

Evaluation of  
Michigan State University  
Advancing Diversity through the  
Alignment of Policies and Procedures  
(ADAPP-ADVANCE)

Faculty Retention Study - 2014

Ohio's Evaluation & Assessment Center for Mathematics and Science Education  
Miami University, Oxford, OH

Authored by:

Sarah Woodruff

Yue Li

Kristen Morio

Principal Investigator

Senior Statistician and Project Manager

Research Associate



Evaluation & Assessment Center  
MATHEMATICS • SCIENCE • EDUCATION

# Faculty Retention - Survival Analysis

In Fall 2014, Ohio's Evaluation and Assessment Center analyzed human resources data on 1,838 tenure-system STEM faculty hired by the university between 1981 and 2013 into nine colleges.<sup>1</sup> The voluntary attrition of these faculty members was tracked between 1981 and 2014. Faculty who left MSU before August 16, 2014 for non-retirement/non-death reasons were counted as not retained, and those employed August 16, 2014 were counted as retained. Faculty were categorized into four hiring cohorts: Cohort A – hired between 1981 and 1990; Cohort B – hired between 1991 and 2000; Cohort C – hired between 2001 and 2007; and Cohort D – hired between 2008 and 2013. For faculty hired in Cohort D, the maximum possible length of employment at the university was 6 years; therefore, the estimation of retention rates for this cohort was less accurate than for the other three cohorts. However, since the hiring process for faculty in this cohort has been impacted by the ADAPP-ADVANCE project, it is important to examine the retention status of faculty belonging to this cohort. In addition, since data used to create the models only included faculty hiring and attrition since 1981, faculty hiring and departures prior to 1981 did not inform the survival analysis.

Table 1 shows the sample size of each hiring cohort by rank at hiring and by gender. In each hiring cohort, the majority of faculty members were hired as assistant professors. The overall trend shows that the percentage of women assistant professors hired increased over time. Between 2001 and 2007, 37.8% of newly hired assistant professors were women. Since ADAPP-ADVANCE began in 2008, 46.8% of newly hired assistant professors were women between 2008 and 2013. There were no observable patterns in gender composition of newly hired associate professors or full professors over time. Table 1 shows the sample size for each hiring cohort by gender, while Table 2 shows the disaggregation of retention status by hiring cohort, by rank at hiring, and by gender.

Table 1. *Sample Size by Hiring Cohort, Rank, and Gender, MSU Faculty Retention Study, 2014*

Hiring Cohort	Beginning Rank	Female	Male	Total	% of Female
Cohort A (1981-1990)	AST PROF	100	279	379	<b>26.4%</b>
	ASC PROF	18	68	86	20.9%
	PROFESSOR	23	82	105	21.9%
	<b>Total</b>	141	429	570	24.7%
Cohort B (1991-2000)	AST PROF	115	226	341	<b>33.7%</b>
	ASC PROF	26	56	82	31.7%
	PROFESSOR	24	62	86	27.9%
	<b>Total</b>	165	344	509	32.4%
Cohort C (2001-2007)	AST PROF	119	196	315	<b>37.8%</b>
	ASC PROF	21	42	63	33.3%
	PROFESSOR	19	55	74	25.7%
	<b>Total</b>	159	293	452	35.2%
Cohort D (2008-2013)	AST PROF	111	126	237	<b>46.8%</b>
	ASC PROF	9	25	34	26.5%
	PROFESSOR	8	28	36	22.2%
	<b>Total</b>	128	179	307	41.7%
Total	AST PROF	445	827	1272	<b>35.0%</b>
	ASC PROF	74	191	265	27.9%
	PROFESSOR	74	227	301	24.6%
	<b>Total</b>	593	1245	1838	32.3%

<sup>1</sup> Tenure-system faculty only include assistant professors, associate professors, and full professors. Faculty hired into administrative/management positions and awarded tenure were not included in this study. Full professor category included university distinguished professors and named professors.

Table 2 shows the disaggregation of retention status by hiring cohort, by rank at hiring, and by gender. Overall, 68% of women and 70% of men faculty hired since 1981 were still working at the university in 2014. Higher percentages of male assistant professors were retained than were female assistant professors in each hiring cohort, except for Cohort D. Cohort D showed no gender difference in assistant professor retention. Ninety-one percent of female and 91.3% of male assistant professors hired since the beginning of ADAPP ADVANCE project still tenure-system STEM faculty positions at MSU as of August 2014. Even though only a small portion of each newly hired faculty cohort were at senior ranks, the general pattern shows a higher female associate professor retention rate and a higher male full professor retention rate over time.

Table 2. Sample Size by Hiring Cohort, Rank, Gender, and Retention Status, MSU Faculty Retention Study, 2014

Hiring Cohort	Beginning Rank	Gender	Retention Status		Total	% Retained
			Left MSU	Retained		
Cohort A (1981-1990)	AST PROF	Female	50	50	100	50.0%
		Male	123	156	279	55.9%
		<b>Total</b>	173	206	379	54.4%
	ASC PROF	Female	4	14	18	77.8%
		Male	26	42	68	61.8%
		<b>Total</b>	30	56	86	65.1%
	PROFESSOR	Female	7	16	23	69.6%
		Male	18	64	82	78.0%
		<b>Total</b>	25	80	105	76.2%
	<b>Total</b>	<b>Female</b>	<b>61</b>	<b>80</b>	<b>141</b>	<b>56.7%</b>
		<b>Male</b>	<b>167</b>	<b>262</b>	<b>429</b>	<b>61.1%</b>
		<b>Total</b>	<b>228</b>	<b>342</b>	<b>570</b>	<b>60.0%</b>
Cohort B (1991-2000)	AST PROF	Female	54	61	115	53.0%
		Male	78	148	226	65.5%
		<b>Total</b>	132	209	341	61.3%
	ASC PROF	Female	3	23	26	88.5%
		Male	14	42	56	75.0%
		<b>Total</b>	17	65	82	79.3%
	PROFESSOR	Female	7	17	24	70.8%
		Male	14	48	62	77.4%
		<b>Total</b>	21	65	86	75.6%
	<b>Total</b>	<b>Female</b>	<b>64</b>	<b>101</b>	<b>165</b>	<b>61.2%</b>
		<b>Male</b>	<b>106</b>	<b>238</b>	<b>344</b>	<b>69.2%</b>
		<b>Total</b>	<b>170</b>	<b>339</b>	<b>509</b>	<b>66.6%</b>
Cohort C (2001-2007)	AST PROF	Female	44	75	119	63.0%
		Male	60	136	196	69.4%
		<b>Total</b>	104	211	315	67.0%
	ASC PROF	Female	3	18	21	85.7%
		Male	11	31	42	73.8%
		<b>Total</b>	14	49	63	77.8%
	PROFESSOR	Female	6	13	19	68.4%
		Male	15	40	55	72.7%
		<b>Total</b>	21	53	74	71.6%
	<b>Total</b>	<b>Female</b>	<b>53</b>	<b>106</b>	<b>159</b>	<b>66.7%</b>
		<b>Male</b>	<b>86</b>	<b>207</b>	<b>293</b>	<b>70.6%</b>
		<b>Total</b>	<b>139</b>	<b>313</b>	<b>452</b>	<b>69.2%</b>

Hiring Cohort	Beginning Rank	Gender	Retention Status		Total	% Retained
			Left MSU	Retained		
Cohort D (2008-2013)	AST PROF	Female	10	101	111	91.0%
		Male	11	115	126	91.3%
		<b>Total</b>	21	216	237	91.1%
	ASC PROF	Female	2	7	9	77.8%
		Male	0	25	25	100.0%
		<b>Total</b>	2	32	34	94.1%
	PROFESSOR	Female	1	7	8	87.5%
		Male	3	25	28	89.3%
		<b>Total</b>	4	32	36	88.9%
	<b>Total</b>	<b>Female</b>	<b>13</b>	<b>115</b>	<b>128</b>	<b>89.8%</b>
		<b>Male</b>	<b>14</b>	<b>165</b>	<b>179</b>	<b>92.2%</b>
		<b>Total</b>	<b>27</b>	<b>280</b>	<b>307</b>	<b>91.2%</b>
Total	AST PROF	Female	158	287	445	64.5%
		Male	272	555	827	67.1%
		<b>Total</b>	430	842	1272	66.2%
	ASC PROF	Female	12	62	74	83.8%
		Male	51	140	191	73.3%
		<b>Total</b>	63	202	265	76.2%
	PROFESSOR	Female	21	53	74	71.6%
		Male	50	177	227	78.0%
		<b>Total</b>	71	230	301	76.4%
	<b>Total</b>	<b>Female</b>	<b>191</b>	<b>402</b>	<b>593</b>	<b>67.8%</b>
		<b>Male</b>	<b>373</b>	<b>872</b>	<b>1245</b>	<b>70.0%</b>
		<b>Total</b>	<b>564</b>	<b>1274</b>	<b>1838</b>	<b>69.3%</b>

Similar to the retention study conducted in 2012, this study performed non-parametric survival analysis for each rank within each hiring cohort and compared survival rates by gender. For each hiring cohort, more assistant professors were hired than associate or full professors. Additionally, earlier hiring cohorts have more historical data which allows tracking over a greater number of years to study their retention. Therefore, statistical estimates for assistant professors hired between 1981 and 1991, between 1991 and 2000, and between 2001 and 2007 are more accurate than estimates for other beginning ranks and/or hiring cohorts. The data set was right censored, which is typical for a survival analysis (i.e., the eventual times to departure are unknown for faculty still employed by the university in 2014).

Figures 1-3 show the Kaplan-Meier survival and hazard functions for assistant, associate, and full professors who were hired between 1981 and 2013 (all four hiring cohorts combined). The survival curves show the percentages of the original population that remained at a given year.

As shown in Figure 1, the shaded areas of the survival curves show that the 95% confidence intervals for men and women barely overlap, which suggests that the survival rates for women assistant professors were significantly lower than for men assistant professors. The attrition rates were highest between Year 3 and Year 9 for women and between Year 4 and Year 8 for men. Men tended to leave at a lower rate for the first 10 years at MSU but after Year 10 the pattern in attrition by gender is not clear. Both men and women showed a sudden increase in attrition around Year 15. The hazard functions show that the instantaneous attrition rates peaked at Year 4 for women with 7% of them likely to leave MSU in the following year, and peaked at Year 7 for men with 5.4% attrition in the following year. The mean time to departure was 15 years for women and was 18 years for men, with  $p$  for Log-Rank = .016,  $p$  for Wilcoxon = .013, and  $p$  for  $-2\text{Log(LR)}$  = .006. These findings indicate that the time to departure for men assistant professors is significantly longer than for women at the .05 significance level, as shown in Table 3. Another notable finding is that the cumulative 6-year retention rates for assistant professors during the past 33 years were 81% for women and 86% for men. That is, 81% of women and 86% of men assistant professors stayed at MSU beyond their initial 6-year period. Compared to these overall retention rates, 6-year retention rates for STEM assistant professors hired between 2008 and 2013 were 91.0% for women and 91.3% for men, which are much higher than those of assistant professors hired in early cohorts.

As shown in Figure 2, the shaded areas of the survival curves show that the 95% confidence intervals for men and women barely overlap, which suggests that the survival rates for women associate professors were significantly higher than for men assistant professors. The hazard functions show the instantaneous attrition rates peaked at Year 5 for women with 6% of them likely to leave MSU in the following year, and peaked at Year 2 (5.7%), Year 3 (5.6%), and Year 5 (4.8%) for men. The mean time to departure was 20 years for women associate professors and was 16 years for men associate professors, with  $p$  for Log-Rank = .048,  $p$  for Wilcoxon = .029, and  $p$  for  $-2\text{Log(LR)}$  = .053. These findings indicate that the time to departure for women associate professors is significantly longer than for men ( $p$  = .05 level), as shown in Table 3.

As shown in Figure 3, the shaded areas of the survival curves show that the 95% confidence intervals for men and women largely overlap, which suggests that the survival rates for women and men full professors were similar. The hazard functions show that the instantaneous attrition rates peaked at Year 5 for women with 11% of them likely to leave MSU in the following year; while there are no obvious peaks for men. The mean time to departure was 15 years for women full professors and was 18 years for men, with no indications of statistical significance, as shown in Table 3.

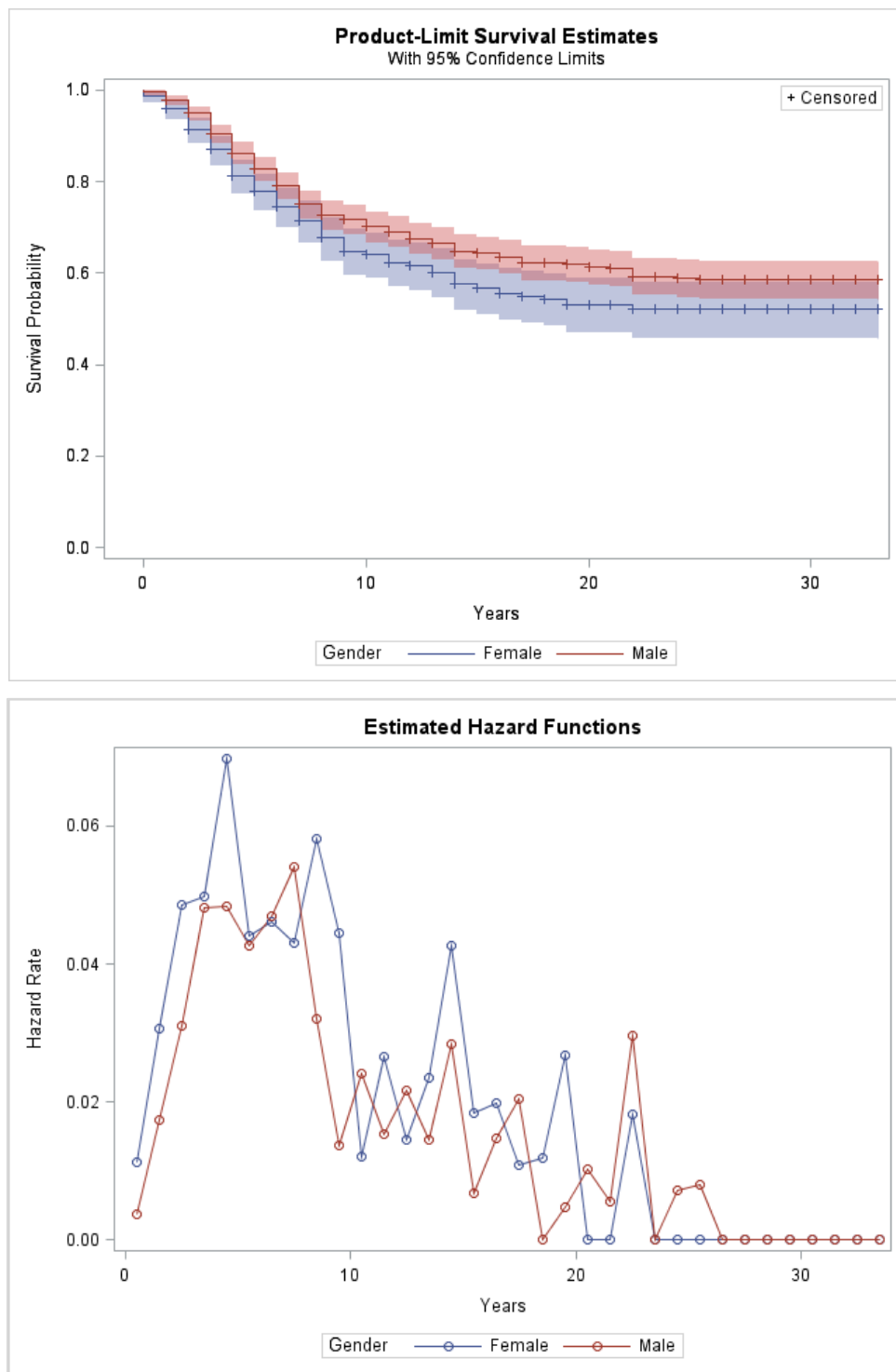


Figure 1. Survival and hazard functions for assistant professors hired between 1981 and 2013 by gender (women in blue, men in red).

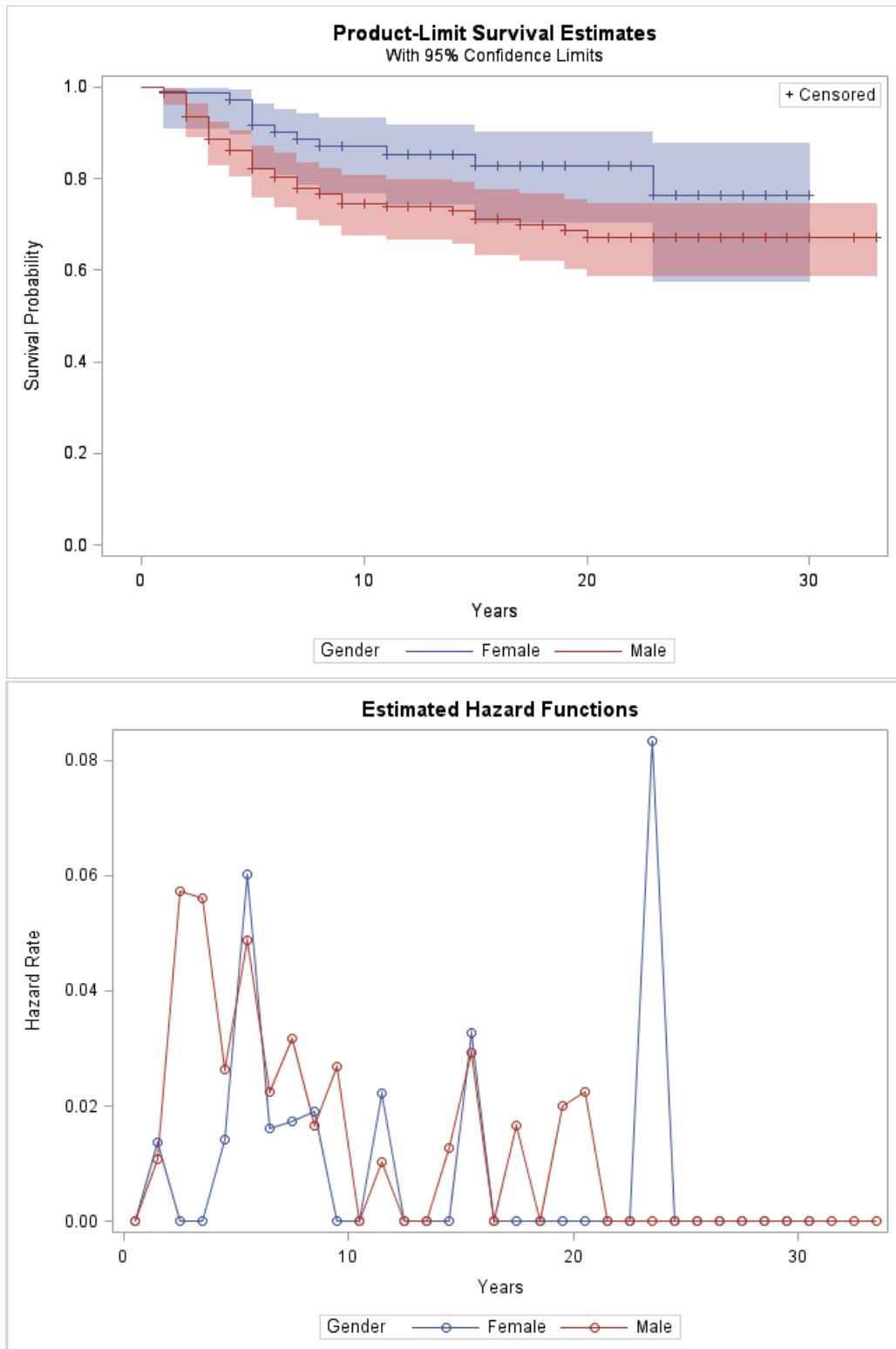


Figure 2. Survival and hazard functions for associate professors hired between 1981 and 2013 by gender (women in blue, men in red).

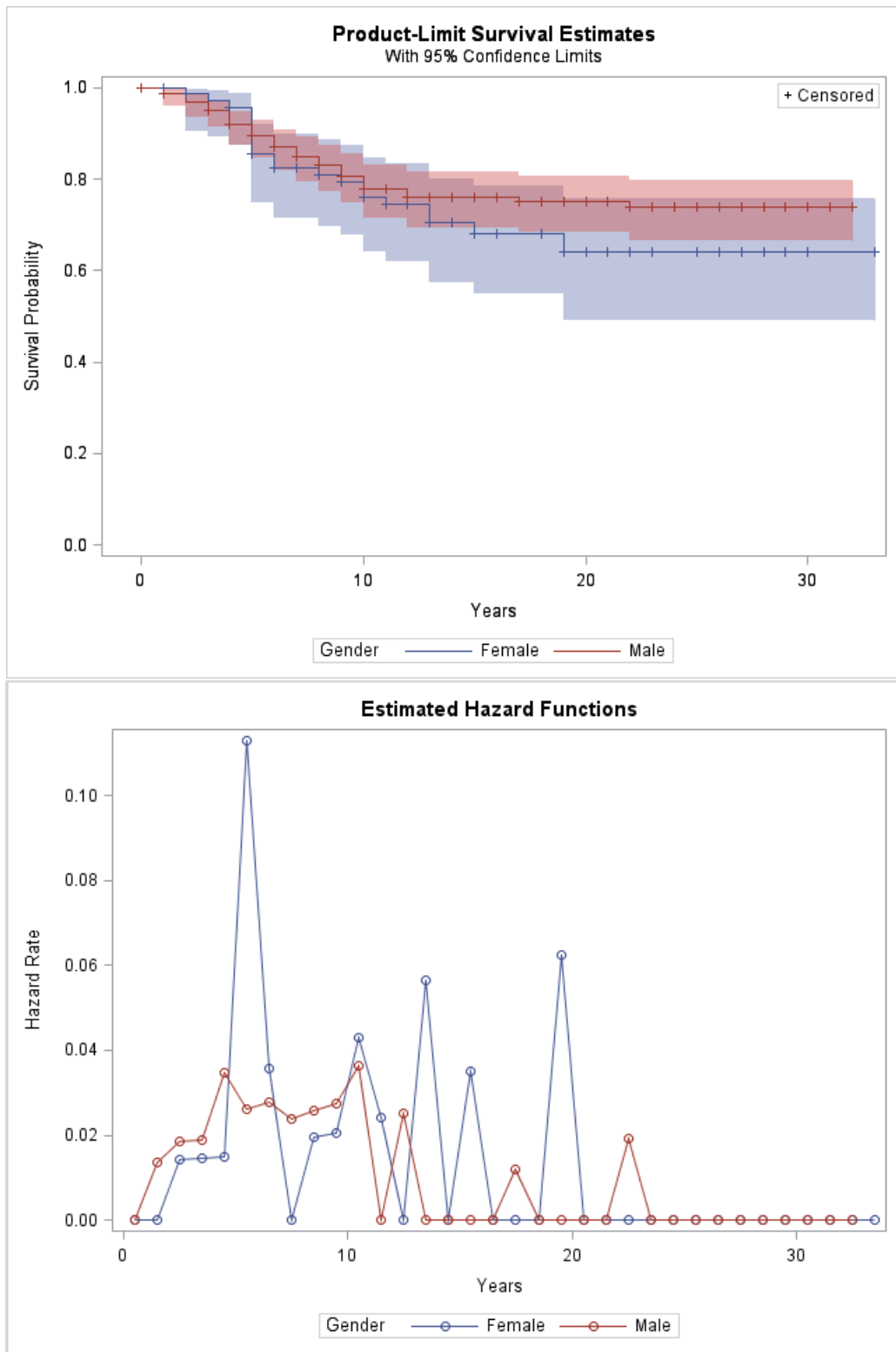


Figure 3. Survival and hazard functions for full professors hired between 1981 and 2013 by gender (women in blue, men in red).



Table 3. Comparisons of Time to Departure for Faculty Hired between 1981 and 2013 by Beginning Rank and by Gender, MSU Faculty Retention Study, 2014

Beginning Rank	Gender	Total Number of Faculty	Retention Status		% Retained	Mean*	SE	p for Log-Rank	p for Wilcoxon	p for -2Log (LR)
			Left MSU	Retained						
Asst. Prof.	Female	445	158	287	65%	15	0.4	.016	.013	.002
	Male	827	272	555	67%	18	0.3			
	Total	1272	430	842	66%					
Assoc. Prof.	Female	74	12	62	84%	20	0.8	.048	.029	.053
	Male	191	51	140	73%	16	0.5			
	Total	265	63	202	76%					
Full Prof.	Female	74	21	53	72%	15	0.7	.300	.464	.224
	Male	227	50	177	78%	18	0.5			
	Total	301	71	230	76%					

\* Mean time to departure was reported here since there were not enough faculty left to estimate a median value.

Figure 4 shows the Kaplan-Meier survival and hazard functions for assistant professors hired between 1981 and 1990, between 1991 and 2000, between 2001 and 2007, and between 2008 and 2013. In general, the survival functions showed relatively steeper declines (higher rates of attrition) at early times in faculty careers and more moderate declines at later times for all hiring cohorts. Highest rates of attrition generally occurred between Years 5 and 10. There were no statistically significant differences between the retention rates of men and women. However, in general, women assistant professors in the first three hiring cohorts had a steeper decline in their retention rate than did men. Assistant professors hired between 2008 and 2013 (during the ADAPP-AVANCE initiative) showed virtually no gender difference in retention rate, although available data only allowed tracking for six years for this hiring cohort.

Table 4 shows the comparisons of time to departure by gender, for each rank, within each hiring cohort. Though most findings are not statistically significant ( $p = .05$ ), potential gender differences in survival times for assistant professors in Cohorts A, B, and C are noted to be of practical significance. In all three cases, women faculty tended to leave earlier than male faculty.

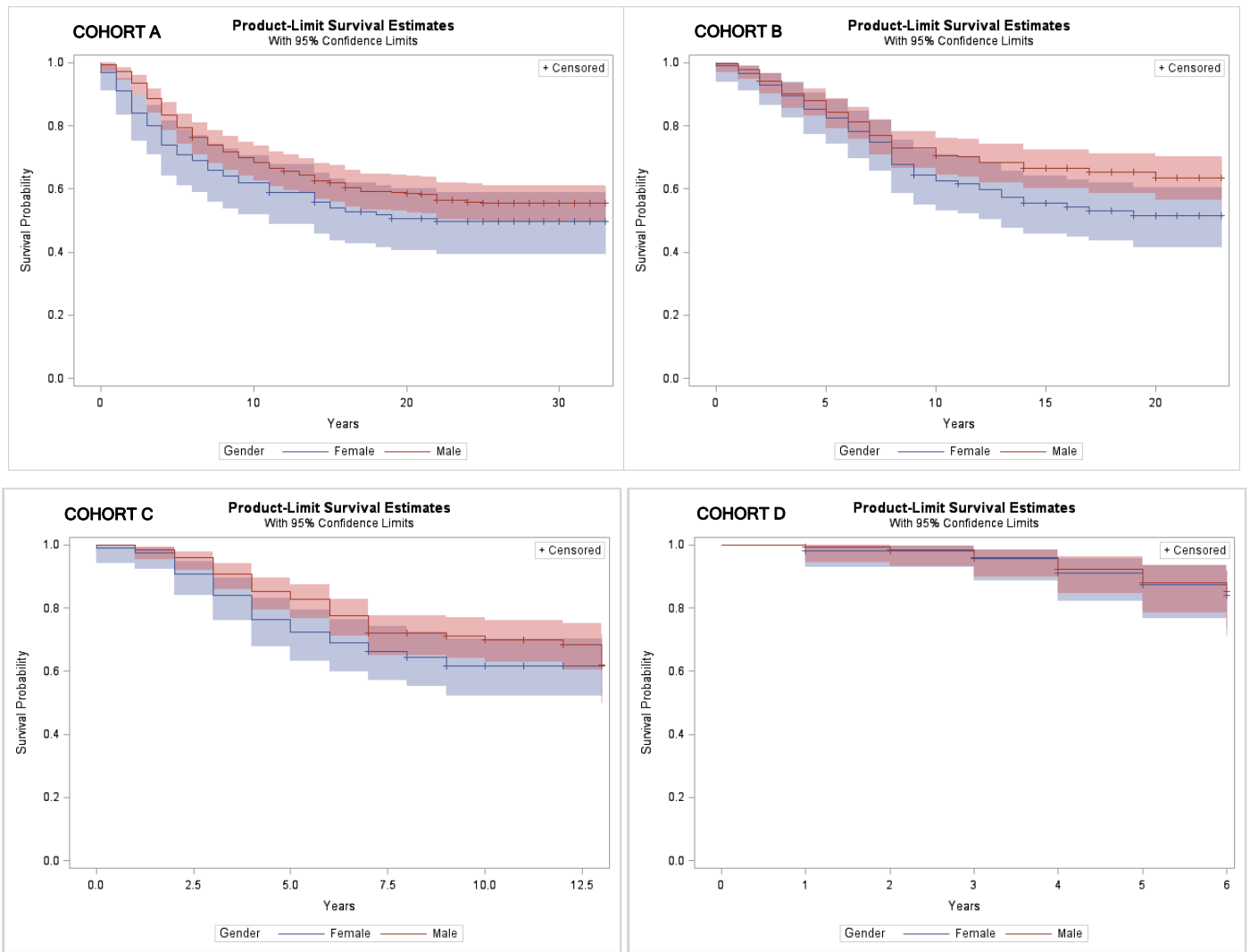


Figure 4. Survival and hazard functions for assistant professors by hiring cohort and by gender (women in blue, men in red).

Table 4. Comparisons of Time to Departure by Gender for Each Rank and Hiring Cohort, MSU Faculty Retention Study, 2014

<b>Hiring Cohort A (1981-1990)</b>										
Beginning Rank	Gender	Total Number of Faculty	Retention Status		% Retained	Mean*	SE	p for Log-Rank	p for Wilcoxon	p for 2Log (LR)
			Left MSU	Retained						
Asst. Prof.	Female	100	50	50	50%	14	0.9	.167	.090	.125
	Male	279	123	156	56%	17	0.6			
	Total	379	173	206	54%					
Assoc. Prof.	Female	18	4	14	78%	20	1.8	.192	.177	.139
	Male	68	26	42	62%	15	0.9			
	Total	86	30	56	65%					
Full Prof.	Female	23	7	16	70%	16	1.2	.397	.483	.374
	Male	82	18	64	78%	19	0.7			
	Total	105	25	80	76%					
<b>Hiring Cohort B (1991-2000)</b>										
Asst. Prof.	Female	115	54	61	53%	13	0.6	<b>.043</b>	.074	<b>.043</b>
	Male	226	78	148	66%	15	0.5			
	Total	341	132	209	61%					
Assoc. Prof.	Female	26	3	23	89%	14	0.6	.139	.097	.117
	Male	56	14	42	75%	12	0.7			
	Total	82	17	65	79%					
Full Prof.	Female	24	7	17	71%	13	0.9	.602	.702	.511
	Male	62	14	48	77%	11	0.4			
	Total	86	21	65	76%					
<b>Hiring Cohort C (2001-2007)</b>										
Asst. Prof.	Female	119	44	75	63%	7	0.2	.155	.096	.176
	Male	196	60	136	69%	11	0.3			
	Total	315	104	211	67%					
Assoc. Prof.	Female	21	3	18	86%	10	0.6	.307	.208	.296
	Male	42	11	31	74%	8	0.4			
	Total	63	14	49	78%					
Full Prof.	Female	19	6	13	68%	9	0.6	.707	.601	.762
	Male	55	15	40	73%	10	0.4			
	Total	74	21	53	72%					
<b>Hiring Cohort D (2008-2013)</b>										
Asst. Prof.	Female	111	10	101	91%	6	0.1	.834	.774	.858
	Male	126	11	115	91%	6	0.1			
	Total	237	21	216	91%					
Assoc. Prof.	Female	9	2	7	78%	5	0.0	.089	.089	<b>.039</b>
	Male	25	0	25	100%	N/A	N/A			
	Total	34	2	32	94%					
Full Prof.	Female	8	1	7	88%	5	N/A	.835	.875	.854
	Male	28	3	25	89%	4	0.1			
	Total	36	4	32	89%					

\* Mean time to departure was reported here since there were not enough faculty left to estimate a median value.

Survival analyses also were conducted by gender, for each beginning rank, for each of the nine colleges providing tenure homes to STEM faculty. Analyses suggested possible gender differences for full professors hired between 1981 and 2013 in the College of Agriculture (women had a lower retention rate), for full professors hired between 1981 and 2013 in the College of Natural Sciences (women had a higher retention rate), and for assistant professors hired between 1981 and 2013 in the College of Veterinary Medicine (women had a lower retention rate). Due to small sample sizes, analyses for each college were not conducted for each hiring cohort. Interpretation of results at the college level should be done with caution due to data limitations that did not permit cohort-level analyses for examination of changes over time.

Compared to the retention study conducted in 2012, data used in this study more accurately represent the retention situation at MSU. Since data in the 2012 study only tracked faculty attrition since 2001, faculty departures prior to 2001 did not inform survival modeling. The data set was both left censored and right censored, i.e., all faculty already working at MSU in 2001 were included in the data set and the eventual times to departure were unknown for faculty who were still employed at MSU in 2011. The study in 2014 included only data of newly hired faculty beginning with 1981, going forward and tracking attrition over time. This study also had access to two additional years of attrition data. Even though this study only monitored six years, the 2014 study allows some positive conclusions to be drawn regarding retention of STEM women at Michigan State University prior to, and during the university’s targeted efforts to improve faculty quality and diversity.

### Comparisons of Faculty Responses on the 2009 and the 2013 MSU Work Environment Survey by Retention Status

Twenty-nine tenure-system STEM faculty completed the 2009 MSU Work Environment Survey and departed MSU between 2009 and August 2014; while 23 tenure-system STEM faculty completed the 2013 MSU Work Environment Survey and then departed. These faculty either left MSU, moved to a position in a non-STEM department, or changed from the tenure system to fixed-term system. Responses of these faculty members the two Work Environment Surveys were compared to those of other tenure-system STEM faculty who also completed these questionnaires and remained at MSU until Summer 2014 ( $n = 478$  for 2009 WE Survey and  $n = 458$  for 2013 WE Survey).

Analyses were performed to determine if there were any measureable differences between the responses of those faculty who stayed and those who departed from tenure-system in STEM departments at MSU. Findings in bold in Tables 5 through 8 are statistically significant. First, responses to the 2009 MSU Work Environment Survey were compared between the 29 departed faculty and the 478 retained faculty using Mann-Whitney U-tests. As shown in Table 5, the only significant difference was on the “Workplace Incivility” subscale. Departed faculty, compared to retained faculty, reported that they experienced more workplace incivility at MSU.

Table 5. *Comparisons of 2009 WE Survey Subscale Scores by Retention Status, MSU Faculty Retention Study, 2014*

2009 WE Survey Subscale	Retention Status	<i>n</i>	<i>M</i>	<i>SD</i>	Mean Rank	<i>p</i> for Mann-Whitney
Recruiting and Hiring Process	Left MSU	29	3.59	0.84	256	.940
	Retained	478	3.57	0.91	254	
Promotion and Tenure	Left MSU	28	3.26	0.85	232	.445
	Retained	476	3.41	0.84	254	
Annual Performance Evaluation/Review	Left MSU	28	3.38	0.65	223	.283
	Retained	474	3.59	0.80	253	
Diversity Issues at MSU: General Climate	Left MSU	28	3.49	0.65	244	.782
	Retained	474	3.52	0.76	252	

2009 WE Survey Subscale	Retention Status	<i>n</i>	<i>M</i>	<i>SD</i>	Mean Rank	<i>p</i> for Mann-Whitney
Diversity Issues at MSU: Women	Left MSU	28	3.37	0.53	267	.531
	Retained	471	3.30	0.56	249	
Diversity Issues at MSU: Faculty of Color	Left MSU	28	3.09	0.40	249	.998
	Retained	469	3.11	0.49	249	
Conditions and Relationships in Your Unit: Respect	Left MSU	28	3.26	0.60	202	.083
	Retained	466	3.49	0.75	250	
Conditions and Relationships in Your Unit: Openness/Transparency	Left MSU	28	3.26	0.73	247	1.000
	Retained	464	3.18	0.70	247	
Conditions and Relationships in Your Unit: Work Family Balance	Left MSU	28	2.94	0.24	242	.847
	Retained	465	2.93	0.48	247	
Resource and Workload Allocation	Left MSU	28	3.21	0.60	263	.374
	Retained	452	3.09	0.55	239	
Workplace Incivility	Left MSU	28	1.14	0.43	288	<b>.051</b>
	Retained	449	0.90	0.69	236	
Sexual Harassment	Left MSU	28	3.48	0.52	271	.193
	Retained	448	3.35	0.52	236	
Beliefs and Attitudes about MSU	Left MSU	28	3.34	0.62	226	.589
	Retained	451	3.41	0.69	241	
Satisfaction at MSU	Left MSU	28	3.45	0.67	268	.292
	Retained	453	3.35	0.67	239	

Next, responses to the 2013 MSU Work Environment Survey were compared between the 23 departed faculty and the 458 retained faculty using t-tests. As shown in Table 6, even though retained faculty reported more positive perceptions of the work environment on several subscales than did departed faculty, there were no statistically significant differences between these two groups.

Table 6. Comparisons of 2013 WE Survey Subscale Scores by Retention Status, MSU Faculty Retention Study, 2014

2013 WE Survey Subscale	Retention Status	<i>n</i>	<i>M</i>	<i>SD</i>	Mean Rank	<i>p</i> for Mann-Whitney
Recruiting and Hiring Process	Left MSU	23	3.22	0.84	208	.246
	Retained	458	3.47	0.95	243	
Promotion and Tenure	Left MSU	22	3.24	1.03	208	.295
	Retained	452	3.40	0.96	239	
Annual Performance Evaluation/Review	Left MSU	22	3.42	0.77	214	.437
	Retained	450	3.55	0.82	238	
Diversity Issues at MSU: General Climate	Left MSU	22	3.25	0.80	208	.340
	Retained	447	3.43	0.82	236	
Diversity Issues at MSU: Women	Left MSU	22	3.26	0.62	223	.672
	Retained	446	3.27	0.66	235	

2013 WE Survey Subscale	Retention Status	<i>n</i>	<i>M</i>	<i>SD</i>	Mean Rank	<i>p</i> for Mann-Whitney
Diversity Issues at MSU: Faculty of Color	Left MSU	21	3.04	0.36	218	.595
	Retained	444	3.07	0.59	234	
Conditions and Relationships in Your Unit: Respect	Left MSU	20	3.08	0.51	197	.257
	Retained	439	3.29	0.71	231	
Conditions and Relationships in Your Unit: Openness/Transparency	Left MSU	19	3.09	0.81	226	.913
	Retained	438	3.05	0.75	229	
Conditions and Relationships in Your Unit: Work Family Balance	Left MSU	20	2.91	0.35	239	.714
	Retained	435	2.88	0.51	228	
Resource and Workload Allocation	Left MSU	20	2.97	0.47	219	.806
	Retained	431	3.00	0.54	226	
Workplace Incivility	Left MSU	19	1.45	0.51	192	.467
	Retained	331	1.39	0.56	175	
Beliefs and Attitudes about MSU	Left MSU	20	3.29	0.67	222	.922
	Retained	429	3.22	0.77	225	
Satisfaction at MSU	Left MSU	20	3.27	0.88	233	.739
	Retained	427	3.19	0.71	224	
Culture of High Performance: Unit Level	Left MSU	20	3.08	0.80	238	.636
	Retained	429	3.02	0.70	224	
Culture of High Performance: University Level	Left MSU	20	2.70	0.57	242	.514
	Retained	427	2.69	0.66	223	

Seventeen departed faculty responded to both the 2009 and 2013 MSU Work Environment Surveys. As shown in Table 7, departed faculty members agreed less often that the climate within their units was diversified in general and their units were supportive for faculty of color. Even though not statistically significant, it is of note that departed faculty reported more positive perceptions of departmental promotion/tenure and annual performance review processes in 2013 than in 2009.

Table 7. Comparisons of 2009 and 2013 WE Survey Subscale Scores for Departed Faculty, MSU Faculty Retention Study, 2014

WE Survey Subscale	Year	<i>n</i>	<i>M</i>	<i>SD</i>	<i>T</i>	<i>Df</i>	<i>p</i>
Recruiting and Hiring Process	2009	17	3.58	0.87	0.88	16	.391
	2013	17	3.41	0.76			
Promotion and Tenure	2009	17	<b>3.23</b>	1.04	-1.18	16	.257
	2013	17	<b>3.43</b>	1.03			
Annual Performance Evaluation/Review	2009	17	<b>3.46</b>	0.66	-0.43	16	.675
	2013	17	<b>3.52</b>	0.80			
Diversity Issues at MSU: General Climate	2009	17	3.68	0.71	2.33	16	<b>.033</b>
	2013	17	3.37	0.69			
Diversity Issues at MSU: Women	2009	17	3.47	0.59	1.24	16	.231
	2013	17	3.36	0.66			

<b>WE Survey Subscale</b>	<b>Year</b>	<b>n</b>	<b>M</b>	<b>SD</b>	<b>T</b>	<b>Df</b>	<b>p</b>
Diversity Issues at MSU: Faculty of Color	2009	17	3.24	0.38	2.28	16	<b>.037</b>
	2013	17	3.09	0.36			
Conditions and Relationships in Your Unit: Respect	2009	16	3.26	0.55	0.92	15	.371
	2013	16	3.12	0.47			
Conditions and Relationships in Your Unit: Openness/Transparency	2009	16	3.31	0.67	0.93	15	.366
	2013	16	3.19	0.82			
Conditions and Relationships in Your Unit: Work Family Balance	2009	16	2.98	0.23	1.39	15	.186
	2013	16	2.87	0.37			
Resource and Workload Allocation	2009	16	3.22	0.55	1.84	15	.085
	2013	16	2.98	0.51			
Workplace Incivility	2009	16	1.10	0.43	-2.16	15	<b>.048</b>
	2013	16	1.42	0.52			
Beliefs and Attitudes about MSU	2009	16	3.42	0.63	1.56	15	.141
	2013	16	3.22	0.59			
Satisfaction at MSU	2009	16	3.40	0.69	0.93	15	.369
	2013	16	3.22	0.83			

A similar pre-post comparison also was conducted for 309 retained faculty who responded to both the 2009 and 2013 MSU Work Environment Surveys. Findings of this comparison are congruent with findings reported in the 2013-2014 annual evaluation report. Retained tenure-system faculty reported less positive perceptions regarding recruitment and hiring processes, departmental climate in general, support for women faculty and faculty of color, respect, openness and transparency with in their units, resource and workload allocation, workplace incivility, general beliefs and attitudes about MSU, and general satisfaction at MSU in 2013 than in 2009.

Table 8. *Comparisons of 2009 and 2013 WE Survey Subscale Scores for Retained Faculty, MSU Faculty Retention Study, 2014*

<b>WE Survey Subscale</b>	<b>Year</b>	<b>n</b>	<b>M</b>	<b>SD</b>	<b>T</b>	<b>df</b>	<b>p</b>
Recruiting and Hiring Process	2009	309	3.60	0.91	3.17	308	<b>.002</b>
	2013	309	3.45	0.95			
Promotion and Tenure	2009	302	3.44	0.87	0.30	301	.767
	2013	302	3.42	0.94			
Annual Performance Evaluation/Review	2009	300	3.63	0.81	1.49	299	.138
	2013	300	3.57	0.84			
Diversity Issues at MSU: General Climate	2009	298	3.54	0.78	2.25	297	<b>.025</b>
	2013	298	3.45	0.84			
Diversity Issues at MSU: Women	2009	296	3.32	0.58	2.53	295	<b>.012</b>
	2013	296	3.24	0.68			
Diversity Issues at MSU: Faculty of Color	2009	294	3.12	0.50	2.49	293	<b>.013</b>
	2013	294	3.05	0.59			
Conditions and Relationships in Your Unit: Respect	2009	291	3.52	0.75	5.08	290	<b>&lt; .001</b>
	2013	291	3.32	0.72			

<b>WE Survey Subscale</b>	<b>Year</b>	<b><i>n</i></b>	<b><i>M</i></b>	<b><i>SD</i></b>	<b><i>T</i></b>	<b><i>df</i></b>	<b><i>p</i></b>
Conditions and Relationships in Your Unit: Openness/Transparency	2009	290	3.22	0.71	3.58	289	< .001
	2013	290	3.08	0.80			
Conditions and Relationships in Your Unit: Work Family Balance	2009	289	2.95	0.51	1.96	288	.051
	2013	289	2.89	0.51			
Resource and Workload Allocation	2009	277	3.10	0.54	3.13	276	.002
	2013	277	3.00	0.56			
Workplace Incivility	2009	217	1.06	0.66	-8.00	216	< .001
	2013	217	1.40	0.58			
Beliefs and Attitudes about MSU	2009	277	3.41	0.68	4.55	276	< .001
	2013	277	3.23	0.78			
Satisfaction at MSU	2009	278	3.35	0.66	3.74	277	< .001
	2013	278	3.23	0.69			

Comparisons also were made for women and men faculty in this subsample. No statistical significant differences were found between retained and departed faculty responses on any of the subscales in 2009 or in 2013, either for female or for male faculty. For departed women faculty, comparisons between the 2009 and 2013 WE Survey responses indicated that they had less positive perceptions regarding departmental support for faculty of color in 2013 than in 2009. No statistically significant differences were found in comparing departed men faculty responses in 2009 and in 2013. Retained women faculty perceived less positively all aspects of climate, except fairness and clarity of the promotion/tenure and annual performance review processes, in 2013 than in 2009. Retained men faculty also reported less positively on recruitment and hiring processes, respect, openness and transparency within their units, workplace incivility, and general beliefs and attitudes about MSU in 2013.



# Summary of Faculty Retention Study

## Findings

---

Compared to the 2012 faculty retention study, the 2014 study refined the data collection query to reflect the tenure-system faculty retention situation more accurately. One advantage of the 2014 study was that by only including faculty hired since 1981, the data set omitted the left censored data, i.e., avoided underestimating the length of employment for those faculty hired before 1981. However, the limitation of this method is that faculty hired prior to 1981 and still working at the university were not represented in this data set. These faculty have served at the university the longest. Therefore, estimations of time to departure for each beginning rank (especially for those hired as assistant professors and associate professors) were underestimated. In addition, interpretation of some of the disaggregated results should be done with caution due to small sample sizes.

While findings of this study may seem intuitive, their value should not be underestimated. This study has mined the university's own rich data sources in order to provide robust analyses that can support the university in confirming or refuting anecdotal information regarding the retention of STEM women faculty. The models provide a snapshot look at how successfully the university is addressing faculty retention issues. Key findings of the analyses suggest:

- The overall trend shows that the percentage of women assistant professors hired has increased over time. Between 2001 and 2007, 37.8% of newly hired assistant professors were female. Since the ADAPP-ADVANCE initiative launched, 46.8% of newly hired assistant professors were women between 2008 and 2013. There were no observable patterns in gender composition of newly hired associate or full professors over time.
- STEM women assistant and full professors historically left the university at higher rates than did STEM men faculty of the same rank. Retention rates for STEM women assistant professors were significantly lower than for men assistant professors hired between 1981 and 2013. The cumulative 6-year retention rates for assistant professors during the past 33 years were 81% for women and 86% for men.
- At the university level, as of Aug 2014, 50% of women and 44% of men hired between 1981 and 1990 as STEM assistant professors voluntarily departed MSU; 47% of women and 34% of men hired between 1991 and 2000 as assistant professors departed MSU; 37% of women and 31% of men hired between 2001 and 2007 as assistant professors departed MSU; and 9% of women and 9% of men hired between 2008 and 2013 as STEM assistant professors departed MSU. Retention appears to be improving for those hired between 2008 and 2013, when compared to the overall 6-year retention rate for assistant professors between 1981 and 2013.
- Findings provide early evidence regarding improvement of women STEM faculty hiring and retention at MSU over time. The ADAPP-ADVANCE project and other university initiatives aimed at retaining women faculty in STEM fields appear to have resulted in positive outcomes for the university. It must be noted that Cohort D has been tracked for only six years. Attrition for this group may be higher, lower, or the same, as that of Cohorts B and C over time and these data should continue to be monitored.

Other findings are similar to the 2012 study:

- High risk of losing STEM women faculty, particularly assistant professors, extend over longer periods of time than does high risk of losing STEM men faculty. Attrition rates for both men and women are low during the first 3 years. The attrition rate of STEM women assistant professors increases and remains high from Year 3 through Year 9, while the rate of STEM men assistant professors attrition increases slightly in Year 4 and drops significantly by Year 8.

- Patterns in STEM women assistant professors leaving the university are less easily explained than are patterns in STEM men assistant professors' attrition. In general, attrition rates are higher at early times in faculty careers and more moderate at later times for all ranks, in all hiring cohorts. Men tended to leave at a lower rate post-tenure (Years 8 and on) than during their pre-tenure stage. Men tended to leave at a lower rate for the first 10 years working at MSU and after that the gender difference in attrition is not clear. Both men and women demonstrate a sudden increase in attrition around Year 15.
- Instantaneous attrition rates peaked at Year 4 for women assistant professors with 7% of them likely to leave MSU in the following year, and peaked at Year 7 for men with 5.4% attrition in the following year. The mean time to departure was 15 years for women and 18 years for men. The time to departure for men assistant professors was significantly longer than for women.
- Instantaneous attrition rates peaked at Year 5 for women associate professors with 6% of them likely to leave MSU in the following year, and peaked at Year 2 (5.7%), Year 3 (5.6%), and Year 5 (4.8%) for men. The mean time to departure was 20 years for women associate professors and 16 years for men. The time to departure for women associate professors was significantly longer than for men.
- Survival rates for women and men full professors were similar. Instantaneous attrition rates peaked at Year 5 for women with 11% of them likely to leave MSU in the following year; while there were no obvious peaks for men. The mean time to departure was 15 years for women and 18 years for men.
- Survival analyses for assistant professors showed relatively higher rates of attrition at early times in faculty careers and more moderate declines at later times in all hiring cohorts. Highest rates of attrition generally occurred between Years 5 and 10. There were no statistically significant differences between the retention rates of men and women. However, in general, women assistant professors in the first three hiring cohorts had a steeper decline in their retention rates than did men. Retention rates of assistant professors hired between 2008-2013 (during ADAPP-AVANCE) showed virtually no gender difference.
- Survival analyses by gender, for each beginning rank, for each of the nine STEM colleges suggested possible gender differences for full professors hired between 1981 and 2013 in the College of Agriculture (women had a lower retention rate), for full professors hired between 1981 and 2013 in the College of Natural Sciences (women had a higher retention rate), and for assistant professors hired between 1981 and 2013 in the College of Veterinary Medicine (women had a lower retention rate).
- Comparisons of responses to the 2009 Work Environment Survey between departed STEM faculty and retained STEM faculty suggested that departed faculty, compared to retained faculty, experienced more workplace incivility at MSU. The 17 departed faculty who responded to the survey in 2009 and 2013 agreed less often that the climate within their units was diversified in general and that their units were supportive for faculty of color. Departed faculty reported more positive perceptions towards departmental promotion/tenure and annual performance review processes in 2013 than in 2009.
- For departed women faculty, comparisons between 2009 and 2013 survey responses indicated that they had less positive perceptions regarding departmental support for faculty of color in 2013 than in 2009. No statistically significant differences found between departed male faculty responses in 2009 and 2013. Retained women faculty perceived less positively all aspects of climate, except fairness and clarity of the promotion/tenure and annual performance review processes, in 2013 than in 2009. Retained male faculty also reported less positively on recruitment and hiring processes, respect, openness and transparency within units, workplace incivility, and general beliefs and attitudes about MSU in 2013.

The survival analysis model provides important and timely data that can inform the retention status of faculty hired prior to and during the ADAPP-ADVANCE project. As more data are added to this model over time, comparisons can be made between the retention of faculty hired prior to, during, and following these targeted efforts to improve faculty quality and diversity. Compared to the retention study conducted in 2012, data used in this study more accurately represent the retention situation at MSU. Since data used in the 2012 study only tracked faculty attrition since 2001, faculty departures prior to 2001 did not inform survival modeling. The data set was both left censored and right censored, i.e., all faculty already working at MSU in 2001 were included in the data set and the eventual times to departure were unknown for faculty still employed at MSU in 2011. The study in 2014 included only data of newly hired faculty beginning in 1981. The 2014 analysis also added two years of attrition data. Even though this study only monitored six years, the 2014 study allows some positive conclusions to be drawn regarding retention of STEM women at Michigan State University prior to, and during the university's targeted efforts to improve faculty quality and diversity. Limitations of the current study include insufficiency of the sample size to provide a clear picture of faculty attrition at the college level; this limitation will self-correct over time as more data become available for the study.