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Systematic review of interventions to encourage careers in academic medicine

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Institutional Change

Author	Year, location	Study type	Participants	Intervention	Outcome measure	Results	Conclusion	Level of outcomes	Strength of conclusions
Fried, LP	1996, USA	Before and after	All full-time tenure tract faculty in a US medical school (43 women and 145 men)	Multiple interventions targeting gender based objectives to women's careers including faculty education, mentoring and specific academic rewards	Yes/no questionnaire of perception of gender based career obstacles and experience of mentoring. Retention and promotion of women faculty.	General improvement across multiple domains, particularly a decrease in proportion of women considering leaving academic medicine	Institutional strategy can improve retention of women in academic medicine.	Level 2a Level 3 Level 4a	4
Villablanca, AC	2013, USA	Before and after	All members of the faculty of medicine, specific details not given	Multifaceted approach to try to improve the knowledge, awareness and use of flexible career policies	Results from annual "Work, Family and Satisfaction" survey, looking at use of, intention to use and barriers to use of flexible career policies	Increased awareness of, and reduced barriers to usage of, flexible career policies	They offer an intervention that can help address faculty work-life balance predicaments	Level 2a	3

Mentoring

Author	Year, location	Study type	Participants	Intervention	Outcome measure	Results	Conclusion	Level of outcomes	Strength of conclusions
Mayer, AP ³⁰	2013, USA	Before and after	33 women faculty at the instructor or assistant professor level	Facilitated peer mentoring program	Perceived mastery of academic skills as measured on a likert scale	Self rated mastery increased	Involvement in the programme led to increased academic skills	Level 2a	3
Varkey, P ³¹	2012, USA	Before and after	19 women academics at a US medical school holding the rank or instructor or assistant professor	Facilitated peer mentoring programme tailored to women in academic medicine	Likert scale self assessment of academic self efficacy, career satisfaction and skills	Self reported skills, satisfaction and self efficacy improved after the programme	The programme reported had a positive impact on academic skills and manuscript writing	Level 2a	3
Farag, E ³²	2012, USA	Before and after	26 anaesthesiologists participating in a mentorship programme	Workshop on mentorship followed by several related interventions	Rating of the importance of mentorships factors and skills	Limited change pre and post intervention	The programme is feasible but the analysis may have asked the wrong questions.	Level 2a	1

Postgraduate Funding

Author	Year, location	Study type	Participants	Intervention	Outcome measure	Results	Conclusion	Level of outcomes	Strength of conclusions
Jagsi, R	2007, USA	Action based	40 junior female researchers who received competitive award compared with 81 whose application was unsuccessful	Clafin distinguished scholars award to provide financial support for the research efforts of women faculty during “critical child-rearing years”	Retention and promotion of faculty receiving award against those not receiving it. Questionnaire of academic achievements and perceived impact of recipients	Retention of recipients was 90% and 68% for non-recipients. Promotion of recipients was 55% and 31% for non-recipients The grants cost the institution \$2.1 million with the awardees receiving external grants of over \$51 million.	These specific awards seem good value for money and may have positively impacted the recipients’ perception of the institution.	Level 1 Level 3	2
Eloy, JA	2014, USA	Case control	Fellowship trained academic rhinologists	Centralised Otolaryngology Research Efforts (CORE) grants	<i>h</i> -index of scholarly impact,	Senior academic rhinologists receiving CORE funding had higher <i>h</i> -index	Receiving funding as a junior researcher is associated with greater success as a more senior researcher	Level 3	3

Postgraduate Training

Author	Year, location	Study type	Participants	Intervention	Outcome measure	Results	Conclusion	Level of outcomes	Strength of conclusions
Thorndyke, LE	2006, USA	Before and after	56 Junior faculty at a US medical school.	25 2-hour session focusing on knowledge, skills and resources relevant to academic medicine. Individual project facilitated by senior faculty mentor	Likert scale questionnaire of value of programme and likert scale questionnaire of participants perception of their self efficacy	Participants were satisfied with the programme, perceptions of self-efficacy improved.	A faculty development programme and integrated mentoring scheme can help develop successful academic careers	Level 1 Level 2a	2
Sanfey, H	2011, USA	Before and after	143 faculty members at a US medical school	Leadership in academic medicine programme and a series of training sessions and self analysis	32 participants completed pre and post course questionnaires and 74 long term post course questionnaire on self-	Participants were satisfied with the course. Increased self rated leadership skills. Self reported behavioral	The leadership in academic medicine programme is effective and this change is sustained	1 2a 2b 3	2

					perception of leadership skills	change			
Ries, A	2012, USA	Case control	122 junior faculty at a US university who did compared to those who did not participate in the programme	Faculty development programme	Retention and academic success. Success as measured by a novel qualitative method	Retention and certain aspects of academic success (leadership and professional activities) was greater in participants	A faculty development programme improved retention and may improve success.	Level 3	4
Ries, A	2009, USA	Case control	839 Junior faculty at a US medical school	Faculty development programme	Retention of 120 participants compared with 719 non participants	Retention was statically greater in the participant group	The faculty development programme described can help improve retention	Level 3	4
Garman, KA	2001, USA	Case control and before and after	39 junior faculty who participated in the programme compared with 97 who did not	National Centre for Leadership in Academic Medicine (NCLAM) programme combining mentoring,	36 item likert scale self efficacy questionnaire covering skills concerning research, professional development,	Significant improvement in self rated skills compared to pre intervention levels and compared to	The NCLAM programme improved self efficacy of critical professional academic skills	Level 2b	4

				academic skills teaching and academic counseling	education and administration	the control group			
Dannels, SA	2008, USA and Canada	Before and after, case control	78 women academics participating in a leadership programme (ELAM), each matched with 6 faculty who did not participate and a third group of 63 women who applied to participate but were unsuccessful	The Hedwig van Ameringen Executive Leadership in Academic Medicine (ELAM) programme is a yearlong external development programme for senior US women faculty	Likert scale self-rating of skills, knowledge and attitudes relating to leadership and administration. Career related demographic details. 16 indicators in total.	Participants rated significantly higher in 12 indicators including 7 leadership competencies, 3 administrative leadership attainment indicators and 2 of leadership aspiration and education indicators	The ELAM programme is beneficial for participants in terms of leadership behaviours and career progression	Level 2b	3
McDade, SA	2004, USA and Canada	Before and after	79 participants in the executive	As above	Likert scale self-rating of knowledge and skills related to	Statistically significant increases in perceived	Participants who completed the ELAM programme had	Level 1 Level 2b	2

			leadership in academic medicine (ELAM) programme		leadership	leadership knowledge and skills	increased self rated leadership knowledge and skills 11 months post completion		
Daley, S	2006, USA	Before and after	112 junior faculty at a US School of Medicine	Multifaceted approach (faculty development programme) aimed to try and improve success and retention of under represented minority faculty	Retention before and after introduction of the programme	Retention in the school of medicine increased from 58% to 80% and in academic medicine from 75% to 90%	A faculty development programme, focusing on mentoring, increased retention across the faculty. There was no difference between underrepresented minorities and non under represented minorities	Level 3	3
Wingard, DL	2004, USA	Before and after	67 junior faculty at a US medical school	Structured mentorship programme	Questionnaires pre, post and 1-4 years after completion of the programme on staff retention, remaining within	Confidence in academic skills increased, retention rates increased, savings from reduced staff	The specific programme reported provides a possible model of support for clinical and non-clinical junior faculty during their initial years	2a 2b 3	3

					academic medicine, confidence in academic skills and cost effectiveness of the programme	turnover were greater than the cost of the programme	in academic medicine, it is cost effective and worked in their context		
Segal, LS	2006, USA	Case control	93 orthopaedic residents who completed their residency training between 1976 and 2005, 15 completed a research year	Resident research year	Proportion of residents entering private or academic practice, number of publications, proportion of time dedicated to academic practice and teaching.	Completing a research year associated with greater proportion entering academic practice (25% versus 6.3%) and had more publications, results not statistically significant	The authors conclude that the resident research year did not appear to positively influence academic careers	Level 3	1
Campion, MW	2016, USA	Case control	"Mid career" faculty from a medical school and school of public health. 16	Programme ran for 10 months, participants were given 10% protected	Knowledge, skills and attitudes survey. Connectivity survey (Sci-2). Qualitative	Participants had increased scores in the both the knowledge skills and attitudes	The authors tell a story of incorporating a mid-career development programme that worked locally.	Level 2a	3

			participants and 20 non-participant controls.	time, 6 x 2-day learning modules, peer mentoring, and a group project.	programme evaluation.	survey and the connectivity survey post intervention and compared with the comparison group.			
Chang, S	2016, USA	Case control	3268 women participants compared with 18642 women non participants and 43189 men.	3 separate career development programmes aimed at women in academic medicine.	Adjusted and unadjusted retention analysis.	Participants were less likely to leave academic medicine that controls.	National career development programmes appear to offer and advantage to women faculty.	Level 3	4

Undergraduate Interventions

Author	Year, location	Study type	Participants	Intervention	Outcome measure	Results	Conclusion	Level of outcomes	Strength of conclusions
Funston, GM	2011, UK	Before and after	Undergraduate medical students in all years. 122 lecture and 58 national conference attendees completed questionnaires.	Formation of an undergraduate research society who ran a lecture series and held an undergraduate conference	Likert scale questionnaire asking about interest in academic medicine and consideration of a future academic career before and immediately after events	Increased self reported interest greatest with the student conference	Undergraduate led events increase medical student interest in research and academic careers and that student led initiatives might have a role in encouraging academic careers	Level 1 Level 2a	3
Solomon, SS	2003, USA	Before and after	1000 medical students who participated in one of two National Institute of Health Medical Student Research	Mentored summer research project and participation in a structured programme to improve research	Short and long term evaluations of interest in academic medicine, continued research participation,	Interest in academic careers increased, most participants did more research after it, many	"Medical student research fellowships should be included in strategies" to encourage academic	Level 1 Level 2a	4

			Fellowships over 25 years	specific skills	academic careers and academic output	published and presented their work	careers		
Coleman, MM	2012, USA	Before and after	11 medical students (MD, naturopathic or osteopathic)	Summer programme in teaching, leadership, scholarship and academic career building	Commitment to academic medicine, single likert question	Commitment to academic medicine increased from a mean of 3.6 to 4.5	The programme led to an increase in commitment to academic medicine	Level 2a	2
Choi, BD	2013, USA	Case control	613 Neurosurgery graduates and residents from 10 US academic institutions	PhD training	Academic versus private practice, NIH (National institute for health) grant funding	Neurosurgeons with MD-PhDs were more likely to hold academic positions and obtain NIH funding than colleagues with MD only	Dual MD-PhD training may be an important factor in predicting participation in, and receiving funding for, academic careers	Level 3	3
Areephanthu, CJ	2015, USA	Case control	119 graduates who had completed a professional student	Medical student research fellowship running	Publication record, national examination results,	Participants had higher score on entrance to medical school,	No negative impact of increased academic demand.	Level 3	3

			mentored research fellowship during medical school compared with 898 other graduates of the same school.	alongside normal undergraduate training consisting of a course, supervised research project, lecture series, conference, and US\$3000 stipend.	residency placement ranking.	possible confounder. Participants had more publications, higher USMLE step 1 scores and more were placed in the top 25% of residency programmes.	Modest increase in measure of academic success.		
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