Promotion & Advancement	--	59%
New & Expanded Collaborations	50%	38%
Funding Opportunities	--	22%
Awards	--	22%
Tool/Resource Development	46%	--
Reimbursement / Payment Reform	33%	9%

--Blank responses indicate a response was not provided for that specific category.

*Data available from: Isetts BJ, Olson AW, Schommer JC, Kondic AM. An Evaluation of the Distribution, Scope, and Impact of Community Pharmacy Foundation Grants Completed by Academic Principal Investigators between 2002 and 2014. *Inov Pharm.* 2017;8(1): Article 24.²

DISCUSSION

Results of this investigation describes similarities and differences between the census of non-academic and academic PIs. An almost equivalent grant distribution between these subgroups was ideal for such a comparison, with 49% of the CPF grants awarded to non-academic PIs and 51% being awarded to academic PIs. This nearly identical split appears to reflect efforts by CPF to provide as many grants as possible to a diverse array of individuals, institutions and practice sites. The collaborative process for conducting this analysis can be viewed as generating a "report card" for CPF decision-makers to evaluate and reflect on funding decisions over the past 10 years. Results also demonstrate that CPF has been a vehicle for practitioner-driven practice innovation research that represents a funding alternative to government agencies (e.g., NIH, AHRQ, etc.).

Pharmacy Practice Activity Classifications (PPAC)

The first objective of this evaluation was to compare the research contributions of CPF grants awarded to non-academic PIs and academic PIs. The affiliation or lack of affiliation of a PI with an academic institution revealed slight

differences at the group level for PPAC domain fulfillment in terms of either type and number.

Findings comparing domain-level differences between academic and non-academic comparator groups showed a higher proportion of the latter completing projects for 'Preparing the Product' (B2), 'Delivering the Medication or Device' (B3), 'Promoting Safe Medication Use' (C3), 'Managing the Practice' (D1), and 'Managing Medications in the System' (D2) relative to the former. In contrast, academics completed a higher proportion of Health Systems Management 'Research Activities' (D4) than their non-academic counterparts. These findings suggest a greater emphasis on these domains and subclasses with slight differences between non-academics and academics in terms of salience and focus for different pharmacist activities. However, the size of these differences between non-academic and academic PIs (i.e., all less than 15%) implies a similar approach with respect to other aspects of pharmacist practice.

Descriptive comparisons between academics and non-academics with respect to the number of PPAC domain

contributions for each respective grant showed a higher proportion of academics who addressed at least one PPAC domain compared to their non-academic counterparts. However, non-academics more frequently completed grants that contributed to all four PPAC domains compared to their academic colleagues. There are many potential reasons for the differences between these groups including training, research focus, and intervening variables related to the grant award process. For instance, academics are generally trained to generate in depth, but very narrow scopes of investigation that may have led to fewer grants that addressed all four PPAC components. In contrast, non-academics may have more pragmatic training in trying to address all relevant causes related to an issue (i.e., address all four domains of pharmacist activities) or focus on topics that indirectly support pharmacist activities, such as developing a residency program manual (i.e., NA). There were also some academics with grants that scored 'NA' for topics, such as entrepreneurial leadership or a national census for community-based patient care services, but these were fewer in number and proportion.

Another difference in the results may reflect a fewer number of academics conducting research in Domain B (e.g., Dispensing Medication and Devices) because their focus is on growing other aspects of pharmacist practice, while non-academics still have dispensing as a critical component of their daily workflow. It's also possible that an intervening variable could explain differences, such as some PIs classified as academics being in practice positions and others not.

Finally, it is important to note that many of the grants analyzed did not fit well into the PPAC domains (e.g., education, residency programs, training grants, conference grants, etc.). This exclusion pertains to their indirect relationship with the specific pharmacist tasks and activities segmented by the PPAC rather than their importance and value to the pharmacist community. For example, although a toolkit for how to sell a pharmacy or a manual for developing a PGY1 residency program manual is useful and important, they do not directly relate to 'Ensuring Appropriate Therapy and Outcomes' (Domain A), 'Dispensing Medications and Devices' (Domain B), 'Health Promotion and Disease Prevention' (Domain C), or Health Systems Management (Domain D). A more flexible interpretation of PPAC definitions that force-fit 'NA' rated grants into PPAC domains was possible, but would expand how other grants were coded and lead to a less meaningful analysis.

Coordinated Use of Medications

The second objective of this evaluation compares each respective group with respect to the CPF "Coordinated Use of Medications" strategic framework. PI affiliation with an academic or non-academic institution did not reveal remarkable differences in the 'Coordinated Use of

Medications' framework. Most grants in both groups contributed to Delivery Reform, with far fewer doing so for Payment Reform and Real Time Data Integration. Furthermore, the 'Coordinated Use of Medications'-related achievement profiles of the respective comparison groups did not reveal remarkable differences for the total number (i.e., None, One, Two, Three) or type (Payment Reform, Delivery Reform, Data Integration). This suggests that both academic and non-academic PIs perceived, focused, and acted within each component of this CPF identified framework at a very similar prevalence within this evaluation's time frame.

CPF Investigator Impact

The third and final objective analyzed practice innovation contributions of CPF funding using PI reflections. Thematic analysis yielded results from non-academic PIs that were consistent with and more descriptive than previous analyses. Both PI groups highlighted new and expanded collaborations with health system and clinic-based collaborative practice agreements, managed care and health insurance partnerships, legislative initiatives, employer-based programs, and local and state health departments with little discernable differences. Similarly, both groups identified new data and information useful for supporting, providing, and reimbursing pharmacist practice innovations like medication reviews, pay for performance, shared-savings measures, and comprehensive medication management. Finally, the development and testing of new patient care services, public health communications tools, and quality metrics was a shared theme between the groups that extended across patient populations. Academics commented on areas of promotion, funding opportunities and awards which, in part, are measures of success and advancement in these settings. In contrast, non-academics emphasized tools and resource development in their responses, which may reflect a focus on communities of learning and practical advancement.

LIMITATIONS

The interpretation of the results should account for limitations of this analysis. The evaluation used observational methods and the thematic analysis of PI reflections were developed from a relatively low response rate (38.5%), which limits its generalizability and may have been subject to selection bias. PIs who responded to requests for reflections about the research contributions of CPF funding may have perceived the grants more impactful or led to more successful results than non-responders. Additionally, it should be noted that non-academic PIs may have had co-investigators or support staff from academic institutions, and vice versa. This information was not accounted for in the analysis and may partially explain the lack of differences between non-academics and academics.

CONCLUSIONS

CPF funding has contributed to new knowledge and tools as demonstrated by quantitative (i.e., Coordinated Use of Medications, PPAC) and qualitative (i.e., PI ethnographic reflections) measures regardless of whether PIs were classified as academic or non-academic. Slight differences between the groups between and within PPAC Domains suggest potential differences in emphasis for non-academic PIs and academic PIs. However, overall similarities between PI groups present an interesting snapshot that suggests CPF has established a unique funding niche with a diversity of practice innovation opportunities regardless of academic or non-academic affiliation. This investigation's findings may be useful to the CPF's continuous quality improvement efforts, as well as existing and future grant applicants, to assess research gaps in the medication use process and developing sustainable, transferable, and replicable patient-care innovations in community pharmacy practice.

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Conflict of interest statement: Anne Marie Kondic is Executive Director and Grants Administrator for the Community Pharmacy Foundation.

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