

Certification and Career Success: A LEADS Project

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This study examines the relationship between certification examination test results and Emergency Medical Technician (EMT) career success. The sample was drawn from the Longitudinal Emergency Medical Technician Attributes and Demographics Study (LEADS). LEADS participants were matched with National Registry of Emergency Medical Technician (NREMT) certification testing data: (1) exam scores for each attempt until passing the exam, and (2) total number of attempts to pass the exam. Career success was measured both objectively and subjectively.

Keywords: Transfer of Training, Career Success, Health Care

The first ambulance services appeared in the military, and these services spread into the civilian sector. The Highway Safety Act of 1966 required states to develop emergency services. The National Registry of EMTs was created in 1970 to “standardize EMT education, examinations, and certification nationally” (Franks, Kocher, & Chapman, 2004, p. 1). Today EMTs treat and transport between one quarter and one third of the nearly 117 million annual emergency hospital visits (American College of Emergency Physicians, 2005), representing a critical part of the emergency services system. Furthermore, both training and certification are important gatekeepers for nationally certified EMTs.

Theoretical Framework

Certification is a process that calls for people to complete prescribed courses of study *and* pass one or more qualifying examinations. Such certification indicates the person “as having met special qualifications (as of a governmental agency or professional board) within a field” (Merriam-Webster, n.d.) Formal certification programs, such as that specified for EMTs, are organized around domains or performance/behavioral standards about which experts agree; these are then marketed as a way to “attest” that successful completers are better qualified for specific tasks and responsibilities than those trained solely on the job (Hale, 2000).

Certification serves several purposes. First, it suggests the kinds of knowledge and skills that are needed for a particular profession; these, then, suggest what might be needed for development purposes (Russ-Eft, Bober, de la Teja, Foxon, & Koszalka, in press). Second, certification acts as a gate or screen. In such cases, people must be certified before they are allowed to perform a task or function or advance to a higher position (e.g., Greiner & Smith, 2006). Third, it can provide personal recognition—to recognize people who have demonstrated competence through on-the-job performance or some sort of testing. Finally, it can help managers, supervisors, or administrators recognize different levels of accomplishment *or* unique capabilities; and it provides marketable skills to job-seekers (Al-Rawi, Lansari, & Bouslama, 2005). Thus, certification can be used to develop, qualify, recognize, or distinguish people.

Given the importance attached to certification, there appear to be few studies of the effects of certification in terms of job performance or career success. On the positive side, Gad (2002), in a survey of toxicologists, found that certification aids the candidate in the job market, as well as in their own career development and success. Furthermore, this research showed that certification led to higher salary levels. Silber, Kennedy, Even-Shoshan, Chen, Mosher, Showan, and Longnecker (2002) found that lack of anesthesiology board certification was associated with worse surgical outcomes for the patient. In contrast, Cegielski, Rebman, and Reithel (2003) examined end-user

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perceptions of local area networks as managed by certified versus non-certified network administrators. These researchers found no significant differences in perceived usefulness or perceived ease of use. Such results do not support an assumption that certification leads to better job performance. Furthermore, these researchers suggest that certification should not be used in determining compensation.

Studies of teachers and certification have also shown mixed results. The National Board for Professional Teaching Standards (2007) reported that National Board Certified teachers performed better than non-certified teachers in “knowledge of subject matter and ability to create challenging and engaging lessons” (p. 3). Furthermore, this Board stated that the certification enhanced the quality of professional development and led to increased teacher retention. In contrast, Dybdahl, Shaw, and Edwards (1997) showed a lack of correlation between basic competency test scores and effectiveness in the classroom. Furthermore, they indicated that state-mandated certification test scores provided only weak predictions of actual classroom performance. Colbert and Wolff (1992) theorized that support and assistance through teacher education and certification should improve teacher retention. But, a recent study by Greiner and Smith (2006) found no relationship between certification and retention.

Research Problem

The National Registry of Emergency Medical Technicians (NREMT) and the U.S. Department of Transportation, National Highway Traffic Safety Administration (USDOT/NHTSA) remain concerned about EMT work-life issues and the quality of care provided by EMTs nationwide. The NHTSA has been designated as the agency within the federal government to work with the State EMS lead agencies to create national standardized education programs for EMTs. The NREMT, in turn, has been designated to develop national certification tests for EMTs. As a result, these two agencies have collaborated on issues related to EMT education, training, certification, and working conditions (e.g., Brown et al., 1999).

The present study focused on issues related to the career success outcomes experienced by EMTs based on the NREMT certification examination results. It represents an extension of previous work by Russ-Eft, Dickison, and Levine (2006) that examined the issue of EMT career success and by Russ-Eft, Dickison, and Levine (2007) on the effects of instructor quality on EMT certification test results. Furthermore, it extends the previous-described research by examining the effects of NREMT certification on job performance and career success. The major research question in the present study focused on whether there is a relationship between NREMT certification exam results and later career success – that is, do higher NREMT certification exam scores and few attempts to pass the exam result in objective and subjective career success?

Methods

This Longitudinal EMT Attributes and Demographics Study (LEADS) is a joint venture between NREMT and NHTSA. The project is lead by researchers with experience as State EMS Directors, State EMS Training Coordinators, EMS System Managers, Emergency Physicians, EMS Educators, and survey researchers. It also includes NREMT and NHTSA staff. More about the LEADS effort can be found in Brown, Dickison, Misselbeck, and Levine (2002). The current study related to certification test results and career success represents a secondary analysis of this larger study.

Original Study - Sample

The sample for the present study comes from the LEADS database available through NREMT. The 1999 LEADS sample was gathered from the over 110,000 EMTs who were nationally registered in the U.S., while the 2000 sample came from the nearly 159,000 EMTs who were nationally registered at the time. The sampling frame for this study involves two levels: EMT-Basics and EMT-Paramedics, reflecting an individual's EMT registration level, as of 15 September 1999.

Separate sampling frames were developed for the two levels, and these frames were stratified by duration of continuous registration at each level (“new”, referring to those registered at the level for less than one year versus “old”, referring to those registered for one year or longer) and by race (“white”, referring to those who self-identified as white, other, or did not self-identify versus “minority”, referring to those who self-identified as Asian, Black, Hispanic, or Native American). Sample sizes were intended to maximize the efficiency of the sample for comparing different types of EMTs as well as for producing estimates of population parameters.

Details on the sizes of the strata and return rates for EMT-Paramedics can be found in Brown, et al (2002) and in Russ-Eft, Dickison, and Levine (2005).

Original Study - Instrument Development

The survey instrument was designed to consist of two sections. The first section, the “core,” consists of 78 items that were readministered in regular annual surveys. The second section, the “snapshot,” has a different focus in each mailing. Copies of the survey are available on-line (http://www.nremt.org/about/lead_survey.asp).

Draft survey instruments were reviewed and modified, leading to the production of a pilot test instrument. This instrument was pilot tested on 42 EMT-Basics and EMT-Paramedics at 8 different locations throughout the United States. After respondents completed the instrument, a debriefing protocol was administered. The protocol elicited extensive feedback about specific survey items and general feedback about the instrument and the proposed cooperation elicitation procedures. As a result of the pilot test, additional response categories were developed for several items, several items were revised, and several items were deleted.

Original Study - Data Collection Procedures

Surveys were mailed to randomly selected EMT-Basics and EMT-Paramedics (with an oversampling of Minority EMTs). A postage-paid return envelope and a letter outlining the project goals and providing assurance of confidentiality was sent to each sample member. Returned surveys were optically scanned and used to create an analytic data file. Similar procedures were used for all LEADS surveys.

A non-respondent survey was undertaken to ensure that the responses from the respondents represented the larger population. An abbreviated version of the survey was mailed to 500 EMT-Basics and 500 EMT-Paramedics survey non-respondents in March 2000. Surveys were received from 154 EMT-Basics (30.8 percent) and 207 EMT-Paramedics (41.4 percent), optically scanned, and used to create analytic data files.

The responses of non-respondents were quite similar to the respondents; however, differences did emerge in the response patterns of three types of EMT-Paramedics respondents and non-respondents (minority, new; minority old; white, new). These three types of EMT-Paramedics comprised less than a quarter (22.5 percent) of the total number of EMT-Paramedics. Differences appeared in responses to an item about EMS income in the past 12 months. Specifically, non-respondents reported significantly higher incomes than respondents. When this earning item was excluded, non-respondents did not differ from respondents on demographic, attitudinal, or education items (Brown, Dickison, Misselbeck, & Levine, 2002). The impact of this bias on our results cannot be known and may adversely impact the generalizability.

Human Protection Procedures

The original data collection and analysis plans were reviewed and approved by the Institutional Review Board of the American Institutes for Research. The plan for the present secondary data analyses was reviewed and approved by the Institutional Review Board of Oregon State University.

Analysis Items and Categorizations for Secondary Analyses

The variables examined in the current study were limited by the items available from previously described data collection efforts. These are detailed below.

Race/ethnicity. We determined race (White vs. Minority) based on responses to a LEADS item about race/ethnicity rather than relying on their sample stratification race/ethnicity. If a respondent failed to answer this survey item, we used their sampling strata race/ethnicity information. For 1999, 4.9 percent were missing self-reported race. The agreement between the sample stratification and the self-identified race/ethnicity for those who reported race was 94.3%. In 2000, only 0.8 percent of the paramedic respondents failed to answer the LEADS race/ethnicity item. Of the remaining paramedic respondents, there was 93.6 percent agreement between their reported race/ethnicity and their sampling strata.

NREMT certification examination test scores. The NREMT written examination consists of items drawn from the National Registry’s item bank following a test plan. This test plan is based upon the results of the EMT-Basic and EMT-Paramedic Practice Analysis conducted in 1995 and 1999. This Practice Analysis involved surveys of hundreds of EMTs at the respective levels who were asked about: (1) the frequency they performed and (2) the importance of various tasks, including assessment and patient management, operational, and intervention tasks.

Test items are prepared by Item Writing Committees consisting of 10 to 20 EMS experts. These items are then pilot tested throughout the United States. Following the pilot test, a Standard Setting and Final Review Committee, comprised of providers in pre-hospital care and varying in credentials from EMT-Basics, Intermediates, Paramedics, Nurse-Paramedics, State Directors, State Training Coordinators, and Physicians, determines the pass/fail score using a modified Nedelsky formula (Nedelsky, 1954). Using the results from this Committee, examinations are developed following the test plan and have a pass-fail score of 70% to pass. Also, the EMT-Paramedic exam includes minimum scores for each part.

It should also be noted the EMT written examination is a criterion-based rather than a norm-based exam. “The purpose of the NREMT exam is not to identify the best, but to identify who is ‘competent’” (National Registry of Emergency Medical Technicians, n.d., ¶ 17). Thus, candidates must simply “demonstrate they have enough knowledge so that they can safely and effectively practice” (¶ 12). Furthermore, because this is a criterion-based

exam, test scores tend to bunch around the cut-off and to show a narrow range. Another characteristic of criterion-based exams is that they do not rank individuals, as do norm-based exams, rather they identify individuals who have met the criteria.

In the present study two separate measures were used. The first measure involved the actual test score from the first attempt by each candidate. For EMT-Basics, the exam contains 150 items, while for EMT-Paramedics, it contains 180 items. The second measure consisted of the number of attempts to pass the test. Candidates are allowed to take the test six times before they have to undergo certification training again. In addition, exam test data from 1996 through 1999 was used because of changes that occurred in the exam.

Human capital variables. Becker (1964) suggested that the number of hours worked, job tenure, work experience, and education level as relevant human capital variables leading to career success. The variable, hours worked as an EMT (for this sample, as an EMT-Paramedic), was transformed from a categorical variable to a continuous variable by using the midpoint of the ranges. Years worked as an EMT was used as the variable for job tenure and work experience; also, the variable was transformed from a categorical variable into a continuous variable by using the midpoint of the ranges. Education was classified into three levels: No degree, AA/AS, and BA/BS or higher.

Objective career success. The previous literature indicates that objective career success is defined as promotions and salary. Since all of the participants remain at the EMT-Paramedic level, which is the highest level for an EMT, the variable of promotions could not be used. As a result, objective career success could only be measured using the EMT salary reported for the past year. As with other variables, this was transformed to a continuous variable.

Subjective career success. Subjective career success was measured using: Satisfaction with current EMS assignment, satisfaction with EMS profession, and likelihood of leaving EMS in the next year. The satisfaction items used the same scale as described above. The variable *likelihood of leaving EMS* was rated on a four-point scale of definitely stay, probably stay, probably leave, definitely leave, and I have already left. The latter two responses were given the same value; and the responses were reverse scored. A Cronbach alpha of .70 for the 1999 data and .62 for the 2000 data.

Results

The regression analysis, using the dependent variable of EMT earnings as a measure of objective career success for EMT-Paramedics in the 1999 survey, is presented in Table 1. It showed that having more experience, working for a fire-based organization, and being a Minority resulted in a higher level of earnings for EMT-Paramedics. Similar results appeared when using number of test attempts. Thus, neither certification test score nor number of test attempts was related to earnings for EMT-Paramedics.

Table 1 Regression Analysis for Dependent Variable of Earnings by EMT-Paramedics (1999)

Parameter	Estimate	Std Error	t Value	Pr > t
Intercept	17335.9784	9043.88204	1.92	0.0559
experience	617.5159	187.83361	3.29	0.0011**
allemployer Fire	9202.6071	2156.46874	4.27	<.0001**
allemployer Gov't	1271.9942	2554.54007	0.50	0.6188
allemployer Other	-3268.8191	2629.27725	-1.24	0.2144
allemployer Private	0.0000	0.00000	.	.
educ AA/AS	-2884.7586	2909.44469	-0.99	0.3220
educ No degree	1115.3276	2702.51439	0.41	0.6800
educ ge BA/BS	0.0000	0.00000	.	.
selfrace Minority	6420.2059	1657.89579	3.87	0.0001**
selfrace White	0.0000	0.00000	.	.
rural NonRural	3497.4613	1977.12550	1.77	0.0776
rural Rural	0.0000	0.00000	.	.
Overall_Score	- 4.2058	67.32763	-0.06	0.9502

NOTE: The denominator degrees of freedom for the t tests is 448.

*p < .05

**p < .01

These same regression analyses were undertaken with the 2000 survey, as shown in Table 2. It showed somewhat similar results; having more experience and working for a fire-based organization resulted in higher earnings for EMT-Paramedics. Unlike the 1999 data, however, being a Minority was not related to earnings but working in a non-rural location did lead to a higher level of earnings. Similar results appeared when using number of test attempts. Again, neither certification test score nor number of test attempts was related to earnings for EMT-Paramedics.

Table 2. *Regression Analysis for Dependent Variable of Earnings by EMT-Paramedics (2000)*

<i>Parameter</i>	<i>Estimate</i>	<i>Std Error</i>	<i>t Value</i>	<i>Pr > t </i>
Intercept	7997.8458	11654.6170	0.69	0.4932
experience	795.1677	194.6460	4.09	<.0001**
allemployer Fire	12936.1399	2277.8247	5.68	<.0001**
allemployer Gov't	1237.3778	2682.8797	0.46	0.6451
allemployer Other	-3146.2498	3187.8792	-0.99	0.3247
allemployer Private	0.0000	0.0000	.	.
educ AA/AS	-841.4071	3183.6843	-0.26	0.7918
educ No degree	1271.4513	3131.7560	0.41	0.6851
educ ge BA/BS	0.0000	0.0000	.	.
selfrace Minority	3705.2151	2310.3324	1.60	0.1101
selfrace White	0.0000	0.0000	.	.
rural NonRural	7670.6857	2155.5335	3.56	0.0004**
rural Rural	0.0000	0.0000	.	.
Overall_Score	42.1595	82.6411	0.51	0.6104

NOTE: The denominator degrees of freedom for the t tests is 241.

*p < .05

**p < .01

When the regression was undertaken separating the “Old” from the “New” EMT-Paramedics (which could only be undertaken with the 1999 survey), there were somewhat different results. Table 3 shows that, for “Old” EMT-Paramedics, having more experience, working in a fire-based organization, and working in a non-rural location resulted in higher earnings. Somewhat similar results emerged for “New” Paramedics, with Table 4 showing that more experience and working in a fire-based organization resulted in higher earnings. In this case, however, being a Minority was related to higher earnings but no differences emerged between rural and non-rural locations. For both “Old” and “New” Paramedics, certification test scores, as well as test attempts, had no relationship with earnings. Furthermore, this occurred even those New EMT Paramedics earned an average of \$25,557, while Old EMT-Paramedics earned an average of \$33,251, a significant different in earnings ($t = -4.45$, $df = 657$, $p < .0001$).

Table 3. *Regression Analysis for Dependent Variable of Earnings by “Old” EMT-Paramedics*

<i>Parameter</i>	<i>Estimate</i>	<i>Std Error</i>	<i>t Value</i>	<i>Pr > t </i>
Intercept	29559.1568	8318.48828	3.55	0.0004
experience	601.7022	175.22514	3.43	0.0007**
allemployer Fire	7191.6735	2199.13986	3.27	0.0012**
allemployer Gov't	2580.2668	2602.57857	0.99	0.3223
allemployer Other	2520.9922	3334.09291	0.76	0.4502
allemployer Private	0.0000	0.00000	.	.
educ AA/AS	-4790.7076	2814.38288	-1.70	0.0898
educ No degree	-2560.9521	2574.78778	0.99	0.3207
educ ge BA/BS	0.0000	0.00000	.	.
selfrace Minority	3457.6581	3268.80002	1.06	0.2910
selfrace White	0.0000	0.00000	.	.
rural NonRural	8390.2112	2065.99751	4.06	<.0001**
rural Rural	0.0000	0.00000	.	.
Overall_Score	- 75.1373	62.15397	-1.21	0.2277

NOTE: The denominator degrees of freedom for the t tests is 293.

* p < .05 **p < .01

Table 4. *Regression Analysis for Dependent Variable of Earnings by “New” Paramedics*

<i>Parameter</i>	<i>Estimate</i>	<i>Std Error</i>	<i>t Value</i>	<i>Pr > t </i>
Intercept	3958.9564	8950.15028	0.44	0.6586
experience	898.9602	195.80063	4.59	<.0001**
allemployer Fire	11781.8798	1957.17715	6.02	<.0001**
allemployer Gov't	-272.6105	1956.83472	-0.14	0.8893
allemployer Other	1048.7018	3951.71673	0.27	0.7909
allemployer Private	0.0000	0.00000	.	.
educ AA/AS	-1789.7443	2687.48354	-0.67	0.5060
educ No degree	-465.2581	2603.71741	-0.18	0.8583
educ ge BA/BS	0.0000	0.00000	.	.
selfrace Minority	5935.2576	1973.19993	3.01	0.0029**
selfrace White	0.0000	0.00000	.	.
rural NonRural	2332.1943	1934.62543	1.21	0.2290
rural Rural	0.0000	0.00000	.	.
Overall_Score	67.0283	61.63626	1.09	0.2778

NOTE: The denominator degrees of freedom for the t tests is 280.

* p < .05 **p < .01

The regression analysis using the dependent variable of career satisfaction for Old EMT-Paramedics revealed that none of the variables were related to career satisfaction, including certification test scores and number of test attempts. In contrast, for New EMT-Paramedics, working in a fire-based organization, having less than a BA/BS, and having a higher certification test score were related to higher levels of career satisfaction (Table 5). Similar results were obtained when substituting number of test attempts (Table 6); thus showing that working in a fire-based organization, having less than a BA/BS, and taking fewer test attempts to pass were related to higher career satisfaction for New Paramedics.

Table 5. *Regression Analysis for Dependent Variable Career Satisfaction for New EMT-Paramedics*

<i>Parameter</i>	<i>Estimate</i>	<i>Std Error</i>	<i>t Value</i>	<i>Pr > t </i>
Intercept	2.0711761	0.36963605	5.60	<.0001
experience	-0.0110036	0.00678591	-1.62	0.1060
allemployer Fire	0.2254147	0.08258100	2.73	0.0067**
allemployer Gov't	0.1767529	0.10304044	1.72	0.0874
allemployer Other	0.1329334	0.14006953	0.95	0.3434
allemployer Private	0.0000000	0.00000000	.	.
educ AA/AS	0.2213525	0.10293867	2.15	0.0324*
educ No degree	0.2278637	0.09164747	2.49	0.0135*
educ ge BA/BS	0.0000000	0.00000000	.	.
selfrace Minority	0.0286778	0.06251620	0.46	0.6468
selfrace White	0.0000000	0.00000000	.	.
rural NonRural	0.0777769	0.07503632	1.04	0.3008
rural Rural	0.0000000	0.00000000	.	.
Overall_Score	0.0076237	0.00257914	2.96	0.0034**

NOTE: The denominator degrees of freedom for the t tests is 281.

*p < .05 **p < .01

Table 6. Regression Analysis for Dependent Variable Career Satisfaction for New EMT-Paramedics

Parameter	Estimate	Std Error	t Value	Pr > t
Intercept	3.2605190	0.13729836	23.75	<.0001
experience	-0.0106953	0.00686157	-1.56	0.1202
allemployer Fire	0.2585628	0.08756178	2.95	0.0034**
allemployer Gov't	0.2015410	0.10578563	1.91	0.0578
allemployer Other	0.1657296	0.13986419	1.18	0.2370
allemployer Private	0.0000000	0.00000000		
educ AA/AS	0.2133366	0.10251151	2.08	0.0383*
educ No degree	0.1923693	0.08922513	2.16	0.0319*
educ ge BA/BS	0.0000000	0.00000000		
selfrace Minority	0.0125907	0.05752728	0.22	0.8269
selfrace White	0.0000000	0.00000000		
rural NonRural	0.0571985	0.07521757	0.76	0.4476
rural Rural	0.0000000	0.00000000		
Total_Att	-0.1041880	0.05069284	-2.06	0.0408

NOTE: The denominator degrees of freedom for the t tests is 281.

*p < .05

**p < .01

Discussion

The present study examined the relationship between NREMT certification test results and objective and subjective career satisfaction. The results showed that for the entire sample of EMT-Paramedics there was no relationship. When the sample was divided into “old” and “new” Paramedics, however, certification test results (both overall score and number of test attempts) were related to subjective career success for the “new” Paramedics. Specifically, those “new” EMT-Paramedics with higher test scores and with a lower number of attempts reported greater career satisfaction. In no case were the certification test results related to objective career success, as defined by EMT earnings. Thus, the study contributes to some increased understanding of the effects of certification on career success for this group of medical professionals.

Such results have implications for those concerned about the early career development among Paramedics. HRD practitioners in fire-based, government, and health-care organizations can use these results in their career development work with EMT-Paramedics. Specifically, this study suggests that EMT certification results may impact early career success and career satisfaction for Paramedics. Recognizing such impacts may help HRD practitioners work with those who may have struggled with the certification process. It may be that the EMT-Paramedics who obtained lower test scores and / or took more attempts to pass the certification exam decide that the EMT career is not worth the effort. Still, such individuals may be able to make important contributions to emergency services by remaining in the profession.

It must be recognized that this study does have limitations. First, it is limited to the population represented by those who receive national certification, and even at this time, there are a few states that do not require national certification. Furthermore, by definition, it has eliminated all those who were never able to become certified, and thus, it has reduced the amount of variance and possibly eliminated some significant relationships. Third, the study is limited to those variables captured by the LEADS survey, and therefore, it fails to gather qualitative data on these EMT-Paramedics. The study does, however, point toward some needed research, particularly in the area of certification. Although this study used longitudinal data, it was not possible, because of attrition, to compare these effects with more refinement – that is, examining the effects of certification results in a year-by-year fashion. A future study could undertake that type of comparison. A second area of needed research would be to examine the effects of certification on EMT practices on-the-job. After all, certification should help to ensure that EMT understand and follow specified procedures. Another type of study would be to undertake a longitudinal, qualitative study of EMTs to examine issues that arise related to certification and career success.

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