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REVIEW

Rethinking Health Professionals' Motivation to Do Research: A Systematic Review

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Background: Health professionals' engagement in translational health and medical research (HMR) is fundamental to evidence-based practice leading to better patient health outcomes. However, there is a decline in the number of health professionals undertaking research which has implications for patient health and the economy. Informed by the motivation-based expectancy-value-cost (EVC) and self determination theories (SDT), this systematic literature review examined the barriers and facilitators of health professionals' (HPs) motivation to undertake research.

Methods: The literature was searched between 2011 and 2021 for relevant peer-reviewed articles written in English, using CINAHL Complete, Informit, Medline Ovid, Medline (PubMed), Scopus, Web of Science and Google Scholar databases. This systematic review was performed and reported in accordance with the PRISMA guidelines.

Results: Identified barriers to HPs' engagement with research included the lack of knowledge, skills, and competence to conduct research, lack of protected research time, lack of funding and lack of organisational support. Integration of the findings of this review based on the EVC and SDT theories indicate that research capacity, ie, expectancy and competence is highly influenced by attitude, ie, the type of value (attainment, intrinsic or utility) and connection attributed to research. HPs who had very positive attitude towards research demonstrated all three values and were keen to take up research despite the barriers. Those who had a positive attitude were only motivated to do research because of its utility value and did not necessarily see it as having personal relevance for themselves. HPs who were unmotivated did not see any personal connection or relatedness to the research experience and saw no value in research.

Conclusion: The attitude HPs hold in their value of research is a catalyst for motivation or amotivation to engage in research as it directly influences the relevance of barriers. Facilitators that expedite the research journey have been attributed to research training, mentorship programs and supportive organisational research culture. Motivation of HPs explored through EVC and SDT is critical to the maintenance of a research culture and the clinician-researcher development pipeline.

Keywords: barriers, facilitators, expectancy-value theory, EVC, self-determination theory, SDT, health professionals, motivation

Introduction

Health professionals (HPs), including doctors, nurses, midwives, and allied health professionals (AHPs) who undertake research have been referred to in the literature under various titles including, clinician researcher[1] clinician investigator[2] and physician-researcher.[3] This group of HPs spend time as both active clinicians and researchers and they engage in translational health and medical research (HMR) to address the issues they see in clinical practice.[4] HP led research is important because it fosters evidence-based clinical practice and improved health outcomes

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for patients.[5] For example, research on chronic diseases has significantly contributed to better health outcomes and improved quality of life for people across Australia and globally.[6] In addition to the patient health benefits, employment of those engaged in HMR has resulted in continued productivity due to better health outcomes and financial benefits from new medicines and technology. HMR has helped Australia become a leading economy of the 21st century returning an increasing net benefit of $8.2 billion, returning $3.90 for every dollar invested[6] and from 2000 to 2015, National Health and Medical Research Council (NHMRC)-funded research saved the Australian health system $23.4 billion.[6] Despite the benefits of research to the economy and health benefits to patients there still exists a dearth of HP researchers.

There has been an ongoing global concern that the number of HPs undertaking research is declining.[7] The seminal paper by Wyngaarden,[8] "The clinical investigator as an endangered species" addressed this concern over 40 years ago.[9,10] Recent international trends from the USA,[7,11,12] Canada,[13] UK,[14] Sweden,[15] Africa,[16] Singapore,[17] Pakistan[18] and Saudi Arabia[19] still indicate a decline in the number of young researchers replacing an aging workforce. For example, in the US, the fraction of physician-researchers has reduced from 4.7% in the 1980s to approximately 1.5% currently.[20] In New Zealand (NZ) and Australia there exists a similar scenario, with the number of individuals training in medical research decreasing or stagnating over the past few decades.[21–23] The Australian Institute of Health and Welfare (AIHW) reported a decline in the proportion of employed Australian doctors who identified primarily as researchers from 2.1% in 2002 to 1.5% in 2010.[24,25] The 2018 Medical Deans of Australia and New Zealand (MDANZ) report indicated a further 3.9% drop in the number of physician-researchers between 2013 and 2017.[26] Comparatively, of the 1346 registered doctors who self-reported as physician-researchers in 2017, 59% were males and 39% were 55 years and above.[26]

Decline in the number of HP researchers has largely been attributed to significant factors including lack of dedicated research time, research expertise, awareness and skills.[10,27] Additionally, there has been lack of effective succession planning.[12] Furthermore, younger generations of HP graduates, particularly females, are wanting more work-life balance; and this generates situations where undertaking research competes with other goals, values and career pathways.[3,7,28] Reduced accessibility to research positions, particularly in rural areas has also been highlighted as a major challenge.[29] Building the capacity of HPs to undertake research is considered to be an international priority in view of the increasing predominance of chronic diseases and aging world populations.[30] Health organisations with strong research culture have been associated with greater service efficiencies and reduced patient mortality and morbidity, indicating that involvement in research extends beyond individual HPs' professional development.[31]

Motivation to undertake or stay in HMR is a key factor in addressing the shortage of HP researchers currently being experienced.[32] Motivation has largely been attributed to the opportunities and barriers HPs have experienced or expect to experience in their research journey.[32] However, the number of HPs engaging in research has still not improved. Applying a theoretically informed approach to examining existing literature findings can point the way to more effective strategies to motivate HPs to do research. The Expectancy-Value-Cost (EVC) motivation theory postulates that achievement-related choices are motivated by a combination of people's expectations for success and subjective task value in particular domains.[33,34] For example, individuals are more likely to pursue an activity if they expect to do well and value the activity. The model further differentiates task value into three components: attainment value (ie, importance of doing well), intrinsic value (ie, personal enjoyment) and utility value (ie, perceived usefulness for future goals). However, motivation can be limited by potential barriers which are referred to as cost (ie, competition with other goals). According to the EVC model, expectations for success and task value are shaped by a combination of factors. These include individual characteristics (abilities, previous experiences, goals, self-concepts, beliefs, expectations, interpretations) and environmental influences (cultural milieu, socializers' beliefs, and behaviours).[35]

A recurrent theme in the literature is that motivation to undertake research has largely been extrinsic, that is, to improve CVs,[36] career progression[37] or for academic improvement. This indicates a need for further exploration into the underlying concepts of motivational theory and its relevance to research uptake and retention by HPs. It is not surprising, therefore, that motivation is increasingly becoming a major area of interest within the field of HPs' education[38] and health research orientation,[39] with a focus on Self-Determination Theory (SDT)[40,41] which has special implications for HMR. Evolving from research

on intrinsic and extrinsic motivations, SDT is a macro theory of human motivation that has been successfully applied to healthcare education and HMR.[42,43] The focus of SDT is not on how motivation can be controlled from without, but instead on how motivation is functionally designed and experienced from within.[41] SDT relates to three basic psychological needs: (1) *Competence*: People need to gain mastery of tasks and learn different skills. When people feel that they have the skills needed for success, they are more likely to take actions that will help them achieve their goals. (2) *Connection or Relatedness*: People need to experience a sense of belonging and attachment to other people. (3) *Autonomy*: People need to feel in control of their own behaviours and goals. This sense of being able to take direct action that will result in real change plays a major part in helping people feel self-determined.[44]

Rethinking HPs' motivation to engage in research, now has immediate and wider implications for all HPs whether medical, nursing and midwifery or allied health.[6] The decline in number of HP researchers comes at a critical time when medical innovations are urgently needed to combat the current global COVID-19 pandemic, other communicable diseases and the aging population crisis.[2,18] The threat to individual and societal health and economic welfare requires a holistic approach to HP engagement with research and research training to ensure long-term outcomes for survival of world populations.[2] Research can no longer be restricted to an elite and specialized few, it needs to be appreciated as a fundamental activity for most, if not all HPs. To foster HP engagement with research, it is important to gain deep insight and understanding of what motivates or discourages them from taking up or continuing with research along the career pipeline. Hence this systematic review utilised two theoretical frameworks (EVC[33,34] and SDT[40,41]) to (1) examine the facilitators and barriers to health professionals' motivation to undertake research and (2) identify current research gaps.

Methods

The systematic review was conducted and reported in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) Statement.

Inclusion and Exclusion Criteria

For the purpose of this review, the term HP researcher is defined as a medical graduate, nurse, midwife or AHP who works both clinically and in research – often varying the fractions throughout their career. The study population consisted of all HPs: AHPs, Medical, Nursing and Midwifery in hospital/research centres. Peer-reviewed articles written in English were considered if they related to HPs' motivation, attitudes, and perceptions about undertaking research. There was no restriction on study design. Articles were excluded if they did not meet the inclusion criteria and/or they were review papers.

Search Strategy

Seven electronic databases comprising, CINAHL Complete, Informit, Medline Ovid, Medline (PubMed), Scopus, Web of Science and Google Scholar were searched. Peer reviewed primary articles, written in English and published between 2011 and 2021 (a decade of literature) were included in this review to reflect the current level of activity in the topic area.

Search terms used were research, health professionals (including physicians, AHPs, nurses, midwives), research, and motivation. The terms research capacity, attitudes and barriers were purposefully excluded as they would have limited a full exploration of the topic. The comprehensive search strategy used for this review is presented in Appendix 1. Reference lists from previous reviews and included studies were also screened for additional relevant articles.

Study Selection

All the identified articles were imported into Endnote X9 software (Clarivate, Australia), then titles and abstracts were screened. Two authors (LMDA and BSMA) independently screened the titles and abstracts of the retrieved articles and excluded those that did not meet the inclusion criteria. Subsequently, full-text articles categorised as potentially eligible for inclusion were screened and disagreements were resolved in a consensus meeting.

Data Synthesis and Analysis

Meta-analysis was not possible, due to the heterogeneous nature of the included articles. A data extraction form was developed and used to collect relevant information from all the included studies. Descriptive data including author, study year, title, country of study, research/study focus, setting – urban/rural/remote, study design, type of participants, participant numbers, gender and mean age were extracted from each of the selected studies. Elements of the Self-Determination Theory (SDT)[43] and the Expectancy-Value-Cost Model of Motivation (EVC)[46]

were adopted to facilitate extraction of the key determinant factors to research motivation. The identified barriers and facilitators of HPs' motivation to undertake research, as reported in each reviewed article were independently extracted and categorised by two authors (LMDA and BSMA). Conceptual content analysis[47,48] was used to extract and systematically code the factors as determined by the tenets of the EVC and SDT frameworks. Rules for translation of text into codes were developed by the researchers. Coding of pre-defined concepts/sets of categories was done manually and analysis of results involved quantification of coded concepts for frequency of occurrence and determination of relationships, trends and patterns.[48]

Three major factors were considered namely: Research Capacity which relates to expectancy and competence; Attitude which relates to value and connection; and Barriers which relate to cost and autonomy. Research capacity was coded based on explicit/implicit statements within each reviewed article about participants' perceived levels of confidence/ competence to participate in research. Participants' attitude to research was underpinned by the type of value they attributed to research – attainment, intrinsic and/or utility value, as well as the connection or relatedness they expressed towards research. Participants' attitude to research was categorised into three groups based on the frequency with which values and connections held by the study participants were openly stated or inferred. Attitude to research was coded as "very positive" if all three value types were established in a study, "positive" if only one and "negative/fear of research" if no value or connection to research was indicated. For autonomy/ cost, reported barriers in all studies were listed and grouped into categories, number of categorised barriers in each study were then quantified. LMDA and BSMA independently extracted and categorised all factors and subsequently met to check for consistency. All discrepancies were resolved through discussion.

For the purpose of this review, research capacity is defined as the ability to engage in, perform or carry out quality research.[49] The expectancy and competence of individuals to carry out research activities underpins research capacity and was viewed through the EVC (expectancy) and SDT (competence) frameworks. While it is postulated that there are two types of expectancies: ability beliefs that comprise of current/immediate beliefs about being able to complete a task and expectancy beliefs that reflect being able to do the task in the future, most investigations collapse measures of ability and expectancy beliefs into a general expectancy scale.[46]

Attitude to undertaking research was viewed through the EVC (value) and SDT (connection) frameworks. Value is differentiated into three components: value of attainment is espoused in meeting a personal need; intrinsic value is gained through personal enjoyment or satisfaction and utility value is perceived usefulness for future goals and may be predictive of current and future interest.[46] Connection or relatedness is where people need to experience a sense of belonging and attachment to other people.[44]

Barriers to undertaking research was also viewed through the EVC (Cost) and SDT (autonomy) frameworks where the perceived cost of undertaking research competes with other goals,[44] and autonomy is seen as the need to feel in control of one's own behaviours and goals without undue external influences.[44] Cost and autonomy are largely seen as influences external to the individual although they may be encountered at the individual, organisational and/or system level.[43,46]

Quality Assessment of Reviewed Articles

The Quality Assessment Tool for Studies with Diverse Designs (QATSDD) was used to assess the methodological consistency and quality of the included studies.[50] This tool contains 16 items and is used for examining studies with different research designs. Each of the included studies was graded on a scale of 0 to 3 for each criterion, with 0 = not at all, 1 = very slightly, 2 = moderately and 3 = complete. To assess the methodological quality of each of the included studies, the criteria scores were summed and expressed as a percentage of the maximum possible score. The percentage scores were classified into low (<50%), medium (50–80%) or high (>80%) quality evidence for easy identification. The QATSDD criteria included: (1) theoretical framework; (2) aims/objectives; (3) description of research setting; (4) sample size; (5) representative sample of target group; (6) procedure for data collection; (7) rationale for choice of data collection tool(s); (8) detailed recruitment data; (9) assessment of reliability and validity of measurement tool(s) (Quantitative only); (10) fit between research question and method of data collection (Quantitative only); (11) fit between research question and data collection method (Qualitative only); (12) fit between research question and method of analysis; (13) good justification for analytical method selected; (14) reliability of analytical process (Qualitative only); (15)

evidence of user involvement in design; (16) strengths and limitations.[50]

Results

Included Studies

Four thousand and twenty four (4024) articles were identified from all searched databases. Ten (10) additional articles were identified through hand searching. After screening the titles and abstracts of the identified articles and reviewing 228 full texts, 46 met the inclusion criteria for this review as shown in Figure 1.

Assessment of Methodological Quality

Table 1 portrays the QATSDD assessment with scores ranging from 33% to 90%. The aims and objectives, description of the research setting as well as the fit between research question and data collection method were well addressed in most studies. Strengths and limitations of the studies were also generally well addressed by most studies. Nonetheless, good justification for analytical method selected was overlooked in 14 studies and only 19 (41.3%) studies had evidence of user involvement in the design. Overall, 10 studies (22%) were rated as high quality because they were judged to be explicit in their methodology and mostly utilised theoretical frameworks. Thirty-five (76%) were medium quality studies and some of the weaknesses identified from these studies included: lack of theoretical framework, inadequate sample sizes and poor reliability. One study[51] met only few quality criteria, had low rating (33%) and therefore was removed from the review.

Study Characteristics

A summary of the characteristics of the included 45 studies is presented in Table 2. The total number of participants was 11,438 and participant numbers per study ranged from 15 to 2052. Of the 33 studies that included

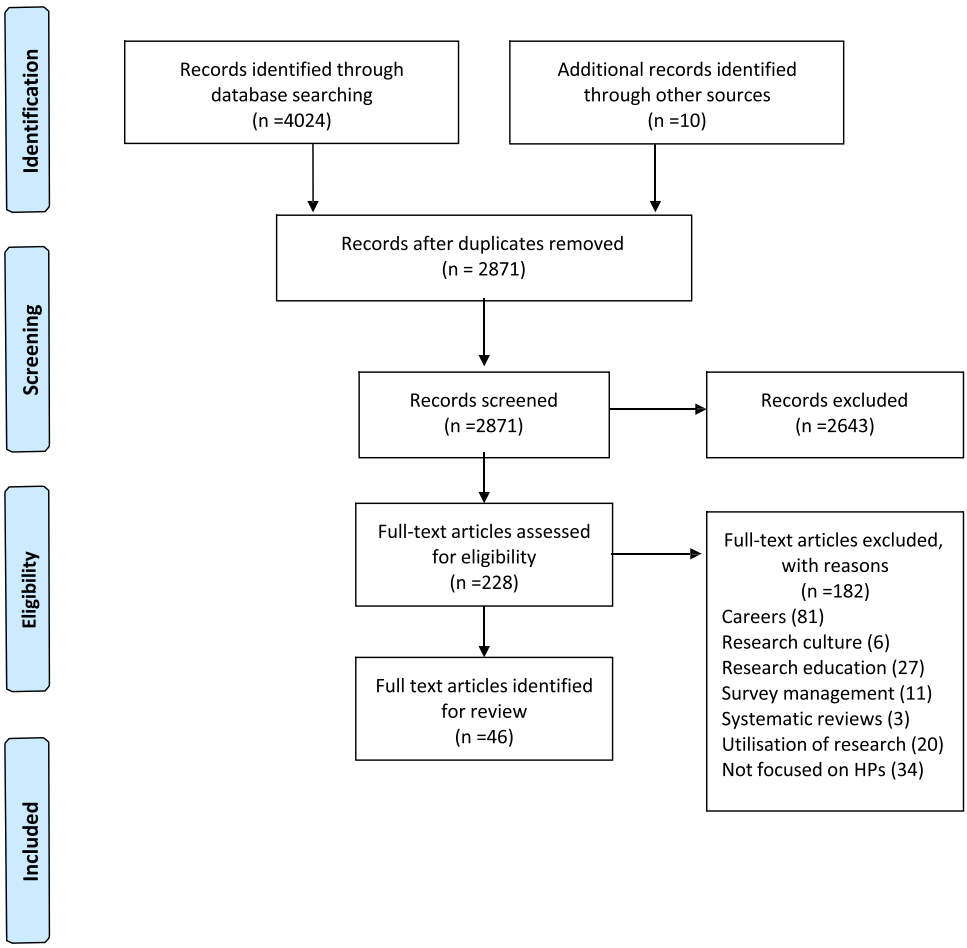

Figure 1 Flow chart of the study selection protocol. PRISMA figure adapted from Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med. 6(7):e1000097. Creative Commons[45].

Table 1 Quality Assessment of the Included Studies

QATSDD Criteria	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total Score	% of Total Score	Grade
Akerjordet, Lode, and Severinsson 2012[83]	0	3	2	1	3	1	0	3	3	2	N/A	3	0	N/A	0	3	24/42	57	Good
Albert et al 2016[67]	0	3	3	3	3	3	3	2	3	3	N/A	3	1	N/A	0	3	33/42	79	Good
Alison, Zafiropoulos, and Heard 2017[64]	0	3	3	3	3	3	3	3	3	3	N/A	3	3	N/A	0	3	36/42	86	Excellent
Bench, Dowie-Baker, and Fish 2019[74]	0	3	3	1	2	3	0	3	1	3	3	3	0	3	2	2	32/48	67	Good
Berthelsen and Holge-Hazelton 2015[84]	0	3	3	2	2	3	2	3	3	3	N/A	2	1	N/A	0	2	29/42	69	Good
Borkowski, McKinstry, and Cotchett 2017[52]	0	3	2	1	3	2	3	2	1	3	N/A	3	2	N/A	0	2	27/42	64	Good
Chan et al 2011[68]	0	3	2	2	3	2	3	3	3	3	N/A	2	0	N/A	0	0	26/42	62	Good
Choo, Muninathan, Pung, and Ramanathan 2017[89]	0	3	3	3	3	2	3	3	1	3	N/A	3	1	N/A	2	2	32/42	76	Good
Cianciolo et al 2020[69]	3	3	3	1	1	3	2	2	N/A	N/A	3	3	2	3	2	3	34/42	81	Excellent
Connolly, Allum, Shaw, Pattison, and Dark 2018[75]	3	3	3	2	3	3	3	2	1	3	3	2	3	3	2	3	42/48	86	Excellent
Conradie, Duys, Forget, and Biccard 2018[16]	0	3	3	3	2	3	1	3	0	3	2	3	1	3	0	3	33/48	69	Good
Dannapfel, Peolsson, and Nilsen 2013[85]	0	3	3	2	3	3	1	2	N/A	N/A	1	3	3	3	1	0	28/42	67	Good
Dannapfel, Peolsson, Stahl, Oberg, and Nilsen 2014[86]	3	3	3	2	3	3	1	2	N/A	N/A	2	3	3	3	1	3	35/42	83	Excellent
Elphinston and Pager 2015[53]	0	3	3	2	1	3	1	2	3	3	N/A	3	0	N/A	0	3	27/42	64	Good
Finch, Cornwell, Nalder, and Ward 2015[54]	0	3	3	3	3	3	2	2	N/A	N/A	3	3	1	3	0	3	32/42	76	Good
Harvey, Plummer, Nielsen, Adams, and Pain 2016[55]	0	3	3	3	3	2	0	2	N/A	N/A	1	3	2	3	0	3	28/42	67	Good
Hiscock et al 2014[56]	0	3	2	2	3	3	0	1	0	3	N/A	3	1	N/A	2	3	26/42	62	Good
Ito-Ihara et al 2013[91]	0	3	3	2	3	2	2	3	0	3	2	3	1	3	0	3	33/48	69	Good
Janssen, Hale, Mirfin-Veitch, and Harland 2016[93]	0	3	3	1	3	3	3	2	3	3	3	3	3	3	0	3	39/48	81	Excellent
Jones, Griffith, Ubel, Stewart, and Jagsi 2016[32]	0	3	2	2	3	3	1	2	0	3	3	3	2	0	0	3	30/48	63	Good
Lowrie et al 2015[76]	0	3	2	3	3	3	1	3	N/A	N/A	3	3	3	3	2	3	35/42	83	Excellent
Luckson, Duncan, Rajai, and Haigh 2018[79]	0	3	3	1	2	2	3	3	1	3	3	3	1	0	3	3	34/48	71	Good
Mahmoud et al 2011[87]	0	3	3	2	2	2	0	2	0	3	N/A	3	1	N/A	2	2	25/42	60	Good
Mansi, Karam, and Chaaban 2019[70]	0	3	3	2	2	2	0	2	0	2	N/A	3	0	N/A	0	3	22/42	52	Good
Marshall et al 2016[65]	0	3	3	3	1	3	3	3	3	3	3	3	3	3	3	3	43/48	90	Excellent

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McDonald 2020[92]	0	3	3	2	2	3	0	3	1	3	N/A	3	0	N/A	2	3	28/42	67	Good
McMaster, Jammali-Blasi, Andersson-Noorgard, Cooper, and McInnes 2013[57]	0	3	3	2	3	2	1	3	1	3	N/A	3	0	N/A	1	1	26/42	62	Good
McNab, Berry, and Skapetis 2019[58]	0	3	3	3	2	2	0	3	1	2	N/A	3	3	N/A	2	3	30/42	71	Good
Mills et al 2019[3]	0	3	3	3	3	3	0	2	0	3	N/A	3	0	N/A	0	3	26/42	62	Good
Oliver-Baxter, Brown, and McIntyre 2017[59]	0	3	3	2	3	3	0	3	1	3	N/A	2	0	N/A	0	3	26/42	62	Good
Pager, Holden, and Golenko 2012[60]	0	3	3	2	2	3	2	2	1	2	2	1	0	1	0	3	27/48	56	Good
Paget, Lilischkis, Morrow, and Caldwell 2014[66]	0	3	2	3	1	3	2	3	0	3	N/A	2	0	N/A	3	0	25/42	60	Good
Pain, Petersen, and Fernando 2018[61]	0	3	3	2	2	2	0	3	0	3	N/A	2	1	N/A	0	2	23/42	55	Good
Sarwar et al 2018[80]	0	3	3	3	3	2	0	3	3	3	N/A	3	0	N/A	2	2	30/42	71	Good
Scala, Patterson, Stavarski, and Mackay 2019[71]	2	3	3	3	3	3	0	2	N/A	N/A	3	3	0	3	0	2	30/42	71	Good
Siedlecki and Albert 2016[72]	3	3	3	2	2	2	0	3	N/A	N/A	2	2	1	3	0	2	28/42	67	Good
Silberman et al 2012[73]	0	3	3	2	3	2	0	3	0	3	N/A	3	0	N/A	0	3	25/42	60	Good
Snelgrove and James 2011[77]	0	3	3	1	1	2	0	3	0	3	3	2	1	3	0	1	26/42	62	Good
Stewart et al 2015[81]	0	3	3	2	2	3	1	2	3	3	N/A	3	3	N/A	2	2	32/42	76	Good
Stewart et al 2019[78]	3	3	3	1	3	3	2	2	3	3	N/A	3	2	N/A	0	3	34/42	81	Excellent
Sultana, Al Jeraisy, Al Ammari, Patel, and Zaidi 2016[82]	1	3	3	2	3	3	1	3	3	3	N/A	3	1	N/A	2	3	34/42	81	Excellent
Torres et al 2017[90]	0	3	3	2	2	3	1	3	3	3	N/A	3	1	N/A	2	2	31/42	74	Good
van Hoving and Brysiewicz 2017[88]	0	3	3	1	3	3	1	3	0	3	N/A	3	1	N/A	0	3	27/42	64	Good
Wenke, Mickan, and Bisset 2017[62]	0	3	3	1	2	3	3	3	0	3	N/A	3	2	N/A	0	3	29/42	69	Good
Wenke, Noble, Weir, and Mickan 2020[63]	3	3	3	3	2	3	2	3	N/A	N/A	3	3	3	3	0	2	36/42	86	Excellent
White 2013[51]	1	3	2	1	1	0	1	2	1	2	N/A	1	1	N/A	0	0	16/48	33	Low

Notes: The QATSDD criteria included: (1) theoretical framework; (2) aims/objectives; (3) description of research setting; (4) sample size; (5) representative sample of target group; (6) procedure for data collection; (7) rationale for choice of data collection tool(s); (8) detailed recruitment data; (9) assessment of reliability and validity of measurement tool(s) (quantitative only); (10) fit between research question and method of data collection (quantitative only); (11) fit between research question and data collection method (qualitative only); (12) fit between research question and method of analysis; (13) good justification for analytical method selected; (14) reliability of analytical process (qualitative only); (15) evidence of user involvement in design; (16) strengths and limitations.

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Table 2 Study Characteristics and Participant Demographics for Reviewed Articles

Author and Year	Title	Country	Setting	Study Design	Type of Participants	Participants (No., Gender, Mean Age [Yrs.]) Response Rate
Akerjordet, Lode, and Severinsson 2012[83]	Clinical nurses' attitudes towards research, management and organisational resources in a university hospital: part I	Norway	Not stated	Quantitative	Nurses	N = 364; Females (95%, n =347); Age: (41.2 ± 11.52) RR 61%
Albert et al 2016[67]	Clinical nurse specialist roles in conducting research: Changes over 3 years	USA	Urban	Quantitative	Nurses	N = 2052; Females (95.9%, n =1782); Age: (50.3 ± 9.3) RR 25%
Alison, Zafiropoulos, and Heard 2017[64]	Key factors influencing allied health research capacity in a large Australian metropolitan health district	Australia	Urban	Quantitative	Allied Health	N = 278; Females**; Age: <25->60yrs: RR 54%
Bench, Dowie-Baker, and Fish 2019[74]	Orthopaedic nurses' engagement in clinical research; an exploration of ideas, facilitators, and challenges	UK	Not stated	Mixed methods	Nurses	N = 75; Females (75%, n =56); Age: (>40 = 56%) RR 20%
Berthelsen and Holge-Hazelton 2015[84]	Orthopaedic nurses' attitudes towards clinical nursing research - A cross-sectional survey	Denmark	Regional	Quantitative	Nurses	N = 43; Females (97.8%, n =42); Age: (>40 =62.7%) RR 49.4%
Borkowski, McKinstry, and Cotchett 2017[52]	Research culture in a regional allied health setting	Australia	Regional	Quantitative	Allied Health	N = 136; Females**; Age**: RR 46%
Chan et al 2011[68]	Barriers and perceived needs for understanding and using research among emergency nurses	USA	Not stated	Quantitative	Nurses	N = 978; Females**; Age**: RR 3.6%
Choo, Muninathan, Pung, and Ramanathan 2017[89]	Attitudes, barriers, and facilitators to the conduct of research in government hospitals: a cross-sectional study among specialists in government hospitals, northern states of Malaysia	Malaysia	Not stated	Quantitative	Physicians	N = 467; Females (49.9%, n =233); Age: 30–44yrs n=340 (72.8%) RR 63.7%
Cianciolo et al 2020[69]	Physician-scientist or basic scientist? Exploring the nature of clinicians' research engagement	USA and Pakistan	Urban and rural	Qualitative	Physicians	N = 36; Females (39%, n =14); Age: (34.5+9.5)
Connolly, Allum, Shaw, Pattison, and Dark 2018[75]	Characterising the research profile of the critical care physiotherapy workforce and engagement with critical care research: a UK national survey	UK	Not stated	Quantitative	Physiotherapists	N = 268; Females** Age**RR**
Conradie, Duys, Forget, and Biccard 2018[16]	Barriers to clinical research in Africa: a quantitative and qualitative survey of clinical researchers in 27 African countries	Africa	Not stated	Mixed methods	Physicians	N = 134; Females**; Age**: RR=32%
Dannapfel, Peolsson, and Nilsen 2013[85]	What supports physiotherapists' use of research in clinical practice? A qualitative study in Sweden	Sweden	Urban and rural	Qualitative	Physiotherapists	N = 45; Females (75%, n =33); Age: (41+11) RR**
Dannapfel, Peolsson, Stahl, Oberg, and Nilsen 2014[86]	Applying self-determination theory for improved understanding of physiotherapists' rationale for using research in clinical practice: a qualitative study in Sweden	Sweden	Urban and rural	Qualitative	Physiotherapists	N = 45; Females (75%, n =33); Age: (41.11+5) RR= RR**

Elphinston and Pager 2015[53]	Untapped potential: Psychologists leading research in clinical practice	Australia	Urban	Quantitative	Psychologists	N = 60; Females (77%, n =46); Age**: RR mean 26.1 across 3 time points
Finch, Cornwell, Nalder, and Ward 2015[54]	Uncovering motivators and stumbling blocks: Exploring the clinical research experiences of speech-language pathologists	Australia	Urban and rural	Qualitative	Speech language pathologists	N = 21; Females (100%, n =21); Age**: RR**
Harvey, Plummer, Nielsen, Adams, and Pain 2016[55]	Becoming a clinician researcher in allied health	Australia	Regional	Qualitative	Allied Health	N = 15; Females (87%, n =13); Age**: RR**
Hiscock et al 2014[56]	Clinical research potential in Victorian hospitals: the Victorian clinician researcher needs analysis survey	Australia	Urban and rural and remote	Quantitative	Allied Health Nurses Physicians	N = 1027; Females (67%, n =688); Age**: RR**
Ito-Ihara et al 2013[91]	An international survey of physicians regarding clinical trials: a comparison between Kyoto University Hospital (KUPH) and Seoul National University Hospital (SNUH)	Japan and South Korea	Urban	Quantitative	Physicians	KUPH N = 301; Females (17%, n = 50); Age ≤29 -≥50: RR 64% SNUH N = 398; Females 37% n = 147: Age ≤29->50: RR 45%
Janssen, Hale, Mirfin-Veitch, and Harland 2016[93]	Perceptions of physiotherapists towards research: a mixed methods study	New Zealand	Not stated	Mixed methods	Physiotherapists	N = 25; Females (84%, n =21); Age: (38.11); RR**
Jones, Griffith, Ubel, Stewart, and Jagsi 2016[32]	A mixed-methods investigation of the motivations, goals, and aspirations of male and female academic medical faculty	USA	Not stated	Mixed methods	Physicians	N = 1275; Females (45.6%, n =582); Age** RR=74.6%
Lowrie et al 2015[76]	Research is 'a step into the unknown': an exploration of pharmacists' perceptions of factors impacting on research participation in the NHS	UK	Urban and rural	Qualitative	Pharmacists	N = 54; Females (68%, n =37); Age** RR**
Luckson, Duncan, Rajai, and Haigh 2018[79]	Exploring the research culture of nurses and allied health professionals (AHPs) in a research-focused and a non-research-focused healthcare organisation in the UK	UK	Urban	Mixed methods	Allied Health Nurses	N = 224: Females (87%, n =194); Age** RR=24%
Mahmoud et al 2011[87]	Survey of medical specialists on their attitudes to and resources for health research in Nigeria	Nigeria	Not stated	Quantitative	Physicians	N = 51; Females (22%, n =11); Age**: (45.3+7.23) RR=63.3%
Mansi, Karam, and Chaaban 2019[70]	Attitudes of residents and program directors towards research in otolaryngology residency	USA	Not stated	Quantitative	Physicians	N = 209 Residents n =178 Program directors n= 31 Females**; Age**: RR**

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Table 2 (Continued).

Author and Year	Title	Country	Setting	Study Design	Type of Participants	Participants (No., Gender, Mean Age [Yrs.]) Response Rate
Marshall et al 2016[65]	Survey of research activity among multidisciplinary health professionals	Australia	Urban	Mixed Methods	Allied Health Nurses Physicians	N = 151; Females (56.2%, n = 82); Age** RR=2.5%
McDonald 2020[92]	Motivators and stressors for Canadian research coordinators in critical care: The motivate survey	Canada	Not stated	Quantitative	Allied Health Nurses Physicians	N = 66; Females**: Age**: RR=78%
McMaster, Jammali-Blasi, Andersson-Noorgard, Cooper, and McInnes 2013[57]	Research involvement, support needs, and factors affecting research participation: A survey of Mental Health Consultation Liaison Nurses	Australia	Not stated	Quantitative	Nurses	N = 31; Females (44%, n =14); Age: (50–59 yrs. =50%) RR=94%
McNab, Berry, and Skapetis 2019[58]	The potential of a lecture series in changing intent and experience among health professionals to conduct research in a large hospital: a retrospective pre-post design	Australia	Urban	Quantitative	Allied Health Nurses	N = 49; Females (89.8%, n =44); Age: (50–65years =47.9%) RR=38.9%
Mills et al 2019[3]	Attractions and barriers to Australian physician-researcher careers: Physician-researcher influences	Australia	Not stated	Quantitative	Physicians	N = 427; Females (44%, n =31); Age: (38+13): RR**
Oliver-Baxter, Brown, and McIntyre 2017[59]	Surviving or thriving in the primary health care research workforce: the Australian experience	Australia	Urban and rural and remote	Quantitative	Allied Health, Nurses, Physicians	N = 37; Females (75.7%, n =28); Age: (47.9+10.2): RR**
Pager, Holden, and Golenko 2012[60]	Motivators, enablers, and barriers to building allied health research capacity	Australia	Not stated	Quantitative	Allied Health	N = 85; Females**; Age**: RR**
Paget, Lilischkis, Morrow, and Caldwell 2014[66]	Embedding research in clinical practice: differences in attitudes to research participation among clinicians in a tertiary teaching hospital	Australia	Urban	Quantitative	Allied Health, Nurses, Physicians	N = 208; Females (76%, n =158); Age: <30 years =20%, 30–50 years =66%, >50 years =14%: RR=17%
Pain, Petersen, and Fernando 2018[61]	Building allied health research capacity at a regional Australian hospital: A follow-up study	Australia	Regional	Quantitative	Allied Health	2011: N = 248; Females (76%, n =188); Age**: RR43% 2015: N = 234; Females (76%, n =178); Age**: RR37%

Sarwar et al 2018[80]	Attitude, perception, willingness, motivation and barriers to practice-based research: A cross-sectional survey of hospital pharmacists in Lahore, Punjab, Pakistan	Pakistan	Urban	Quantitative	Pharmacists	N = 130; Females (42.3%, n =55); Age: <30yrs (82.3%) RR=92%
Scala, Patterson, Stavarski, and Mackay 2019[71]	Engagement in research: A clinical nurse profile and motivating factors	USA	Not stated.	Qualitative	Nurses	N = 34; Females (91.2%, n =31); Age**: RR**
Siedlecki and Albert 2016[72]	Research-active clinical nurses: against all odds	USA	Not stated	Qualitative	Nurses	N = 26; Females**; Age: (50+7.7): RR**
Silberman et al 2012[73]	Recruiting researchers in psychiatry: The influence of residency vs early motivation	USA	Urban	Quantitative	Physicians	N = 127; Females (51.6%, n =65.5); Age**: RR=67%
Snelgrove and James 2011[77]	Graduate nurses' and midwives' perceptions of research	UK	Not stated	Qualitative	Nurses	N = 58; Females** Age**: RR=29%
Stewart et al 2015[81]	Building hospital pharmacy practice research capacity in Qatar: a cross-sectional survey of hospital pharmacists	Qatar	Urban	Quantitative	Pharmacists	N = 213; Females (47.9%, n =102); Age**: RR= 53.1%
Stewart et al 2019[78]	A theoretically informed survey of the views and experiences of practicing pharmacists on research conduct, dissemination and translation	UK	Rural and remote	Quantitative	Pharmacists	N = 136; Females (76.5%, n =104); Age: (>45 30.9%) RR= 19.4%
Sultana, Al Jeraisy, Al Ammari, Patel, and Zaidi 2016[82]	Attitude, barriers and facilitators to practice-based research: cross-sectional survey of hospital pharmacists in Saudi Arabia	Saudi Arabia	Urban	Quantitative	Pharmacists	N = 182; Females (51.1%, n =93); Age**: RR=84%.
Torres et al 2017[90]	Assessment of research capacity among nursing faculty in a clinical intensive university in the Philippines	Philippines	Urban	Quantitative	Nurses	N = 66; Females (77%, n =51); Age**: RR 80.49%
van Hoving and Brysiewicz 2017[88]	African emergency care providers' attitudes and practices towards research	Africa	Not stated	Quantitative	Physicians, Nurses	N = 188; Females (27.4%, n =46); Age: (36.3+9.1) RR= 34.8%,
Wenke, Mickan, and Bisset 2017[62]	A cross sectional observational study of research activity of allied health teams: is there a link with self-reported success, motivators and barriers to undertaking research?	Australia	Regional	Quantitative	Allied Health	N = 95; Females**; Age**: RR**
Wenke, Noble, Weir, and Mickan 2020[63]	What influences allied health clinician participation in research in the public hospital setting: a qualitative theory-informed approach	Australia	Regional	Qualitative	Allied Health	N = 21; Females**; Age**: RR 2.9%

Note: **Values/categories not specified.

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both genders, 5620 (62.2%) of the 9039 participants were females. Only 19 studies indicated participants' mean age which ranged from 34.5 ± 9.5 to 50 ± 7.7 years.

Sixteen (16) of the studies were conducted in Australia,[3,52–66] eight from USA,[32,67–73] six from UK,[74–79] four from the Middle East,[69,80–82] four from Europe,[83–86] three from Africa,[16,87,88] two from South East Asia,[89,90] one from Japan and South Korea[91] and one each from Canada[92] and New Zealand[93] Study settings included 13 urban,-[53,58,64–67,73,79–82,90,91] six regional[52,55,61–63,84] and five urban and rural settings.[54,69,76,85,86] Two studies were conducted in all three settings (urban, rural and remote)[56,59] while one was located in rural and remote settings.[78] The setting type was not specified in 18 studies. The study designs were varied with 29 quantitative, 10 qualitative and six mixed methods studies.

Five studies focused on all HPs[56,59,65,66,92] as a heterogeneous group, two on AHPs and nurses[58,79] and one on nurses and physicians.[88] Overall, 18 studies concentrated on AHPs with 7 of those studies considering them as a homogenous group,[52,55,60–64] five studies were solely on pharmacists,[76,78,80–82] four on physiotherapists[75,85,86,93] and one each on psychologists[53] and speech language pathologists.[54] Ten studies focused on nurses-[57,67,68,71,72,74,77,83,84,90] and nine on physicians.[3,16,32,69,70,73,87,89,91]

While HPs' motivation to do research was investigated by all 45 reviewed studies, only eight studies utilised a theoretical framework or model in their investigation. These included Self-Determination Theory (SDT),[86] Social Cognitive Career Theory (SCCCT) and Professional Identity Formation as an integrated framework,[69] COM-B framework,[75] Vroom's Expectancy Theory,[71] Research-Active Nurse Model,[72] Theoretical Domains Framework (TDF),[78] Social Cognitive Theory,[82] combination of TDF and COM-B.[63]

Factors Influencing Motivation

In relation to factors influencing motivation, all the studies in this review were appraised utilising the EVC and SDT frameworks. A summary of the findings is presented in Table 3.

HPs' Research Capacity

Research capacity was investigated in the studies in terms of competence/confidence and expectancy to do research. As shown in Table 3, over half 25 (56%) of the reviewed studies identified their participants as competent to undertake research, while the participants in the remaining 20 (44%) studies were identified as lacking confidence and requiring support to undertake research.

Of the 25 studies where participants were identified as competent, seven focused on physicians (medical doctors).,[3,32,69,70,73,89,91] another seven on AHPs,[52,55,60–64] four of which targeted pharmacists.[78,80–82] Five studies focused on nurses, four on all HP groups and one each on nurse-physician group and nurse-AHP group. Most participants who felt competent perceived that they had the required abilities, skills, and knowledge to participate in research. For example, participants in one study reported high competence levels ranging from 3.14 to 4.06 on a 5-point rating scale.[90] About 60–90% of participants who were identified as competent reported having prior research experience, with 66–75% confirming that they had formal training during their undergraduate education.-[3,58,65,66,70,75,80,82,88,90] Between 20% and 65% of this group of participants indicated that they had either completed or were undertaking a postgraduate qualification which had enhanced their research capacity.[59,60,71–73,75,77,78,81,82,88]

Eleven studies that targeted AHPs reported that the participants lacked competence/confidence to undertake research. Similar results were obtained for five studies focused on nurses, two on physicians and one each on all HP groups and nurse-AHP group. Common features for these studies were overwhelming poor research capacity, very little or no prior research training/experience, low research culture with other work roles taking priority and need for research support. In one study, participants indicated that they had never attended research training nor spent time on research and reported mean confidence level of 38% (SD 27).[93]

Overall, the results show that HPs' confidence and expectancy to undertake research is largely dependent on research skills and experience gained through research training during their undergraduate/postgraduate education. The medical doctors were the most confident to undertake research as indicated in seven out of nine studies (77.8%) compared to nurses in five out of 11 (45.5%) studies; and AHPs in seven out of 18 (38.9%) studies. This may be attributed to the reported early exposure to research training and research experience by the medical doctors in comparison to nurses and AHPs. These findings highlight the impact of research training on perceived competence, confidence, and capability to participate in research.

Table 3 Theoretical Framework Summary of Study Outcomes

Author and Year/ Reference #	Type of Participants	Theoretical Framework	Research Capacity	Attitude	Barriers
Akerjordet, Lode, and Severinsson 2012[83]	Nurses	NIL	*Lacks confidence requires support* *>20% wanted to improve research skills as did 56% of the 8% engaged in research*	*Positive – utility value* *Positive attitude to research by 40% all respondents*	Lack of designated time for research Lack of organisational support Lack of knowledge Lack of support including acceptance by colleagues, reward, and acknowledgement Lack of interest in research
Albert et al 2016[67]	Nurses	NIL	*Competent* *< 42% conducted research*	*Positive – utility value* *Mid-range scores for value and confidence in conducting research*	Lack of knowledge Lack of support including acceptance by colleagues, reward, and acknowledgement Access to literature
Alison, Zafiropoulos, and Heard 2017[64]	Allied Health	NIL	*Lacks confidence requires support* *Ten of the 19 items at the individual level had a median score of ≤5*	*Positive – utility value* *Main motivators to performing research reported by participants included: to develop skills (84%, n=210)*	Lack of designated time for research Lack of funding including incentives and failed grants Lack of training/resources/dedicated research team Lack of confidence, competence, skills, or experience Lack of organisational support Lack of interest in research Access to literature
Bench, Dowie-Baker, and Fish 2019[74]	Nurses	NIL	*Lacks confidence requires support* *27% respondents had desire to be involved in research. 87% reported never having published 61% never having presented at a conference*	*Negative – no connection to researchers* *Research not part of the role - Unpleasant and scary*	Lack of designated time for research Lack of confidence, competence, skills, or experience Lack of training/resources/dedicated research team Lack of knowledge

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Table 3 (Continued).

Author and Year/ Reference #	Type of Participants	Theoretical Framework	Research Capacity	Attitude	Barriers
Berthelsen and Holge-Hazelton 2015[84]	Nurses	NIL	*Lacks confidence requires support* *Interested in improving research skills*	*Very positive – attainment, intrinsic and utility value.* *Low theoretical knowledge and practical research competencies*	Lack of designated time for research Lack of confidence, competence, skills, or experience Lack of training/resources/dedicated research team Lack of support including acceptance by colleagues, reward, and acknowledgement Lack of interest in research
Borkowski, McKinstry, and Cotchett 2017[52]	Allied Health	NIL	*Lacks confidence requires support* *Low research capacity and culture with other work roles taking priority and lack of time and skills*	*Positive – utility value* *Focus on developing skills but unable to overcome numerous barriers*	Lack of designated time for research Lack of confidence, competence, skills, or experience
Chan et al 2011[68]	Nurses	NIL	*Lacks confidence requires support* *Overwhelming lack of research experience but highly interested*	*Very positive – attainment, intrinsic and utility value*	Lack of confidence, competence, skills, or experience Lack of knowledge Lack of support including acceptance by colleagues, reward, and acknowledgement
Choo, Muninathan, Pung, and Ramanathan 2017[89]	Physicians	NIL	*Competent* *34.8% unlikely to participate in research under present working conditions*	*Negative – no connection to researchers* *Identified research benefits for patients and society (98.9%) and professional development (93.3%).* *However, less than half perceive research to be one of their job functions (49.7%)*	Lack of designated time for research Lack of funding including incentives and failed grants Lack of training/resources/dedicated research team Lack of support including acceptance by colleagues, reward, and acknowledgement
Cianciolo et al 2020[69]	Physicians	SCCT and Professional Identity Formation	*Competent* *Pakistan better alignment between clinicians' research success and national priorities than U. S*	*Very positive – attainment, intrinsic and utility value* *Clinicians and scientists resilient in pursuing research*	Lack of funding including incentives and failed grants

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Connolly, Allum, Shaw, Pattison, and Dark 2018[75]	Physiotherapists	COM-B model. capability, opportunity, motivation, and behaviour	*Competent* *84.7% indicated existing research experience.* *60.8% had postgraduate qualifications at master's level or above*	*Very positive – attainment, intrinsic and utility value.* *24.2% of respondents currently involved in research. 10.4% not interested in any research training.*	Lack of designated time for research Lack of funding including incentives and failed grants Lack of confidence, competence, skills, or experience
Conradie, Duys, Forget, and Biccard 2018[16]	Physicians	NIL	*Lacks confidence requires support* *Potential for research once barriers are addressed.*	*Very positive – attainment, intrinsic and utility value*	Lack of training/resources/dedicated research team Lack of support including acceptance by colleagues, reward, and acknowledgement. Barriers to successful participation in ASOS related to resource limitations and not motivation of the clinician investigators.
Dannapfel, Peolsson, and Nilsen 2013[85]	Physiotherapists	NIL	*Lacks confidence requires support* *Research use* *Changes in practice based on research findings, which reflects changes in thinking rather than actual behaviour*	*Very positive – attainment, intrinsic and utility value* *Positive attitudes to research and a strong motivation to use research in clinical practice*	Lack of designated time for research Lack of knowledge Lack of confidence, competence, skills, or experience Lack of support including acceptance by colleagues, reward, and acknowledgement Access to literature
Dannapfel, Peolsson, Stahl, Oberg, and Nilsen 2014[86]	Physiotherapists	Self-determination Theory SDT	*Lacks confidence requires support* *Motivation measured along continuum of autonomy from intrinsic – extrinsic-amotivated*	*Very positive – attainment, intrinsic and utility value* *Autonomous forms of motivation were most common*	Lack of interest in research
Elphinston and Pager 2015[53]	Psychologists	NIL	*Competent* *Greater research capacity of psychologists compared with other allied health professions*	*Negative – no connection to researchers* *Majority of psychologists in study perceived that research not part of their work* role	Lack of designated time for research Lack of funding including incentives and failed grants Lack of organisational support
Finch, Cornwell, Nalder, and Ward 2015[54]	Speech language pathologists	NIL	*Lacks confidence requires support* *Time constraints from their clinical caseload greatly limited their research engagement*	*Fear of research* *Lack of research training was viewed as a key obstacle preventing participants who were not engaged in research from partaking in research related activities*	Lack of designated time for research Lack of organisational support Lack of support including acceptance by colleagues, reward, and acknowledgement Lack of training/resources/dedicated research team

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Table 3 (Continued).

Author and Year/ Reference #	Type of Participants	Theoretical Framework	Research Capacity	Attitude	Barriers
Harvey, Plummer, Nielsen, Adams, and Pain 2016[55]	Allied Health	NIL	*Lacks confidence requires support* *Clinician researcher career trajectory*	*Very positive – attainment, intrinsic and utility value* *Predisposing personal qualities and exposure to research facilitated a research debut by priming participants to take advantage of workplace opportunities for research.*	Lack of designated time for research Lack of funding including incentives and failed grants Lack of organisational support Lack of support including acceptance by colleagues, reward, and acknowledgement
Hiscock et al 2014[56]	Allied Health, Nurses, Physicians	NIL	*Competent* *Gender, age, occupation, and postgraduate qualification – were significantly associated with research activity*	*Very positive – attainment, intrinsic and utility value* *Research-inactive clinicians identified protected research time as the key enabler of future research.*	Lack of designated time for research Lack of organisational support Lack of training/resources/dedicated research team Lack of support including acceptance by colleagues, reward, and acknowledgement
Ito-Ihara et al 2013[91]	Physicians	NIL	*Competent* *Physicians with experience in clinical trials*	*Positive – utility value* *Showed interest in conducting clinical trials*	Lack of designated time for research Lack of funding including incentives and failed grants Lack of organisational support Lack of training/resources/dedicated research team Lack of support including acceptance by colleagues, reward, and acknowledgement Unrealistic workload and tedious research process
Janssen, Hale, Mirfin-Veitch, and Harland 2016[93]	Physiotherapists	NIL	*Lacks confidence requires support* *56% of subjects had not attended a research course and 60%* *Confidence in conducting research ranged from 0 to 100 [mean 38 (SD 27)]*	*Positive – utility value* *Physiotherapists were generally positive towards research but struggled with the concept of research. use of research vs participation in research.*	Lack of confidence, competence, skills, or experience
Jones, Griffith, Ubel, Stewart, and Jagsi 2016[32]	Physicians	NIL	*Competent* *Attrition from academic medicine may be more so due to a* combination of conflicting values	*Very positive – attainment, intrinsic and utility value.* *Elite sample of highly apt and research-motivated clinician– investigators*	Lack of designated time for research Lack of funding including incentives and failed grants Lack of support including acceptance by colleagues, reward, and acknowledgement

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Lowrie et al 2015[76]	Pharmacists	NIL	*Lacks confidence requires support. Active engagement in research is set out as a part of the role however, saw research as an activity that involved substantial personal cost for limited personal gain.*	*Negative – no connection to researchers* *HSR for most pharmacists, for multiple reasons, was viewed as an exceptional activity rather than a core role.*	Lack of designated time for research Lack of confidence, competence, skills, or experience Lack of organisational support Lack of interest in research
Luckson, Duncan, Rajai, and Haigh 2018[79]	Allied Health, Nurses	NIL	*Lacks confidence requires support* *Individuals lacking adequate skills to undertake most aspects of research.*	*Positive – utility value* *Partner with external links such as universities to do research.*	Lack of confidence, competence, skills, or experience Lack of organisational support Lack of knowledge Lack of support including acceptance by colleagues, reward, and acknowledgement
Mahmoud et al 2011[87]	Physicians	NIL	*Lacks confidence requires support* *Internet always source of literature search for 96.1% library 28%.*	*Very positive – attainment, intrinsic and utility value.* *Advancement of knowledge strongest motivator for research 78.4%*	Lack of designated time for research Lack of confidence, competence, skills, or experience Access to literature Lack of research opportunities
Mansi, Karam, and Chaaban 2019[70]	Physicians	NIL	*Competent* *90% of the residents reported previous research experience during medical school, and 71.6% reported research during their undergraduate education*	*Very positive – attainment, intrinsic and utility value.* *More than half (56%) of the residents surveyed agreed that resident research is a positive experience overall.*	Lack of designated time for research Lack of knowledge Lack of interest in research
Marshall et al 2016[65]	Allied Health, Nurses, Physicians	NIL	*Competent* (n = *113; 75.3%) reported they had actively participated in ethics-approved research.*	*Very positive – attainment, intrinsic and utility value.* *Embedding research in clinical practice was critical and should be seen as core business*	Lack of designated time for research Lack of research opportunities
McDonald 2020[92]	Allied Health, Nurses, Physicians	NIL	*Lacks confidence requires support. Mainly involved in applying for research ethics board approvals, entering data, attending study start-up and update meetings, and screening patients for study eligibility.*	*Positive – utility value* *Overall, 26% were* "very satisfied" *and 53% were* "satisfied" *with their jobs.*	Lack of designated time for research Lack of support including acceptance by colleagues, reward, and acknowledgement Unrealistic workload and tedious research process Felt undervalued

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Table 3 (Continued).

Author and Year/ Reference #	Type of Participants	Theoretical Framework	Research Capacity	Attitude	Barriers
McMaster, Jammali-Blasi, Andersson-Noorgard, Cooper, and McInnes 2013[57]	Nurses	NIL	*Lacks confidence requires support* *Majority of respondents reported no current involvement in research*	*Positive – utility value* *Over half of participants in our study reported having research goals for the following 12 months*	Lack of designated time for research Lack of confidence, competence, skills, or experience Lack of organisational support Lack of training/resources/dedicated research team Lack of interest in research
McNab, Berry, and Skapetis 2019[58]	Allied Health, Nurses	NIL	*Competent* *Six one-hour face to face research lectures improvement in self-reported levels of intention to become involved in research as well as research experience.*	*Positive – utility value* *Significant change in the self-assessed level of experience was seen in a wide range of research areas.*	NIL
Mills et al 2019[3]	Physicians	NIL	*Competent* *49% agreed that medical research is a lifestyle-friendly career*	*Positive – utility value* *Improve human health, intellectual stimulation, and career diversity*	Lack of designated time for research Lack of funding including incentives and failed grants Lack of training/resources/dedicated research team Unrealistic workload and tedious research process
Oliver-Baxter, Brown, and McIntyre 2017[59]	Allied Health, Nurses, Physicians	NIL	*Competent* *Higher research degree graduates completed their RHD in the last 5 years*	*Positive – utility value* *Importance of connection/relatedness. Stayers are more affiliated with professional organisation than leavers.*	Lack of designated time for research Lack of funding including incentives and failed grants
Pager, Holden, and Golenko 2012[60]	Allied Health	NIL	*Competent* *43.9% of all participants had postgraduate qualifications. About half were required to do research as part of their role description.*	*Very positive – attainment, intrinsic and utility value* *Desire to develop skills, increase job satisfaction, and address identified problems*	Lack of designated time for research Lack of funding including incentives and failed grants Lack of organisational support Lack of training/resources/dedicated research team Lack of knowledge Lack of support including acceptance by colleagues, reward, and acknowledgement

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Paget, Lilischkis, Morrow, and Caldwell 2014[66]	Allied Health, Nurses, Physicians	NIL	*Competent* *Most participants identified themselves as having research skills or experience (63%) or formal research training (66%)*	*Very positive – attainment, intrinsic and utility value.* *Enjoy participating in research (68%) and the departments value research (66%)*	Lack of designated time for research Lack of funding including incentives and failed grants Lack of organisational support Lack of training/resources/dedicated research team Lack of support including acceptance by colleagues, reward, and acknowledgement
Pain, Petersen, and Fernando 2018[61]	Allied Health	NIL	*Lacks confidence requires support. Research experience increased from 2011 to 2015 as did the need for support. Conducting research was part of role description.*	*Positive – utility value* *Make a difference in clinical care (56.8%) and evaluate their service (52.6%).*	Lack of designated time for research
Sarwar et al 2018[80]	Pharmacists	NIL	*Competent* *Majority of the respondents* (n = *112, 86.2%) agreed* *with the statement* "I have the required abilities to participate in research".	*Positive – utility value* *Uplifting of the profession,* *opportunity to gain knowledge, provide better services and increased patient care.*	Lack of designated time for research Lack of funding including incentives and failed grants Lack of knowledge Lack of research opportunities
Scala, Patterson, Stavarski, and Mackay 2019[71]	Nurses	Vroom's expectancy theory framework:	*Competent* *7 (20.6%) Master's degree*	*Positive – utility value* *Feeling empowered to make a difference and legitimize the profession*	Lack of organisational support
Siedlecki and Albert 2016[72]	Nurses	Research-Active Nurse Model	*Competent* *65% Master's Degree*	*Very positive – attainment, intrinsic and utility value.* *Passion for enquiry; they enjoyed the process, despite the work and personal time involved.*	Lack of designated time for research Lack of funding including incentives and failed grants Lack of knowledge
Silberman et al 2012[73]	Physicians	NIL	*Competent* *30.7% had master's or doctoral degrees in addition to medical degrees.*	*Very positive – attainment, intrinsic and utility value.* *Had a consistent pattern of interest and involvement in research, starting well before residency.*	Lack of funding including incentives and failed grants Barriers specific to women
Snelgrove and James 2011[77]	Nurses	NIL	*Competent* *Most participants had completed or were completing a master's level degree*	*Research frightening/Lack of connection and institutional support. Despite positive attitudes and some research education, many of the participants described research as* 'frightening', *with a lack of skills cited as a determinant of this fear*	Lack of organisational support Lack of training/resources/dedicated research team

(*Continued*)

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Table 3 (Continued).

Author and Year/ Reference #	Type of Participants	Theoretical Framework	Research Capacity	Attitude	Barriers
Stewart et al 2015[81]	Pharmacists	NIL	*Competent* *One third (32.9%, n = 70) had completed a postgraduate course, one third (30.0%, n = 64) were currently studying for a postgraduate qualification.*	*Positive – utility value* *Generally held positive attitudes, with a median overall score of 13 (IQR 8–18), range possible 8–40, with 8 representing best positive attitudinal score*	Lack of organisational support Lack of training/resources/dedicated research team
Stewart et al 2019[78]	Pharmacists	Theoretical Domains Framework TDF	*Competent* *Postgraduate qualifications 58.1% (79) 14.7% (n=20) had been involved in research in the past and had plans to be involved in the future, and 12.5% (n=17) were currently involved in research.*	*Positive – utility value* *Attainment value – 94% benefit to profession.* *Utility value – benefit to patients 90.45 benefit to self-72.6%.*	Lack of designated time for research Lack of organisational support Lack of support including acceptance by colleagues, reward, and acknowledgement
Sultana, Al Jeraisy, Al Ammari, Patel, and Zaidi 2016[82]	Pharmacists	Social cognitive theory	*Competent* *Prior research experience was reported by 59% of participants.* *More than 40% of participants hold Masters degree in pharmacy.*	*Positive – utility value* *70% of the participants were interested in doing practice-based research with nearly half willing to make time for it.*	Lack of designated time for research Lack of organisational support Lack of research opportunities
Torres et al 2017[90]	Nurses	NIL	*Competent* *Perceived knowledge and skills of the research process were above 3 on a 5-point scale (means ranged between 3.14 and 4.06).*	*Positive – utility value* *Professional advancement, tenure and promotion, research record*	Lack of confidence, competence, skills, or experience Lack of knowledge Unrealistic workload and tedious research process
van Hoving and Brysiewicz 2017[88]	Physicians, Nurses	NIL	*Competent* *Honours or Masters degree - 44 (26.2%).* *Doctoral degree - 35 (20.8%)*	*Positive – utility value* *Improvement of research skills (70.2%) and having research published (69.6%)*	Lack of designated time for research Lack of funding including incentives and failed grants Lack of training/resources/dedicated research team Access to literature

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Wenke, Mickan, and Bisset 2017[62]	Allied Health	NIL	*Lacks confidence requires support. 80% of interviews was a lack of belief or confidence in their capability to undertake aspects of research*	*Positive – utility value* *Better patient outcomes*	Lack of designated time for research Lack of funding including incentives and failed grants Lack of confidence, competence, skills, or experience Lack of training/resources/dedicated research team Lack of support including acceptance by colleagues, reward, and acknowledgement
Wenke, Noble, Weir, and Mickan 2020[63]	Allied Health	Theoretical Domains Framework YES – TDF & COM- B system	*Lacks confidence requires support* *All 'novice' researchers and had no formal postgraduate research qualifications*	*Fear of failure or feeling intimidated* *Clinicians described feeling overwhelmed or intimidated at the thought of undertaking research*	Lack of designated time for research Lack of funding including incentives and failed grants Lack of confidence, competence, skills, or experience

HPs Attitude – This Relates to Value and Connection

As depicted in Table 3, participants' attitude to research was assessed as very positive in 17 (38%) studies,-[16,32,55,56,60,65,66,68–70,72,73,75,84–87] positive in 21 (47%) studies[3,52,57–59,61,62,64,67,71,78–83,88,90–93] and negative in four (9%)[53,74,76,89] studies.

The 17 studies in which HPs were deemed very positive included six on medical doctors,[16,32,69,70,73,87] five on AHPs,[55,60,75,85,86] three on nurses[55,60,75,85,86] and three on a combination of the three groups.[56,65,66] The 21 studies that identified respondents as positive comprised nine on AHPs,[52,61,62,64,78,80–82,93] (including four on pharmacists-[78,80–82] and one on physiotherapists),[93] five on nurses,-[57,67,71,83,90] two on medical doctors[3,91] and five on a combination of the HP groups – two focused on all three HP groups,[59,92] two on AHPs and nurses[58,79] and one on medical doctors and nurses[88] The four studies in which HPs were identified as negative included two on AHPs – pharmacists[76] and psychologists,[53] one each on nurses[74] and medical doctors.[89] Another three studies reported their respondents as being afraid of research – two on AHPs[54,63] and one on nurses.[77]

Generally, participants who demonstrated very positive attitude towards research were keen to contribute to clinical practice by engaging in collaborative research to advance clinical knowledge and improve patient health outcomes (utility value). Additionally, they were avidly interested in publishing, producing new knowledge, gaining grants and getting respect of colleagues (attainment value) as well as broadening personal scope of professional career and becoming knowledgeable researchers with genuine interest in research as a problem-solving tool[32,55,69,87] (intrinsic value). This group of participants had genuine curiosity and willingness to learn, were mostly satisfied with their jobs, wanted to develop research skills so they could increase knowledge and develop cutting edge research that proffer solutions to clinical problems.[55,60,75,85,86] They also felt a strong connection to research and their profession bodies. For example, research active pharmacists reported the importance of research in uplifting the pharmacy profession and enjoyed reading articles.[80,82]

Participants who demonstrated positive attitude mainly viewed research as beneficial for making a difference in clinical care with improved patient health outcomes and service delivery.[16,70,73,91] This group focused on the utility of research and mainly focused on its benefits in improving clinical care and practice. For participants who were

negative, the common attitude reported included perceived benefit only for the institution in which they worked.[89] They also did not feel supported by their organisation and therefore did not consider research as part of their role. Interestingly, one study on the medical group identified its participants as negative/not involved in research and perceived the value of research as solely for the benefit of patients and the institution in which they worked.[89] Nurses were negative in one study[74] and found research frightening in another.[77] Two studies on AHPs fell under the fear of research category.[54,63] This group of participants reported minuscule[63] or no value[54] for research and emphasised the need for connection and relatedness. Participants in the negative/fear of research groups were of the opinion that research was a "huge undertaking" and "daunting task".[57]

Overall, most of the participants in the medical group were very positive while the AHP and nursing groups were mostly in the positive category. Intrinsic value was seen as a pre-requisite for motivation, while utility value is the trigger for research to satisfy the need in clinical practice.[72] The results suggest that very positive attitude towards research is based on intrinsic and attainment values and these help the HPs develop strong long-term connection with research. On the other hand, negative attitude seemed to be linked to perceived low organisational support for research. Although participants with negative attitude acknowledged that research could improve clinical practice and boost professional reputation, but feelings of poor connection to research team created disillusion or fear. These findings indicate that sense of value and connection could be paramount in determining HPs' level of motivation to engage with research.

HPs Barriers to Undertaking Research Relates to Cost and Autonomy

Table 4 depicts the barriers identified by the participant groups. The most frequently reported barriers to undertaking research were lack of time and funding. Lack of designated time for research was reported in 32 (71%) studies[3,32,52–57,59–66,70,72,74–76,78,80,82–85,87–89,91,92] while lack of funding (including incentives and failed grants) was identified as a significant barrier to conducting research in 18 (40%) studies, mostly by the medical

Table 4 Major Types of Barriers by Participant Groups

Participants	Number of studies and #	Major Barriers
Physicians	6[3,32,69,73,89,91]	Lack of funding including incentives and failed grants
AH, Nurses, Physicians	2[59,66]	
Physicians, Nurses	1[88]	
AH	8[53,55,60,62–64,75,80]	
Nurses	1[72]	
Total	18	
AH	8[62–64,75,76,85,93,94]	Lack of confidence, competence, skills, or experience
Nurses	5[57,68,74,84,90]	
AH, Nurses	1[79]	
Physicians	1[87]	
Total	15	
AH	9[53–55,60,64,76,78,81,82]	Lack of organisational support
Nurses	4[57,71,77,83]	
AH, Nurses, Physicians	2[56,66]	
AH, Nurses	1[79]	
Physicians	1[91]	
Total	17	
AH	4[60,62,64,81]	Lack of training/ resources/dedicated research team
Nurses	4[57,74,77,84]	
Physicians	4[3,16,89,91]	
AH, Nurses, Physicians	2[56,66]	
Physicians, Nurses	1[88]	
Total	15	
Nurses	6[67,68,72,74,83,90]	Lack of knowledge
AH	3[80,85,95]	
AH, Nurses	1[79]	
Physician	1[70]	
Total	11	
AH	5[55,60,62,78,85]	Lack of support (including acceptance by colleagues, reward, and acknowledgement)
Physicians	3[16,32,91]	
Nurses	2[68,84]	
AH, Nurses, Physicians	2[66,92]	
AH, Nurses	1[79]	
Total	13	
AH	2[54,60]	Lack of supervisors/ mentors
Nurses	2[67,83]	
AH, Nurses, Physicians	2[56,66]	
Physicians	2[89,91]	
Total	8	

(*Continued*)

Table 4 (Continued).

Participants	Number of studies and #	Major Barriers
AH Nurses Physicians	3[64,76,86] 3[57,83,84] 1[70]	Lack of interest in research
Total	7	
AH Nurses AH, Nurses, Physicians Physicians	1[64] 1[90] 1[88] 2[3,91]	Unrealistic workload and tedious research process
Total	5	
AH Nurses Physicians, Nurses Physicians	2[64,85] 1[67] 1[88] 1[87]	Access to literature
Total	5	
AH AH, Nurses, Physicians Physicians	2[80,82] 1[65] 1[87]	Lack of research opportunities
Total	4	
AH, Nurses, Physicians	1[92]	Felt undervalued
Total	1	
Physicians	1[73]	Barriers specific to women
Total	1	

doctors,[3,32,59,66,69,73,88,89,91] followed by the AHPs[53,55,60,62–64,75,80] and nurses.[72,88]

Respondents in 15 (33%) studies reported lack of confidence, competence, skills and/or research experience,-[57,62–64,68,74–76,79,84,85,87,90,93,94] while 17 (38%) studies reported lack of organisational support as a significant barrier to research involvement[53–57,60,64,66,71,76–79,81–83,91] Lack of research competence and organisational support were mostly flagged by the AHPs,[52–55,60,62–64,75,76,78,79,81,82,85,93] followed by the nurses-[57,68,71,74,77,83,84,90] and only few medical doctors.[87,91]

Lack of training/resources/dedicated research team was mentioned by participant groups in 15 studies (33%)-[3,16,56,57,60,62,64,66,74,77,81,84,88,89,91] Lack of knowledge was of concern in 11 studies (24%) and mostly acknowledged by the nursing group,[67,68,72,74,83,90] followed by the AHPs[79,80,85,95] and the medical group.[70] Lack of support (including acceptance by colleagues, reward and acknowledgement) was mentioned in 13 studies (29%) and mostly indicated by AHPs,[55,60,62,78,85] and the medical group.[16,32,91] Eight studies (18%) reported lack of supervision/mentors,[54,56,60,66,67,83,89,91] seven studies (16%) reported lack of interest in research.-[57,64,70,76,83,84,86] Five studies each (11%) identified unrealistic workload/tedious research process[3,64,90–92] and access to literature as barriers to research, while lack of research opportunities was reported in 4 studies (9%).-[65,80,82,87] Participants felt undervalued in one study[92] while another study found barriers specific to women[73] as a deterrent to their participation in research.

Overall, AHPs reported more barriers than nurses and medical doctors, particularly in relation to lack of organisational support, confidence, training, and acceptance by colleagues. Major barriers for nurses were lack of knowledge, training, and confidence; while for medical doctors, it was lack of funding. The results show that the AHPs and nurses were less able to demonstrate autonomy to engage with research in comparison to the medical doctors and they were mostly limited by lack of knowledge, training, and confidence which are important pre-requisites of research capability. This finding indicates that just as research knowledge and training can foster confidence and competence, lack of them can also serve as major and costly barriers that limit HPs' capacity to participate in research.

Integration of the Elements of the Conceptual Frameworks

Integration of the findings based on the EVC[33,34] and SDT[40,41] theories indicate strong interactions between the three components – research capacity (expectancy and competence), attitude (value and connection), and barriers (cost and autonomy). Table 5 presents the relationship between the components that influence motivation to engage in research. Generally, HPs who were reported as competent (mostly studies on medical doctors or combination of all three groups[32,56,60,65,66,69,70,72,73,75]) had prior exposure to research training either in their undergraduate or postgraduate education. This boosted their confidence and facilitated interest and connection with research in their career paths. In addition, engagement with research was based on the type of value (utility, intrinsic and attainment) HPs attached to research. Those who were

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Table 5 Integration of Theoretical Framework Elements by Participant Groups

Research Capacity	Attitude	Participants	Numbers	Major Barriers	Summary
Competent	*Very positive – attainment, intrinsic and utility value*	AH AH Physiotherapists AH, Nurses, Physicians Physicians Nurses	1[60] 1[75] 3[56,65,66] 4[32,69,70,73] 1[72]	Multiple barriers	Demonstrated all three types of value, felt connected to other research colleagues and despite multiple barriers, they had genuine interest which fostered their capacity for on-going, long-term research. Viewed research as highly beneficial in advancing clinical knowledge, improving patient health outcome (utility value), producing new knowledge, gaining recognition (attainment value) as well as broadening personal scope of professional career and building sustainable problem-solving systems to identify solutions to key clinical problems (intrinsic value).
		Total	10		
Competent	*Positive – utility value*	AH Pharmacists AH, Nurses AH, Nurses, Physicians Physicians Physicians, Nurses Nurses	4[78,80–82] 1[58] 1[59] 2[3,91] 1[88] 3[67,71,90]	Multiple barriers	Competent and positive in their attitude, but they exhibited only utility value because connection with professional organisation was lacking
		Total	12		
Competent	*Negative – no connection to researchers*	AH Psychologists Physicians	1[53] 1[89]	Lack of organisational support	High confidence/competence levels, but they were negative and feared research Perception that research was not part of their job roles and there was no organisational support, so they did not see the connection with the research community
		Total	2		
Competent	*Fear of Research*	Nurses	1[77]	Lack of organisational support Lack of training/resources/dedicated research team	As above
		Total	1		
		Total Competent	25		

Lacks confidence requires support	*Very positive – attainment, intrinsic and utility value*	AH AH Physiotherapists Physicians Nurses	1[55] 2[85,86] 2[16,87] 2[68,84]	Lack of organisational support Lack of training/resources/dedicated research team	Lacked confidence but because of their predisposing personal qualities and exposure to research, which was facilitated by workplace research opportunities, they had very positive attitude towards research
		Total	7		
Lacks confidence requires support	*Positive – utility value*	AH AH Physiotherapists AH, Nurses AH, Nurses, Physicians Nurses	4[52,61,62,64] 1[93] 1[79] 1[92] 2[57,83]	Lack of organisational support Lack of training/resources/dedicated research team Lack of support including acceptance by colleagues, reward, and acknowledgement	Perceived only the utility value
		Total	9		
Lacks confidence requires support	*Negative – no connection to researchers*	AH Pharmacists Nurses	1[76] 1[74]	Lack of organisational support Lack of training/resources/dedicated research team Lack of knowledge	Perceived that it had no value and involved a lot of personal cost for limited personal gain
		Total	2		
Lacks confidence requires support	*Fear of Research*	AH AH Speech language pathologists	1[63] 1[54]	Lack of organisational support Lack of training/resources/dedicated research team	Perceived that it had no value and involved a lot of personal cost for limited personal gain
		Total	2		
		Total Lacks confidence requires support	20		

Abbreviations: EVC, expectancy-value theory; SDT, self-determination theory; HMR, translational health and medical research; HPs, health professionals; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses; EVC, expectancy-value-cost model of motivation; QATSDD, Quality Assessment Tool for Studies with Diverse Designs.

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very positive demonstrated all three types of value, felt connected to other research colleagues and despite multiple barriers, they had genuine interest which fostered their capacity for on-going, long-term research. They viewed research as highly beneficial in advancing clinical knowledge, improving patient health outcomes (utility value), producing new knowledge, gaining recognition (attainment value) as well as broadening personal scope of professional career and building sustainable problem-solving systems to identify solutions to key clinical problems (intrinsic value). Some HPs (mostly AHPs and nurses) were competent and positive in their attitude, but they exhibited only utility value[3,58,59,67,71,78,80–82,88,90,91] because connection with professional organisation was lacking.[3,59] Interestingly, another group of HPs reported high confidence/competence levels, but they were negative and feared research.[53,77,89] The reason for this attitude was the perception that research was not part of their job roles and there was no organisational support, so they did not see the connection with the research community.[53] This same reason was observed for HPs who lacked confidence, had no prior exposure and had negative attitude towards research.[54,63,74,76] They perceived that it had no value and involved a lot of personal cost for limited personal gain.[76] Others lacked confidence but because of their predisposing personal qualities and exposure to research, which was facilitated by workplace research opportunities, they had positive attitude towards research.[16,55,68,84–87]

Overall, the type of value attributed to research directly influenced the relevance of barriers and affected motivation to participate in research. As shown in Figure 2, participants who were very positive displayed an attitude inclusive of attainment, intrinsic and utility values as well as connectedness to research and were able to overcome the barriers relating to cost with a display of great autonomy. HPs who were positive but lacking confidence/requiring support, mainly subscribed to utility values and were limited by the burden of barriers. HPs who reported low expectancy and competence, exhibited total lack of value for research, had no sense of belonging or attachment to researchers in their organisations, focused on the barriers/ limitations and therefore had no interest to undertake research. These findings indicate that prior exposure to research training increases expectancy and confidence, but type of value placed on research determines the strength of connection to research, and ability to disregard the myriads of challenges/barriers. High values foster on-going intrinsic commitment and long-term motivation to engage with research.

Discussion

Various strategies and assumptions have been made and tested regarding the reasons for the decline in the uptake/continuation of research by HPs and how to build research capacity among HPs.[3,7,55,61,96–98] Despite these efforts, little headway has been made which necessitates taking the opportunity of examining HPs engagement in research through a different lens. This review has explored the literature with a focus on understanding HPs' motivation to do research through the EVC[33,34] and SDT[40,41]

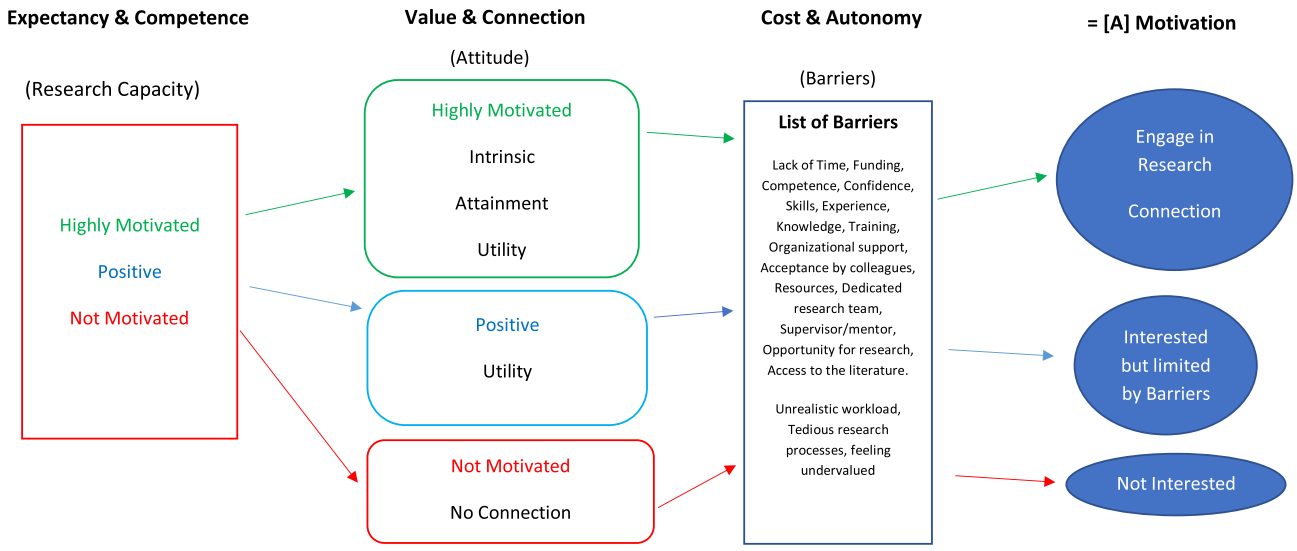

Figure 2 Process of motivation to do research.

theoretical constructs and an investigation of expectancy, research capacity, attitude and barriers as precursors to motivation to undertake/continue with research. The elements in these theories have been used to understand the interactions and sequence of occurrence of themes to allow for long-term motivation to do research.

Based on SDT with its elements of competence, connection, and autonomy, the review findings posit that competence is enhanced if there is prior exposure to research in undergraduate/postgraduate space and this then influences graduates when they come into the workspace as it helps them to get that connection and a sense of belonging with other research active members of the organisation and that makes them feel that they are in control and they are able to keep going.[41,44] However, if HPs have not had prior exposure to research and there is no perceived organisational support, they see the barriers or limitations more and that sometimes frightens them and stops them from engaging in research.[44]

EVC follows a similar pattern as it considers HPs' expectancy or anticipated ability to do research which is fostered by that confidence gained from prior exposure to research in their undergraduate/postgraduate years. Taking it one step further, EVC helps to unpack the importance of value that is attached to research. The findings from this review predicate that even when research training is strong, which is important for confidence building and expectancy to do well in research, what keeps HPs motivated and helps them to overlook or disregard the myriads of barriers is the kind of value they attach to research.

Factors which motivate and facilitate research by HPs are dependent on both extrinsic and intrinsic variables.[49] These variables are dynamic in nature and are influenced at the individual, organisational and cultural level in a dynamic research ecosystem.[98] In this review, in most cases those who were competent in their research capacity, with high expectations of success and had very positive attitude towards research demonstrated all three values attributed to doing research (intrinsic – personal enjoyment, utility – future usefulness and attainment – doing well). This group of HPs were keen to take up research despite the barriers. Those who had a positive attitude were only motivated to do research because of its utility value, although they did not necessarily see it as having personal relevance for themselves.[57,61,88,90,93] Those who were unmotivated did not see any connection or relatedness to the research experience for themselves, felt it was too difficult and had very low ability beliefs which devalued active participation in research.[54,74,76,77] Ability beliefs have been predicted to positively impact expectancy and research capacity, while task difficulty negatively impacts expectancy.[33]

The barriers to involvement in research which were identified in this review corroborate previous literature findings and centre around lack of knowledge and skills to conduct research,[94,97] lack of protected research time,[99,100] lack of funding[69,101,102] and lack of support from colleagues, and the organisation.[54,74,76,77] Clinical workloads take precedence over time available for research[17,56] and this was confirmed in a recent Australian study which reported that 55% of research active doctors spend most of their time on clinical activities.[3] Studies have also shown that research careers pay lower salary than clinical careers[3,13] and offer lower job security relative to clinical careers.[3,101] These issues are compounded by the difficulty in getting research grants[13,32] and the lower funding rates available for research.[3,102] Lack of resources was also a deterrent for otherwise motivated medical professionals to engage in research.[16,32]

The lack of support, acceptance by colleagues, reward and acknowledgement highlighted in this review can be attributed to lack of organisational support. Studies have shown that organisational challenges such as lack of acknowledgement and recognition of medical professionals undertaking a research role by their peers and by the organisation for which they work are significant barriers to research involvement.[32,103] Several studies found that medical professionals had difficulty finding a mentor for their research project.[102,104,105] In this review, for HPs who were negative, the emphasis was on the concept of lack of mentorship which would have offered a sense of connection to inspire an attitude of value (intrinsic, attainment, and/ or utility), boosting confidence and providing support for research participation.-[106,107] Effective mentorship has been identified as vital for HPs undertaking research[70,108,109] and an important contributor to research success.[110] Mentoring programmes that support the health researcher with resources and expertise will optimise research training and research outcomes.[60,111] Healthcare organisations in Australia,[21] the US[108,110,111] and the UK[96] have been encouraged to include meaningful mentoring programmes into their research profile at all stages of the clinical academic training and career pathway from medical student, intern and pre-vocational doctor, vocational trainee, post-doctoral/early fellowships and definite appointment.[21] Positive reinforcement by research active HPs is critical at all stages of the research training and career pipeline.[3,112] An effective mentorship program is integral to

establishing or building a research culture within the HPs' organisation.[56] Conducive organisational research culture enhances research capacity building, which is enhanced by developing organisational structure, processes and systems, developing appropriate links with external partners and research career pathways[16,94] to enable health researchers to conduct research in a safe, supportive and nurturing environment where research is valued and resourced.[96,113] An organisational culture that supports research and enables building research capacity through supporting research training, quarantined time for research and adequate funding espouses the value of research which engenders connection. Overall, barriers impact on attitude to conduct research[66,70,80,82–84,87–89,100] and by implication affect response to the cost of doing research and significantly contribute to undervaluing research.[49,65]

The concept of value in research is of primary importance and is an area that needs to be focused on, particularly during training.[61,64] Emphasis should be placed on the value elements of motivation, with focus on attainment and intrinsic motivation. Explaining that value goes beyond the utility of research in clinical practice, is a useful way of introducing and developing an appreciation of attainment value which is about professional gains and fostering intrinsic value, which is about being involved in finding solutions to clinical problems as such an approach may keep HPs engaged in research. This strategy may be worthy of consideration by accrediting professional bodies, educational institutions, funding bodies and workplace organisations in their endeavours to foster uptake and retention of research activities by HPs.

Of all three HP groups, AHPs were the most lacking confidence and requiring support which may be attributed to having less research training and research experience than the other groups. Nonetheless, it is interesting to note that amongst the AHPs, the pharmacists were the most confident to undertake research. The findings of this systematic review also indicate that medical professionals, possibly due to their prior exposure to research training and research experience are in a better position than AHPs and nurses to overcome the barriers. Future studies could investigate how HPs navigate their way through barriers at different career stages – early, mid-career, late career. Future explorations could also consider whether the three HP groups (AHPs, medical doctors, nurses) follow similar or dissimilar trajectories in terms of how their research values change over their career stages.

The ability to accurately inform potential researchers regarding the attractions and barriers to health research in their careers, and to implement strategies to reverse current concerning trends in the decline of health professionals engaging in research will help to ensure HPs' leadership in HMR into the foreseeable future. Furthermore, utilisation of theoretical frameworks that inform processes and facilitate a culture of HP research would enable optimisation of health workforce research capability and high-quality care.

Strengths and Limitations

The major strength of this review is the integration of the EVC and SDT theories which offer an overarching construct that provide in-depth understanding into HPs' motivation to do research. Additionally, the quality appraisal of the reviewed articles provides evidence for the methodological rigour of the reviewed articles and strengthens the interpretation of the findings because all the articles were assessed as medium to high-quality studies. However, interpretation of the results must be applied cautiously due to some inherent limitations of the review. Generalisation of the findings may be limited by the authors' interpretation of the investigated research elements/domains in the reviewed papers. Other limitations of this review include the heterogeneity of the included studies and the possible exclusion of relevant studies due to the pre-set inclusion criteria.

Conclusion

Overall, this review provides good evidence for the practicality of EVC and SDT in understanding HPs' motivation to do research. In line with SDT elements, competence is enhanced by prior exposure to research training, and this enhances autonomy and connection with other research active members of the organisation. Similarly, EVC considers HPs' expectancy or anticipated ability to do research which is fostered by confidence gained from prior exposure to research. EVC further emphasises the impactful effect of the type of value attributed to research on the relevance HPs attach to the myriads of barriers they face and their motivation to engage in research. The findings from this systematic review indicate priority facilitators to research participation revolve around the themes of allocated time for research, funding, research training, strong organisational research culture and mentorship program. The importance of confidence building and the expectation to succeed leading to competency through

research education and training is accentuated. Nonetheless, autonomy and on-going motivation to actively engage in research are mostly influenced by HPs' attitude vis-A-vis the three value components – intrinsic attainment and utility. Therefore, emphasis on the value attributes of research may be worthy of note by accrediting professional bodies, educational institutions, funding bodies and workplace organisations as critical to the research pipeline and the motivation of HPs to undertake research.

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