

Institutional and Faculty Vitality Impact on Research Productivity of Occupational and Physical Therapy Faculty

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Abstract

This is a study of the relationship between individual and institutional/leadership vitality characteristics and high levels of research productivity among occupational and physical therapy faculty. Five hundred full-time occupational and physical therapy faculty were surveyed from 45 public health science research universities within the US. One hundred forty two surveys were returned; a return rate of 28.4 percent. The results identify a statistically significant relationship between faculty perception of adequate and protected time to conduct research and scholarly activities, esteem among fellow colleagues, presence of a collegial network, and a clearly communicated institutional vision and administrative expectations with the annual publication of three or more refereed journal articles. This study also revealed a significant difference in vitality factors identified by faculty annually publishing three or more refereed journal articles and those publishing less than three. The results of this study provide a method for predicting high levels of productivity among occupational and physical therapy faculty.

Keywords: Faculty vitality, Institutional vitality, Research productivity, Allied Health Faculty

1. Introduction to the Problem

A noticeably high level of faculty productivity continues to be the goal of American public research universities (Levitan & Ray, 1992, Hardre, 2014). Professors have a mandate to enhance the flow of extramural funding to their universities while at the same time produce knowledge in their fields, integrate the latest research results into their teaching, and mentor learners in conducting research to continue the advancement of knowledge (Dundar & Lewis, 1998; Gumpert, 1999; Webber, 2011). The literature presents the difficulty encountered when attempts are made to quantify the multifaceted work of academics into acceptable measures of productivity; for this reason many of the studies in productivity identify refereed journal publications as the hallmark of academic and institutional funding, prestige, merit, and tenure decisions (Baker, & Wilson, 1992; Barrow, 2002; Bosseau, 1999; Creamer, 1998; Hasselback & Reinstein, 1995; Hughes, 1996; Leslie et al., 1998; Levitan & Ray, 1992; Shanklin, C., 2001; Helsi, & Lee, 2011; Dankoski, Palmer, Laird, Thomas, Ribera & Stephen, 2012).

American universities, as a whole, seek to develop institutional climates that foster characteristics that guarantee the type of faculty productivity that elevates the status of the institution and meet the demands of both public and private stakeholders (Karukstis, 2003; Kauffmann 2000; Harde, 2014). The literature identifies these as the characteristics of faculty and institutional vitality and asserts that such factors enhance research productivity (Fox & Milbourn, 1999; Hughes, 1996).

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The literature further infers that the characteristics of faculty and institutional vitality are unique to the type of higher education institution and its mission and therefore produces a variation in the ideal types of vital faculty (Clark, Boyer, and Corcoran, 1985; Clark, Corcoran, and Lewis, 1986; Webber, 2011).

Clark and Corcoran (1985) reported that the range of individual and institutional characteristics (variables) that distinguish vital faculty from their peers at research-oriented universities include such individual characteristics as: demonstrated sustained productivity in teaching, research, and professional services; a balanced interest in teaching and research; or a skewed preference toward research; and such institutional characteristics as research libraries, the quality of graduate students, and leave policies that enhance research (Clark & Corcoran, 1985). Bland, Collins, Goldstein, and Swan (1996) explained that a productive research university is the product of three categories of vital characteristics. These include: individual features, institutional features, and leadership features (Bland, Collins, Goldstein, & Swan, 1996).

According to the literature, the individual, institutional, and leadership features that correlate with high levels of vitality and subsequent productivity include: *Individual features* such as socialization, motivation, content knowledge and research/teaching skills, mentors, work habits, productive local peer support, professional network, simultaneous projects, sufficient work time, orientation, and autonomy and commitment (Bland et al., 1996).

Institutional features such as clear coordinating goals, emphasis of priority goals -especially research-, culture, positive group climate, assertive participative governance, decentralized organization, communication, resources, size-age-diversity, rewards, recruitment and selection, and a brokered opportunity structure (Bland et al., 1996; Quimbo & Sulabo, 2014).

Leadership features such as highly regarded, able scholars; a research/teaching orientation; and attention to individual and institutional characteristics that facilitate productivity, keeps goals visible, initiates structure, uses assertive participative style, and proactively brokers opportunities (Bland et al., 1996).

According to Walker and Hale (1999), vitality within the faculty is an attribute of institutions that demonstrate characteristics that foster vitality in their faculty (Walker & Hale, 1999). Such characteristics include: a genuine mission with clear goals; a distinctive institutional culture, productive faculty-administration relations; participatory governance; decentralized control; an effective communication system; a competent supportive staff; sufficient technical and other resources; a heterogeneous - diverse community; fair, equitable, and ample rewards and recognition; opportunities for career flexibility; and effective leadership (p.12). Walker and Hale (1999) further stated that such institutional characteristics manifest themselves in categories of evidence among faculty (Walker & Hale, 1999). These categories of evidence include: increased professional efficacy, purposes and goals, autonomy, relatedness, and general well-being.

2. Background of the Study

Allied health faculty at major health science (research) universities face an unprecedented demand for research productivity coupled with uniquely high teaching loads; given the responsibility of producing entry-level health care practitioners at the master's and doctoral levels (Harris, Adamson, & Hunt, 1998; Stephenson, Peloquin, Richmond, Hinman & Christiansen, 2002). Karukstis (2003) reported that a lack of time secondary to multiple demands on faculty was identified by 80% of his research participants as a block to research productivity in undergraduate higher education institutions. The majority of the Occupational and Physical Therapy faculty in Schools of Allied Health Sciences are heavily invested in scholarly activities that emphasize teaching and clinical practice rather than research (Black, 1996; Christiansen, 2002; Hitchcock & Stritter, 1992). Given the enormity of their academic responsibilities and the institutional demands for research productivity, occupational and physical therapy faculty must be encouraged by academic environments that elicit characteristics that foster the levels of productivity identified by their institutions. University leadership must, therefore, take a genuine interest in understanding the factors that enhance occupational and physical therapy faculty's ability to perform and publish research, and must promote an academic climate that fosters the characteristics of faculty and institutional vitality (Hughes, 1996; Levitan & Ray, 1992; Teodorescu, 2000; Walker, 1999; Santo, Engstrom, Reetz, Schweinle & Reed, 2009)

The purpose of this study was to identify the characteristics of faculty and institutional vitality that correlate with high levels of productivity among selected allied health faculty in American public health science research universities. Few studies have examined characteristics of faculty and institutional vitality and how they correlate with high levels of research productivity in allied health faculty.

Identifying and exposing certain characteristics of the individual and environment that predict vitality and subsequent research productivity is needed at this time to sustain the performance of faculty who are alive, energetic, and ready for challenges. This study was limited to two allied health disciplines: occupational therapy and physical therapy at public health science universities within the United States. Although there are a number of other health care disciplines identified as allied health practitioners, these two are the largest by way of faculty numbers and student enrollment, and demonstrate a consistent pattern of faculty staffing within public health science universities (America's Career InfoNet, 2003). The disciplines identified also educate entry-level practitioners at both the master's and doctoral levels.

The participants in this study were asked to identify the presence or absence of vital characteristics within themselves and their university, as well as, their current level of research productivity. Though limited to five hundred faculty members within these specific allied health disciplines, the results and implications may be applicable to faculty within all allied health disciplines, as well as other professional healthcare faculty at public health science universities experiencing demands for productivity in teaching, scholarship, and research.

This study measured the degree of association between the characteristics of faculty and institutional vitality with high levels of productivity among selected occupational and physical therapy faculty using the Survey of Individual, Institutional, and Leadership Factors Affecting Faculty Productivity (SIILFAFP). The SIILFAFP is an instrument developed by Bland, C.J.; Seaquist, E.; Pacala, J.T.; Center, B.; & Finstad, D. (2002) to assess the vitality of faculty at the University of Minnesota Medical School-Twin Cities. The SIILFAFP is based on features that research studies have found to be associated with academic productivity and was assessed for content validity by specialists in faculty development from the University of Michigan Medical School, the Medical College of Wisconsin, Southern California Keck School of Medicine, and Case Western Reserve University School of Medicine. This study also used the Subjective Vitality Scales (Individual Difference and State Level) to assess the subjects' individual and state vitality levels at the time of the survey. The 7-item versions of these scales were used applying a reverse scoring technique to item #2 to replicate the validity of the 6-item scales (Bostic, Rubio, & Hood, 2000; Ryan & Frederick, 1996).

Data collected were used to determine whether: certain individual characteristics of faculty vitality were related to high levels of faculty productivity in occupational and physical therapy faculty; certain institutional characteristics of vitality were related to high levels of faculty productivity in occupational and physical therapy faculty; and whether a combination of individual and institutional characteristics were related to high levels of faculty productivity of occupational and physical therapy faculty.

3. Description of Sample Methodology

The sample methodology used in this research was a survey of occupational therapy and physical therapy faculty at U.S. Public Health Science Universities where departments containing these professions existed at the time of the study. The subjects were full-time occupational therapy and physical therapy faculty who held appropriate professional credentials within their professions, were appropriately aligned with the profession and department, throughout the United States. The subjects were grouped as follows: (a) total fulltime occupational therapy faculty at public health science universities within the U.S. n=310, (b) total full time physical therapy faculty at public health science universities within the U.S. n=392, and (c) total potential (n) subjects was 702 (Joseph, 2004, supportive demographic research, unpublished).

4. Description of the Statistical Analysis

Faculty productivity was the criterion variable. The perceptions of individual faculty and/or institutional vitality were the predictor variables. The outcome measure for the research productivity of occupational and physical therapy faculty, similar to the measures used in prior studies, was categorized into two levels of productivity: participants who published less than three refereed journal publications per year during the period 2002-2003 and participants who published three or more refereed journal publications per year during the period 2002-2003 as first author or co-author (Haggerty, 1990; Lee, Ognibene, & Schwartz, 1991; Levey, Sherman, Gentile, Hough, Dial, & Jolly, 1988; National Research Council Committee on National Needs for Biomedical and Behavioral Scientists, 2000).

The vitality of the faculty and institution was determined by the tabulated interplay among individual, institutional and leadership factors and was separately correlated with scores from subjective vitality scales; the mean score for each participant was determined, as well as the standard deviations.

Statistical analysis was performed using SAS and statistical significance was assessed using an alpha level of 0.10 so as not to eliminate potential correlates of faculty productivity that could warrant further investigation. Descriptive statistics were produced for each individual and institutional/leadership item for the faculty publishing less than 3 publications per year (<3pubs/yr.) and those publishing greater than or equal to 3 publications per year. The mean scores for each individual vitality, institutional, and leadership questions for faculty who published <3pubs/yr. and those who published >=3pubs/yr. were determined along with the standard deviation, minimum, and maximum response.

Univariate logistic regression was used to examine each demographic (age, gender, ethnicity, degree type, and academic rank), individual, institutional or leadership variable individually and then a backward stepwise logistic regression model building strategy was used to derive a final model of individual and institutional/leadership characteristics that predict high levels of research productivity controlling for demographic characteristics.

5. Hypotheses and Results

The hypothesis this study attempted to test were as follow:

Hypothesis 1: There will be a significant relationship between certain institutional/leadership characteristics of vitality and faculty demonstrating high levels of productivity.

Hypothesis 2: There will be a significant relationship between a combined set of characteristics of individual and institutional/leadership vitality and faculty demonstrating high levels of productivity.

Table 1a & b gives the descriptive statistics for faculty producing less than three referred journal publications and those producing three or more referred journal publications per year.

Table 1: Descriptive Statistics

1a. Individual Factors Supporting Research Productivity										
Less than 3 Publications per year (< 3 pubs/yr.)						Greater or Equal to 3 Publications per year (>=3 pubs/yr.)				
	Response Percentage 73.33%					Response Percentage 26.66%				
Variables	N	Mean	Std Dev	Min	Max	N	Mean	Std Dev	Min	Max
Adequate Time	102	3.21	0.677	1.66	5.00	36	3.44	0.714	2.25	5.00
Assigned Mentor	101	0.57	1.345	0	5.00	35	1.08	1.753	0.00	5.00
Unassigned Mentor	95	2.92	1.062	1.00	5.00	31	3.22	1.107	1.00	5.00
Perceived Freedom	101	4.00	0.720	2.00	5.00	36	4.09	0.843	1.50	5.00
Up-to-date in current literature	101	4.04	0.578	2.50	5.00	36	4.17	0.635	2.75	5.00
Committed to success	100	4.34	0.483	3.16	5.00	36	4.38	0.491	3.33	5.00
Internally Driven	100	4.07	0.552	2.66	5.00	36	4.59	2.162	2.66	16.66
Participate in Leadership	100	3.26	0.866	1.00	5.00	36	3.12	1.094	1.00	5.00
Worth & Value	100	3.59	0.878	1.00	5.00	36	4.00	1.910	2.20	14.20
Protected Time	100	2.70	0.943	1.00	5.00	36	3.20	1.221	1.00	5.00
Current in Aspects of Work	100	3.56	0.633	1.66	5.00	36	4.02	0.535	2.60	4.83
Valued by local Colleagues	100	3.67	0.769	2.00	5.00	36	3.59	0.912	1.66	5.00
Opportunities to pursue interest	101	3.53	0.855	1.00	5.00	34	3.66	0.866	2.25	5.00
Satisfaction with career	101	3.39	0.601	1.75	5.00	34	3.22	0.666	1.75	4.25
Understand requirements for advancement	101	3.98	0.969	1.00	5.00	34	4.32	0.976	1.00	5.00
Goals and direction	101	3.65	0.865	1.00	5.00	34	4.02	0.895	1.00	5.00

1b. Institutional and Leadership Factors Supporting Research Productivity											
Variables	N	Mean	Std Dev	Min	Max		N	Mean	Std Dev	Min	Max
Organizational Expectations	101	3.68	0.730	2.00	5.00		34	3.65	0.656	2.00	5.00
High Organizational Standards	102	3.23	0.702	1.66	5.00		34	3.31	0.889	1.75	4.75
Collegial Network (Dept.)	102	3.38	0.732	1.66	5.00		34	3.89	0.612	2.66	5.00
(External)	102	2.38	0.931	1.00	5.00		34	2.70	0.838	2.08	4.00
Collegial communication Departmental	102	2.88	0.739	1.33	5.00		34	3.29	0.591	1.00	4.25
Freedom to manage time	101	3.50	1.145	1.00	5.00		34	3.61	1.181	2.00	5.00
Supportive leadership	99	3.80	0.949	1.00	5.00		32	3.86	0.955	1.00	5.00
Esteemed leadership of Department	99	3.44	0.872	1.00	5.00		34	3.51	1.139	2.00	5.00
Esteemed division leadership	36	3.28	0.829	1.66	4.75		14	3.47	0.987	1.00	5.00
Adequate resources	102	3.63	2.317	1.00	24.00		36	3.44	1.109	1.00	5.00
Adequate support to travel to conferences	101	3.19	1.245	1.00	5.00		36	3.26	1.267	1.00	5.00
Adequate space	102	3.62	0.882	1.00	5.00		36	3.66	1.032	1.00	5.00
Well-equipped space	101	3.60	0.931	1.00	5.00		36	3.72	0.881	1.00	5.00
Adequate departmental faculty	102	3.25	1.087	1.00	5.00		36	3.22	1.113	1.00	5.00
Skills and expertise of departmental faculty	101	3.76	0.906	1.00	5.00		35	3.78	0.813	1.33	5.00
School vision awareness	87	3.21	1.214	1.00	5.00		35	3.37	1.139	1.00	5.00
Department vision awareness	95	3.38	1.248	1.00	5.00		36	3.65	1.055	1.00	5.00
Goals and Link to Institution's	82	3.28	1.103	1.00	5.00		36	3.39	1.223	1.00	5.00
Integration of Personal work & goals with department's	97	3.82	0.935	1.00	5.00		33	3.94	1.040	2.00	5.00
Integration of Department award system with vision & goals	88	2.95	1.092	1.00	5.00		33	3.18	1.157	1.00	5.00
Department priorities matched to stated vision	90	3.25	1.117	1.00	5.00		36	3.39	1.170	1.00	5.00
Vision of Department kept visible by	101	3.33	0.983	1.00	5.00		36	3.56	0.908	2.00	5.00
Personal confidence of Institutional direction	101	3.63	1.056	1.20	11.00		36	3.55	0.697	2.00	5.00
Clear emphasis of Core Mission	101	3.56	1.135	1.00	5.00		36	3.41	1.227	1.00	5.00

Participative leadership in department	102	3.66	1.299	1.00	5.00		36	3.88	0.949	1.00	5.00
Participative leadership in institution	102	3.60	1.259	1.00	5.00		36	3.80	1.037	1.00	5.00
Expected faculty contribution to important decisions in	101	3.64	0.995	1.00	5.00		36	3.55	0.882	1.50	5.00
Constructive feedback by organization	102	3.24	0.810	1.00	5.00		36	3.25	0.809	1.20	5.6
Clear expected ethical standards and practice	100	3.92	0.860	1.00	5.00		36	3.58	0.924	1.50	5.00
Departmental mechanisms for non-monetary recognition	101	3.20	1.198	1.00	5.00		36	3.29	1.094	1.00	5.00
Departmental mechanisms for monetary recognition	100	2.83	1.114	1.00	5.00		36	2.85	1.091	1.00	5.00
Compensation is fair	91	3.51	1.086	1.00	5.00		36	3.88	1.007	1.00	5.00
Good departmental communication system	99	3.93	1.00	1.00	5.00		36	3.88	1.089	1.00	5.00
Effective recruitment strategies	92	3.18	1.020	1.00	5.00		35	3.12	1.061	1.00	5.00

Table 2a & b displays the simple logistic regression results of individual (2a) and institutional/leadership (2b) vitality variables on faculty productivity.

Table 2: Univariate Logistic Regression on Productivity

Variables	OR	95%CI	Chi-Sq	P-Value
2a Individual Factors				
Age	1.05	0.99 – 1.11	2.8442	0.0917
Sex: Male vs. Female	0.72	0.28 – 1.83	0.4894	0.4842
Education: PhD vs. <MS	3.37	0.39 – 29.23	5.9584	0.0146
Education: MA/MS vs <MS	0.46	0.04 – 5.20	2.8748	0.0900
Academic Rank: Research vs Clinical	2.47	0.53 – 11.52	1.3161	0.2513
Individual Vitality	1.14	0.78 – 1.67	0.4321	0.5110
State Vitality	1.23	0.89 – 1.71	1.5221	0.2173
Adequate Time for Research	1.65	0.94 – 2.91	3.0369	0.0814
Assigned/Unassigned mentor for Research	1.28	0.91 – 1.81	2.0032	0.1570
Perceived freedom to conduct chosen research	1.19	0.71 – 2.01	0.4453	0.5046
Up-to-date current literature in research	1.47	0.76- 2.87	1.2964	0.2549
Committed to contributing to success of research	1.19	0.54 – 2.64	0.1866	0.6657
Internally driven to conduct research	1.70	0.87 – 3.32	2.4207	0.1197
Participates in Leadership	0.85	0.56 – 1.28	0.6209	0.4307
Worth & Value	1.20	0.76 – 1.91	0.6196	0.4312
Protected time for productivity in Research	1.62	1.10 – 2.39	5.9500	0.0147
Current in aspects of research	3.80	1.18 – 7.98	12.4587	0.0004
Valued by local colleagues for work in Research	0.87	0.55 – 1.39	0.3163	0.5739
Opportunities to pursue interest in Research	1.21	0.76 – 1.92	0.6357	0.4253

Satisfaction with career in	0.65	0.35 – 1.21	1.8558	0.1731
Understand requirements for advancement	1.53	0.95 – 2.46	3.0313	0.0817
Goals and direction	1.70	1.03 – 2.78	4.3553	0.0369
2b. Institutional and Leadership Factors				
Organizational Expectations for research	0.94	0.54 – 1.63	0.0495	0.8239
High Standards for research productivity	1.14	0.68 – 1.91	0.2515	0.6160
Collegial Network / Communication In/Outside	2.31	1.28 – 4.17	7.7271	0.0054
Freedom to manage time	1.09	0.77 – 1.54	0.2451	0.6206
Supportive leadership for Research	1.08	0.70 – 1.66	0.1119	0.7380
Esteemed leadership of Department for research	1.09	0.72 – 1.66	0.1579	0.6911
Esteemed division leadership for research	1.29	0.62 – 2.68	0.4704	0.4928
Resources to Accomplish Research Mission	1.08	0.63 – 1.84	0.0760	0.7827
Clear Vision	1.37	0.86 – 2.18	1.7075	0.1913
Personal confidence of Institutional direction	0.98	0.59 – 1.65	0.0038	0.9507
Emphasis of Core Mission	0.90	0.65 – 1.24	0.4340	0.5100
Participative leadership	1.12	0.86 – 1.64	0.3011	0.5832
Constructive feedback by Organization	0.87	0.54 – 1.40	0.3486	0.5549
Awards & Recognition	1.28	0.79 – 2.09	1.0133	0.3141

Hypothesis 1 Results:

Simple logistic regression results are given for individual (Table 2a) and institutional/leadership (Table 2b) vitality variables on faculty productivity. Increasing age and having a PhD versus less than an MS degree were significantly associated with high faculty productivity. Individual factors including having adequate time for research (OR=1.65), protected time for productivity in research (OR=1.62), being current in aspects of research (OR=3.80), understanding requirements for advancement (OR=1.53), and goals and direction (OR=1.70) were significantly associated with high faculty productivity. For each of these individual factors, those with higher perceptions of each factor were more likely to have higher productivity. Institutional and leadership factors (Table 2b) that were associated with high faculty productivity included the presence of a collegial network (OR=2.31) indicating that those who had higher perceptions of a collegial network were more likely to have higher productivity.

Table 2: Univariate Logistic Regression on Productivity

Variables	OR	95%CI	Chi-Sq	P-Value
2a Individual Factors				
Age	1.05	0.99 – 1.11	2.8442	0.0917
Sex: Male vs. Female	0.72	0.28 – 1.83	0.4894	0.4842
Education: PhD vs. <MS	3.37	0.39 – 29.23	5.9584	0.0146
Education: MA/MS vs <MS	0.46	0.04 – 5.20	2.8748	0.0900
Academic Rank: Research vs Clinical	2.47	0.53 – 11.52	1.3161	0.2513
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State Vitality	1.23	0.89 – 1.71	1.5221	0.2173
Adequate Time for Research	1.65	0.94 – 2.91	3.0369	0.0814
Assigned/Unassigned mentor for Research	1.28	0.91 – 1.81	2.0032	0.1570
Perceived freedom to conduct chosen research	1.19	0.71 – 2.01	0.4453	0.5046
Up-to-date current literature in research	1.47	0.76- 2.87	1.2964	0.2549
Committed to contributing to success of research	1.19	0.54 – 2.64	0.1866	0.6657
Internally driven to conduct research	1.70	0.87 – 3.32	2.4207	0.1197
Participates in Leadership	0.85	0.56 – 1.28	0.6209	0.4307
Worth & Value	1.20	0.76 – 1.91	0.6196	0.4312
Protected time for productivity in Research	1.62	1.10 – 2.39	5.9500	0.0147
Current in aspects of research	3.80	1.18 – 7.98	12.4587	0.0004
Valued by local colleagues for work in Research	0.87	0.55 – 1.39	0.3163	0.5739
Opportunities to pursue interest in Research	1.21	0.76 – 1.92	0.6357	0.4253
Satisfaction with career in	0.65	0.35 – 1.21	1.8558	0.1731

Understand requirements for advancement	1.53	0.95 – 2.46	3.0313	0.0817
Goals and direction	1.70	1.03 – 2.78	4.3553	0.0369
2b. Institutional and Leadership Factors				
Organizational Expectations for research	0.94	0.54 – 1.63	0.0495	0.8239
High Standards for research productivity	1.14	0.68 – 1.91	0.2515	0.6160
Collegial Network / Communication In/Outside	2.31	1.28 – 4.17	7.7271	0.0054
Freedom to manage time	1.09	0.77 – 1.54	0.2451	0.6206
Supportive leadership for Research	1.08	0.70 – 1.66	0.1119	0.7380
Esteemed leadership of Department for research	1.09	0.72 – 1.66	0.1579	0.6911
Esteemed division leadership for research	1.29	0.62 – 2.68	0.4704	0.4928
Resources to Accomplish Research Mission	1.08	0.63 – 1.84	0.0760	0.7827
Clear Vision	1.37	0.86 – 2.18	1.7075	0.1913
Personal confidence of Institutional direction	0.98	0.59 – 1.65	0.0038	0.9507
Emphasis of Core Mission	0.90	0.65 – 1.24	0.4340	0.5100
Participative leadership	1.12	0.86 – 1.64	0.3011	0.5832
Constructive feedback by Organization	0.87	0.54 – 1.40	0.3486	0.5549
Awards & Recognition	1.28	0.79 – 2.09	1.0133	0.3141

Hypothesis 2 Results:

Table 3, give the results of interim multivariable models on faculty productivity for individual factors (Table 3a) and institutional or leadership factors (Table 3b) controlling for demographic characteristics. Table 4 gives the final multivariable model combining demographic, individual and institutional or leadership factors associated with high faculty productivity. For the individual factor multivariable model (Table 3a), gender (OR=0.16), having a PhD versus less than an MS degree (OR=6.27), being up to date on currently literature (OR=0.40), participating in leadership (OR=0.67), having worth and value (OR=0.92), having protected time for productivity (OR=1.90), and having goals and direction (OR=2.06) were significantly associated with high faculty productivity. For the institutional or leadership multivariable model (Table 3b), age (OR=1.14), having a PhD versus less than an MS degree (OR=3.25), being in a research position (OR=11.23), having a collegial network (OR=5.58), having supportive leadership (OR=2.89), having institutional vision awareness (OR=1.96), and having clear ethical standards and practice (OR=0.13) were associated with high faculty productivity.

Table 3: Full Multivariable Logistic Regression of Individual and Institutional/Leadership Characteristics

VARIABLES	ODDS RATIO	95% CI	Chi-Sq	P-VALUE
3a. Individual Factors				
Age	1.083	0.97 – 1.15	1.3575	0.2440
Sex: Male vs. Female	0.16	0.03 – 1.05	3.6293	0.0568
Education: PhD vs. <MS	6.27	0.38 – 72.50	4.3184	0.0377
Education: MA/MS vs <MS	0.76	0.03 – 17.76	0.9063	0.3411
Academic Rank: Research vs Clinical	3.67	0.42 – 31.80	1.3939	0.2377
Individual Vitality	0.51	0.18 – 1.44	1.6129	0.2041
State Vitality	1.77	0.77 – 4.06	1.8339	0.1757
Adequate Time for Research	3.27	0.96 – 11.20	2.0976	0.1475
Assigned/Unassigned mentor for Research	1.02	0.61 – 1.70	2.1327	0.1442
Perceived freedom to conduct chosen research	0.54	0.23 – 1.25	0.0112	0.9159
Up-to-date current literature in research	0.40	0.12 – 1.37	2.8625	0.0907
Committed to contributing to success of research	1.08	0.25 – 4.61	1.2532	0.2629
Internally driven to conduct research	3.00	0.84 – 10.74	0.0283	0.8664
Participates in Leadership	0.67	0.33 – 1.35	4.0983	0.0429
Worth & Value	0.92	0.37 – 2.33	3.0378	0.0813
Protected time for productivity in Research	1.90	1.02 – 3.55	4.3613	0.0368
Current in aspects of research	3.05	0.87 – 10.70	1.8575	0.1729
Valued by local colleagues for work in Research	0.40	0.17 – 0.95	1.3114	0.2521

Opportunities to pursue interest in Research	0.51	0.20 – 1.34	0.8570	0.3546
Satisfaction with career in	0.55	0.20 – 1.52	2.2005	0.1380
Understand requirements for advancement	1.40	0.69 – 2.85	1.3575	0.2440
Goals and direction	2.06	0.79 – 5.32	3.6293	0.0568
3b. Institutional/Leadership Factors				
Age	1.14	1.02 – 1.27	4.9398	0.0262
Sex: Male vs. Female	0.39	0.08 – 1.84	1.4174	0.2338
Education: PhD vs. <MS	3.25	0.25 – 41.89	4.7135	0.0299
Education: MA/MS vs <MS	0.24	0.10 – 6.05	2.6858	0.1012
Academic Rank: Research vs Clinical	11.23	0.74 – 170.20	3.0407	0.0812
Individual Vitality	0.62	0.20 – 1.92	0.7017	0.4022
State Vitality	1.42	0.55 – 3.64	0.5231	0.4695
Organizational Expectation	1.25	0.37 – 4.17	0.1301	0.7183
High Organizational Standards	1.03	0.26 – 4.11	0.0012	0.9721
Collegial Network	5.58	1.32 – 23.63	5.4559	0.0195
Freedom to Manage Time	0.98	0.52 – 1.86	0.0028	0.9575
Supportive Leadership	2.89	0.83 – 10.07	2.7786	0.0955
Esteemed Leadership Department	1.40	0.46 – 4.32	0.3453	0.5568
Institutional Mission Awareness	0.76	0.23 – 2.51	0.1989	0.6556
Institutional Vision Awareness	1.96	1/16 – 17.64	4.1577	0.0414
Confidence in Organizational future direction	0.53	0.12 – 2.38	0.6895	0.4063
Clear emphasis of Core Mission	0.37	0.10 – 1.36	2.2321	0.1352
Participative Leadership	1.67	0.62 – 4.52	1.0193	0.3127
Constructive feedback by Organization	0.59	0.20 – 1.71	0.9588	0.3275
Clear ethical standards and practice	0.13	0.04 – 0.51	8.707	0.0032
Awards & Recognition	0.85	0.25 – 2.84	0.0722	0.7882

The significant demographic, individual and institutional/leadership variables that were statistically significant in univariable models or in the interim multivariable models were entered into a more comprehensive multivariable model and the final model is shown in Table 4.

Table 4: Final Logistic Regression Model of Individual and Institutional/Leadership Factors Associated with of Research Productivity ≥ 3 Pubs/Yr

VARIABLES	ODDS RATIO	95% CI	Chi-Sq	P-VALUE
Age	1.14	1.03 – 1.25	6.8336	0.0089
Gender: Male vs Female	0.12	0.02 – 0.72	5.4136	0.0200
Education: PhD vs <MS	5.16	0.34 – 79.17	6.4482	0.0111
Education: MS vs <MS	0.29	0.01 – 6.56	3.4291	0.0641
Academic Rank: Research vs Clinical	33.04	1.84 – 595.12	5.6233	0.0177
Adequate Time for Research	4.99	1.42 – 17.59	6.2666	0.0123
Protected time for productivity in Research	1.85	0.97 – 3.52	3.4818	0.0620
Valued by local colleagues for work in Research	0.23	0.08 – 0.66	7.4233	0.0064
Opportunities to pursue interest in Research	0.45	0.17 – 1.16	2.7394	0.0979
Collegial network	4.28	1.46 – 12.58	6.9999	0.0082
Institutional Vision Awareness	4.39	1.62 – 11.89	8.4515	0.0036
Clear ethical standards and practice	0.21	0.09 – 0.49	12.5674	0.0004

The final multivariable model contained age, gender, education, academic rank, having adequate time for research, having protected time for research, being valued by colleagues, having the opportunity to pursue interests in research, collegial network, institutional vision awareness and clear ethical standards and practice. Increasing age (OR=1.14), having a PhD versus <MS (OR=5.16), being in a research position (OR=33.04), having higher perception of adequate time for research (OR=4.99), having higher perception of protected time for productivity in research (OR=1.85), having a higher perception of a collegial network (OR=4.28), and having a higher perception of institutional vision awareness (OR=4.39) were associated with high faculty productivity.

Males (OR=0.12), those with an MS versus <MS degree (OR=0.29), having higher perception of value by colleagues in research (OR=0.23), having higher perception of opportunities to pursue research (OR=0.45), and having high perceptions of clear ethical standards and practice (OR=0.21) were less likely to have high faculty productivity.

7. Conclusion

This study sought to identify those characteristics of vitality that when fostered in the individual and institution, engender research productivity. The conclusions of this study suggest that there are both individual and institutional/leadership characteristics of vitality that correlate with and are predictive of high levels of research productivity in occupational and physical therapy faculty. These characteristics remain predictive of high levels of occupational and physical therapy faculty productivity when considered either separately or as a combined model. This model of individual and institutional/leadership vitality characteristics is uniquely significant and predictive of high levels of productivity in occupational and physical therapy as it has not been noted in the literature prior to this study. Although the individual and institutional/leadership vitality characteristics are both significant predictors within this model, the institutional/leadership vitality characteristics are much stronger in their predictive nature. The findings and conclusions from this study have resulted in several recommendations.

8. Implications

The results of this study adds to the literature by identifying the specific individual and institutional/leadership vitality characteristics that predict and promote high levels of research productivity in occupational and physical therapy faculty. Leaders in higher education can use the results of this study to foster educational climates that will engender the research productivity and well-being of occupational and physical therapy faculty.

This study substantiates that generalizations made about the ability of any one model of vitality characteristics' ability to engender productivity in all faculty is misleading, as the model that correlates with high levels of productivity in occupational and physical therapy faculty produced in this study is unique and has not been identified in current literature. This study also provides higher education institution's administrators the means to affect the level of research productivity among occupational and physical therapy faculty and predict faculty research productivity potential.

This is a critical time for higher education funding. Both individual states and the federal government are no longer able to commit adequate funds to public higher education. Public health science research institutions are, therefore, competitors on both a national and international stage for extramural funding from supporters of research. Occupational and physical therapy faculty have been poor competitors for such funds but have produced quality teaching and scholarly outcomes under the burdening demand for higher levels of research productivity. This study has identified the individual and institutional/leadership vitality characteristics critical to public health science research institutions if occupational and physical therapy faculty are to realize their full potential in enhancing the health of the university through research funding. The absence of such individual and institutional/leadership characteristics has resulted in the majority of occupational and physical therapy faculty reflected in this study being characterized as minimally productive in the area or research. This situation could be changed by higher education administrators who foster institutional organizations where allied health faculty will have adequate time to conduct research, teaching, patient care, and administrative task; protected time to address research and teaching activities; esteem and value among colleagues for their work in research, teaching and patient care; and where departmental chairs and deans are empowered with the resources needed to support faculty collegial networks for education and research; communicate and integrate the institutional and departmental vision for guiding personal work; and communicate clear administrative expectations and standards for work.

References

- Levitan AS, Ray R. (1992). Personal and institutional characteristics affecting research productivity of academic accountants. *Journal of Education for Business*, 67(6), 335-341.
- Dundar H, Lewis DR. (1998). Determinants of research productivity in higher education. *Research in Higher Education*, 39(6), 607-631.
- Gumport PJ. (1999). Graduate education and research: Interdependence and strain. In P.G.

- Albach, R.O. Berdahl, & P.J. Gumpert (Eds.), *American higher education in the twenty-first century: Social, political, and economic challenges*. Baltimore: Johns Hopkins University Press.
- Webber KL.(2011). Factors related to faculty research productivity and implications for academicplanners. *Planning for Higher Education*, 39(4), 32-43.
- Baker DR, Wilson MVK. (1992). An evaluation of the scholarly productivity of doctoral graduates. *Journal of Social Work Education*, 28(2), 204-213.
- Barrow LH. (2002). Longitudinal study of career productivity of the most prolific science education researchers. *Educational Research Quarterly*, 25(4), 20-27.
- Bosseau DL, Martin SK, Hirshon A. (1999). The productivity game. *Journal of Academic Librarianship*, 25(1), 44-45.
- Creamer EG.(1998) *Assessing faculty publication productivity: Issues of equity*. ERIC Clearinghouse Washington DC. BBB32577.
- Hasselback JR, Reinstein A. (1995).A proposal for measuring scholarly productivity of accounting faculty. *Issues in Accounting Education*, 10(2), 269-302.
- Hughes CA. (1996). *Scholarly productivity: A structural equation modeling analysis with special attention to the role of the campus information environment*. [dissertation] Ann Arbor Michigan (MI): University of Michigan.
- Leslie PL, Harvey LK, Leslie GJ. (1998). Chief academic officers' perceptions of the relationship between faculty research and undergraduate teaching. *Sociological Spectrum*, 18(2), 185-200.
- Shanklin C. (2001). *A Faculty Perspective: Intrinsic Research Rewards that Make a Successful Faculty Member Tick*. [Online] Available: <http://dept.ku.edu/~merrill/PDFfiles/2001whitepaper.pdf>(April 10, 2018)
- Helsi VL, Lee JM. (2011). Productivity: Why do some of our colleagues publish more than others. *Political Science and Politics*, 44(2), 393-408.
- Dankoski ME, Palmer MM, Laird TFN, Ribera AK, Bogdewic SP. (2012).An expanded model of faculty vitality in academic medicine. *Advances in Health Sciences Education*, 17(5), 633-649.
- Karukstis KK. (2003). Sustaining research productivity throughout an academic career: Recommendations for an integrated and comprehensive approach [Online]. Available: <http://cms-content.bates.edu/prebuilt/chem-vitalfaculty.pdf> (April 10, 2018)
- Kauffmann P, Unal R, Fernandez A. Keating C. (2000). A model for allocating resources to research programs by evaluating technical importance and research productivity. *Engineering Management Journal*,12(1), 5-8.
- Hardre P. (2014). Raising the bar on faculty productivity: Realigning performance standards to enhance quality trajectories, *Journal of Faculty Development*, 28(1), 25-32.
- Fox KJ, Milbourn R. (1999). What determines research output of academic economists. *Economic Record*, 75(3), 256-267.
- Clark SM, Boyer CM, (1985).Corcoran M. Faculty and institutional vitality in higher education. In Shirley Clark M, Darrell L (Eds).*Faculty vitality and institutional productivity: Critical perspectives for higher education*. New York: Teachers College Press.
- Clark SM, Corcoran M. (1985).Individual and organizational contributions to faculty vitality: An institutional case study. In Shirley M. Clark and Darrell Lewis (Eds.), *Faculty vitality and institutional productivity: Critical perspectives for higher education*. New York: Teachers College Press.
- Bland CJ, Collins WA, Goldstein RJ, Swan CE. (1996). Faculty vitality in the changing research university. [Online] Available: <http://www.umn.edu/usenate/fcc/vitality.html>. (July 10, 2011)
- Quimbo MAT, Sulabo EC. (2014). Research productivity and its policy implications in higher education institutions. *Studies in Higher Education*, 39(10), 1955-71.
- Walker CJ, Hale NM.(1999). Faculty vitality and well-being. In R. Menges, *Professors in new jobs: Mastering academic work*. San Francisco, CA.:Jossey-Bass.
- Harris LM, Adamson BJ, Hunt AE. (1998). Assessing quality in higher education: Criteria for evaluating programs for allied health professional. *Assessment & Evaluation in Higher Education*,23(3), 273-81.
- Stephenson KS, Peloquin SM, Richmond SA, Hinman MR, Christiansen CH. (2002). Changing educational paradigms to prepare allied health professionals for the 21st century [Abstract]. *Education Health*, 15(1), 37-49
- Black GG. (1996). Examining higher education's role in health care. *Higher Education*, 13(20). Christiansen CH. (2002). Changing educational paradigms to prepare allied health professionals for the 21st century. *Education for Health*, 15(1), 37-50.
- Hitchcock MA, Stritter FT. (1992). Faculty development in the health professions: Conclusions and recommendations. *Medical Teacher*, 14(4), 295-309.

- Santo SA, Engstrom ME, Reetz L, Schweinle WE, Reed L. (2009). Faculty productivity barriers and supports at a school of education. *Innovative Higher Education*, 34 (2): 117-29.
- America's Career InfoNet. (2003). Fastest growing occupations: Requiring a bachelor's degree or higher. [Online] Available: <https://www.thebalance.com/fastest-growing-jobs-for-college-graduates-525684> (April 10, 2018)
- Bland CJ, Seaquist E, Pacala JT, Center B, Finstad D. (2002). One school's strategy to assess and improve the vitality of its faculty. *Academic Medicine*, 77(5), 368-376.
- Bostic TJ, Rubio DM, Hood M. (2000). A validation of the subjective vitality scale using structural equation modeling. *Social Indicators Research*, 52(3), 313-324.
- Ryan RM, Frederick C. (1996). On energy, personality and health: Exploring the dynamics of subjective vitality. Unpublished manuscript.
- Haggerty RJ. (1990). The academic generalist: An endangered species revived. *Pediatrics*, 86(3), 413-420.
- Lee TH, Ognibene FP, Schwartz JS. (1991). Correlates of external research support among respondents to the 1990 American Federation for Clinical Research survey. *Clinical Residents*, 39, 135-144.
- Levey GS, Sherman CR, Gentile NO, Hough LJ, Dial TH, Jolly P. (1998). Postdoctoral research training of full-time faculty in academic departments of medicine. *Annual of Internal Medicine*, 109 (41), 4-8.
- National Research Council Committee on National Needs for Biomedical and Behavioral Scientists (2000). Addressing the nation's changing needs for biomedical and behavioral scientists. Washington, DC: National Academy Press.