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Expert consensus on facilitators and barriers to return-to-work following surgery for non-traumatic upper extremity conditions: a Delphi study

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Abstract

This Delphi study aimed to reach consensus on important facilitators and barriers for return-to-work following surgery for non-traumatic upper extremity conditions. In Round 1, experts ($n = 42$) listed 134 factors, which were appraised in Rounds 2 and 3. Consensus (⩾85% agreement) was achieved for 13 facilitators (high motivation to return-to-work; high self-efficacy for return-to-work and recovery; availability of modified/alternative duties; flexible return-to-work arrangements; positive coping skills; limited heavy work exertion; supportive return-to-work policies; supportive supervisor/management; no catastrophic thinking; no fear avoidance to return-to-work; no fear avoidance to pain/activity; return to meaningful work duties; high job satisfaction) and six barriers (mood disorder diagnosis; pain/symptoms at more than one musculoskeletal site; heavy upper extremity exertions at work; lack of flexible return-to-work arrangements; lack of support from supervisor/management; high level of pain catastrophizing). Future prognostic studies are required to validate these biopsychosocial factors to further improve return-to-work outcomes.

Level of evidence: V

Keywords

Hand, wrist, shoulder, prognostic factors, work disability, sickness absence

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Introduction

Globally, the incidence of work-related upper extremity (UE) conditions is high (World Health Organization, 2003). Yet, prognostic factors for return-to-work (RTW) and remaining at work following surgery for non-traumatic UE conditions (such as carpal tunnel syndrome, lateral epicondylitis and rotator cuff tendinopathy) are poorly understood and inadequately researched. For workers with musculoskeletal conditions, establishing the prognostic value of factors that are internal or external to the injured worker using the biopsychosocial framework, is one way of identifying individuals who may be at greater risk of poorer outcomes. This information can be used to tailor interventions to facilitate the best possible results.

There are several options available to assist in identifying the prognostic factors for RTW. However, recent systematic reviews revealed that only a few studies have used high-quality prospective methods to examine prognostic factors for a delayed RTW or longer-term work disability for UE conditions (Peters et al., 2016a; Shi et al., 2014). Most studies used inferior retrospective and cross-sectional study designs,

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and often reported differing results for the same prognostic variable (Linton et al., 2005; Steenstra et al., 2013). Furthermore, the predictive factors investigated were often derived from administrative data from insurance agency databases or medical records, which typically fail to capture the multifaceted nature of the condition. In addition, there is a dearth of evidence on psychosocial factors that determine RTW following UE conditions (Peters et al., 2016a; Shi et al., 2014).

More than 100 prognostic factors for RTW and work disability have been identified in the literature (Foreman et al., 2006; Krause et al., 2001). Such a high number of potential predictors render adequately powered prospective prognostic studies unfeasible (Altman, 2001; Hayden et al., 2009). Thus, it is still largely unknown which variables should be the primary focus in both research and clinical practice. One method of establishing a more discrete set of variables that warrants further examination is to conduct a Delphi study (Wong et al., 2015). The Delphi survey technique is designed to transform expert opinion into group consensus using an iterative multi-stage process (Hasson et al., 2000). It has been applied to identify consensus on a range of topics, including prognostic variables for both recovery (Brunner et al., 2008; Meijer et al., 2003), and prevention of disability (Guzman et al., 2007). It has advantages over other methods as it allows agreement to be achieved in areas of uncertainty when there is a dearth of empirical evidence. The purpose of this study was to seek consensus on important facilitators and barriers to RTW following surgery for non-traumatic UE conditions, using a Delphi survey design.

Methods

A three-round Delphi study was conducted to identify important facilitators and barriers contributing to a delayed RTW following surgery for non-traumatic UE conditions. We adhered to the recommended six steps to conduct a Delphi study: (1) selection of experts and formal invitation of involvement; (2) determination of the number of rounds; (3) development of the questionnaires; (4) facilitation of participation in each round; (5) analysis of data from each round; and (6) dissemination of data (Delbecq et al., 1975). In each round, experts were able to clarify their responses using open-ended comments for each question. The Delphi study was distributed electronically using a web-based survey program (www.surveymonkey.net).

Expert panel

Researchers and clinicians with at least one publication on work disability for workers with UE conditions, or at least three publications on prognosis for delayed RTW met the criteria to participate in this study. The participants ($n = 102$) were identified through an electronic literature search of peer-reviewed articles or doctoral theses published in the last 20 years using search terms including prognos*, predict*, determinant*, work, employment, return-to-work, work disability, sickness absence, sick leave, work loss, upper limb, upper extremity, hand, wrist, elbow, shoulder, musculoskeletal, back pain. Both first and senior/corresponding authors of these publications were contacted. Six additional experts who met the criteria were not contacted as they were known to either have retired or were deceased. The compiled list provided a global representation of experts and represented various disciplines, including epidemiology, hand surgery, occupational health, occupational therapy and physiotherapy.

Procedure

In the first round, experts were asked via two separate open-ended questions to nominate facilitators and barriers contributing to prolonged RTW following surgery for non-traumatic UE conditions. Experts were also asked to indicate ('yes' or 'no') whether the factors they nominated were prognostic for all non-traumatic UE conditions, regardless of the diagnosis.

Based on the responses from the first round, three authors (SP, VJ, MC) used an iterative process to combine and summarize the answers where possible and to generate a concise list of facilitators and barriers to RTW and work disability. An independent member external to the research team checked the two lists. This was to ensure that all factors listed by the participants were included in the two lists developed by the authors. The final list was also cross-checked with factors derived from a systematic review (Peters et al., 2016a) and factors derived for a previous study (Peters et al., 2016b).

In the second round, the participants received the lists of facilitators and barriers. They were asked to rate the factors on a 5-point Likert scale. The response anchors were: (1) not at all influential; (2) slightly influential; (3) somewhat influential; (4) very influential; and (5) extremely influential. There was also an option 'unable to comment on this factor', which was not counted in the analysis.

The median and interquartile ranges were determined to document the distribution of responses. For each factor, the responses of the experts were dichotomized. A score of four ('very influential') was used as the cut-off score to create two categories: (1) 'not-to-somewhat influential' (Score 1, 2 and 3) and (2) 'very-to-extremely influential' (Score 4 and 5) (Hsu and Sandford, 2007; Peters et al., 2016b). Factors that were rated by at least two-thirds of the experts as

'very-to-extremely influential' were retained on the short-lists and advanced to the third round (Wong et al., 2015). Two short-lists were generated: one for facilitators and one for barriers to RTW.

In the third round, participants received the short-listed facilitators and barriers. They were asked to indicate ('yes' or 'no') for each factor whether they believed the factor should be included in future prognostic studies of workers focusing on either RTW or work disability following surgery for non-traumatic UE conditions. In all rounds, four reminders (with 2–4 weeks between reminders) were sent to those who had not yet completed the round.

In order to analyse the responses and to determine the level of consensus for the factors on the short-lists, we used the following criteria – strong consensus: ⩾85% of experts agreed; moderate consensus: 66%–84% of experts agreed; low consensus: 33%–65% of experts agreed; and lack of consensus: ⩽32% of experts agreed (Guzman et al., 2007). We determined a priori that only factors with strong consensus (i.e. ⩾85% agreement) would be recommended to be included in future studies.

Results

Expert panel

A total of 42 experts (41% response rate) completed the first round; 34 experts participated in the second round; and 31 in the third round. Most participating experts were based in either Europe or North America. The various professions involved in RTW were represented. The vast majority was actively involved in research and approximately one-third was also involved in clinical practice. Demographic details of the participants for each round are detailed in Table 1.

Consensus on facilitators to RTW

Based on the answers from Round 1, a list of 67 potential facilitators for RTW was generated (Table 2), and was presented to the experts in Round 2. Fifteen of these factors were considered 'very-to-extremely influential' by at least two-thirds of the experts (Table 2) and therefore progressed to Round 3. In Round 3, strong consensus (i.e. ⩾85% agreement) was reached for 13 facilitators. These factors were: high motivation to RTW; high self-efficacy for RTW and recovery; availability of modified/alternative duties; flexible RTW arrangements; positive coping skills; limited heavy UE work exertion; supportive RTW policies; supportive supervisor/management; no catastrophic thinking; no fear avoidance to RTW; no fear avoidance to pain/activity; return to meaningful RTW duties and high job satisfaction (Table 2).

Consensus on barriers to RTW

A list of 67 potential barriers to RTW was generated from the first round of responses (Table 3). Twelve of these factors were considered 'very-to-extremely influential' by at least two-thirds of the experts and therefore advanced to Round 3. In Round 3, there was strong consensus for six factors: mood disorder diagnosis; pain/symptoms at more than one musculoskeletal site; heavy UE exertions at work; lack of flexible RTW arrangements; lack of support from supervisor/management; high level of pain catastrophizing (Table 3).

In Round 1, 35 experts (85.4%) agreed that the factors they nominated as facilitators or barriers were the same across non-traumatic conditions of the hand, wrist, elbow or shoulder.

Discussion

The main finding of this study was the agreement among experts over a set of 19 key factors that were considered to influence RTW following surgery for non-traumatic UE conditions.

Initially, the experts identified 134 potential facilitators or barriers. A similarly large number of factors have been identified in previous reviews (Foreman et al., 2006; Krause et al., 2001). However, such numbers of potential predictor variables make it unfeasible to conduct adequately powered prospective prognostic studies due to the high number of participants required (Linton et al., 2005). Following two additional rounds, the experts reached consensus (i.e. ⩾85% agreement) on 13 facilitators and six barriers from the original list of 130 factors. These factors should be included in future studies on RTW following surgery for non-traumatic UE conditions.

The factors that achieved consensus could be largely grouped at the level of the worker, or externally to the worker at the level of the workplace. Similar models have been used to identify barriers to RTW, with a focus on factors either influencing the worker (internally); or interacting through organizations (externally to the worker), that is, at the workplace, healthcare or insurance-system levels (Loisel et al., 2001; World Health Organization, 2015). The level at which the factor can be measured has implications for the focus of RTW evaluations and interventions. At the level of the worker, there were six facilitators (high motivation to RTW; high recovery and/or RTW self-efficacy; positive coping skills; no catastrophic thinking; no fear avoidance to RTW; no fear avoidance to pain or activity) and four barriers (two or more musculoskeletal pain sites; lower recovery expectations; diagnosis of a mood disorder; high level of pain catastrophizing). At the

Table 1. Demographic characteristics of the experts by round.

		Round 1 *N*	Round 2 *N*	Round 3 *N*
Number of experts who completed each round		42	34	31
Gender	Male	25	21	19
	Female	17	13	12
Age	20–29 years	1	1	1
	30–39 years	5	3	3
	40–49 years	11	10	7
	50–59 years	19	16	16
	60 years or older	6	4	4
Country	Canada	11	11	11
	The Netherlands	8	7	6
	USA	8	5	4
	Australia	3	3	3
	United Kingdom	3	1	0
	France	3	1	1
	Denmark	1	1	1
	Finland	1	1	1
	Slovenia	1	1	1
	Sweden	1	1	1
	South Africa	1	1	1
	Israel	1	0	0
	China	1	0	0
Discipline	Physical therapist	10	9	8
	Orthopaedic surgeon	7	6	5
	Academic or professor in occupational health	5	4	4
	Occupational physician	5	4	4
	Occupational therapist	4	3	3
	Research scientist	4	2	1
	Biostatistician	2	2	2
	Human movement scientist	2	2	2
	Plastic surgeon	2	1	1
	Neurologist	1	1	1
Current practice	Research, academia and clinical	14	12	12
	Academia and research	11	8	7
	Research only	10	8	7
	Clinical only	2	2	1
	Academia (teaching) only	2	2	2
	Clinical and research	2	2	2
Focus of research and/ or practice within RTW[a]	UE[b]	28	22	21
	General musculoskeletal	27	21	19
	Back	16	13	13
	Neck	9	8	8

[a]Experts were able to nominate more than one category, so the number of experts who nominated each category is detailed in the table.
[b]upper extremity.
RTW: return-to-work.

workplace level, there were six facilitators (availability of suitable duties (modified, alternate or host employment); no or limited forceful or heavy UE exertions; supportive RTW policies and procedures; supportive supervisor/management support; worker is able to perform meaningful duties on RTW; high level of job satisfaction) and three barriers (lack of job accommodation availability; poor supervisor or management support; heavy UE exertions at work). Interestingly, no factors related to healthcare or insurance systems (e.g. compensation status, days waiting to have surgery for the condition) reached consensus, despite the fact that these have been found to be prognostic for RTW for

Table 2. Agreement regarding facilitators to RTW.

	Round 2			Round 3
	Median	IQR	% agreement (score 4 or 5)	% agreement (Yes/no)
High motivation to RTW [I/P]	5.0	1.0	**87.9**	*96.8*
High self-efficacy (or recovery expectations) for recovery and RTW [I/P]	4.0	1.0	**81.8**	*96.8*
Availability of modified, alternate duties or host employment [W/S]	4.0	1.0	**78.8**	*96.8*
Flexible RTW arrangements possible (e.g. working hours, shifts, locations or duties) [W/S]	4.0	1.0	**78.8**	*93.5*
Positive coping skills [I/P]	4.0	1.0	**75.8**	*93.5*
No or limited forceful or heavy UE exertions at work [W/S]	4.0	1.0	**75.8**	*93.5*
Supportive RTW policies and procedures [W/S]	4.0	2.0	**66.7**	*90.3*
Supportive supervisor or management [W/S]	4.0	2.0	**66.7**	*90.3*
No catastrophic thinking [I/P]	4.0	2.0	**66.7**	*90.3*
No fear avoidance to RTW [I/P]	4.0	2.0	**72.7**	*87.1*
No fear avoidance to pain or activity [I/P]	4.0	2.0	**69.7**	*87.1*
Worker is able to perform meaningful duties on RTW [IW/S]	4.0	1.0	**69.7**	*87.1*
High level of job satisfaction [IW/PS]	4.0	2.0	**66.7**	*87.1*
Worker is empowered to take part in own recovery [I/PS]	4.0	2.0	**72.7**	83.9
No diagnosis of mood condition (e.g. anxiety, depression) [I/P]	4.0	1.0	**72.7**	83.9
Returning to a safe working environment [W/S]	4.0	2.0	60.6	
Worker feels a level of responsibility towards their job [IW/PS]	4.0	2.0	60.6	
No physical comorbidities (e.g. arthritis, obesity) [I/B]	4.0	1.0	60.6	
High resilience to life and/or work stressors [I/P]	4.0	1.0	60.6	
No or limited repetitive UE use at work [W/S]	4.0	1.0	60.6	
Early identification for risk factors for delayed RTW [IW/BPS]	4.0	1.0	60.6	
Supportive work colleagues [W/S]	4.0	2.0	57.6	
Supportive external resources (family, friends, social networks, financial, general health) [IW/S]	4.0	2.0	57.6	
Being self-employed [I/S]	4.0	2.0	57.6	
Active locus of control in the RTW process [IS/PS]	4.0	1.0	57.6	
No or very little psychological distress at work [IW/PS]	4.0	1.0	57.6	
Doctor's recommendation for early RTW [S/S]	4.0	1.0	57.6	
Early commencement of rehabilitation following surgery [S/B]	4.0	1.0	57.6	
Low levels of pain following surgery [I/BP]	4.0	1.0	54.5	
Early contact between supervisor/employer and injured worker [W/S]	4.0	2.0	51.5	
Having a high level of education (i.e. high school or tertiary education completed) [I/D]	4.0	1.0	51.5	
No psychological distress at work [IW/PS]	4.0	1.0	51.5	
High task latitude at work [W/PS]	4.0	1.0	51.5	
High financial incentives to RTW from insurer or employer [WS/S]	4.0	1.0	51.5	
High decision latitude at work [W/PS]	4.0	1.0	48.5	
No surgical complications [I/B]	4.0	1.0	48.5	
No attorney involvement [IS/S]	4.0	1.0	51.5	
Stakeholders focus on capacity rather than incapacity [WS/S]	3.5	1.0	48.9	
Being a white collar worker [I/D]	3.0	1.0	48.5	
Someone other than the worker has responsibility for coordinating RTW [WS/S]	3.0	1.0	48.5	
Appropriate communication and collaborative approach between stakeholders involved in RTW process [WS/S]	3.0	1.0	48.5	
Having a high socio-economic status [I/D]	3.0	1.0	45.5	
High rating of quality of life [I/BPS]	3.0	1.0	45.5	
Worker has a clear understanding of condition and treatments [I/B]	3.0	1.0	45.5	

(Continued)

Table 2. (Continued)

	Round 2			Round 3
	Median	IQR	% agreement (score 4 or 5)	% agreement (Yes/no)
HCPs are specialists in managing UE conditions [S/BS]	3.0	1.0	42.4	
Adherence to rehabilitation or RTW program [I/BPS]	3.0	1.0	42.4	
Appropriate pain control following surgery [I/B]	3.0	1.0	42.4	
No adequate compensation for loss of income thus 'forcing' RTW [S/S]	3.0	1.0	39.4	
Supportive insurer policies [S/S]	3.0	1.0	39.4	
No previous work-related injury for another condition [I/B]	3.0	2.0	36.4	
Less invasive surgical procedures (e.g. arthroscopic or endoscopic) [I/B]	3.0	2.0	33.3	
No request for pain medication following surgery [I/BP]	3.0	1.0	33.3	
Supportive insurer representative dealing with the worker [S/S]	3.0	1.0	33.3	
No time off work before the surgery related to the injury [I/BPS]	3.0	1.0	30.3	
High job security [W/S]	3.0	2.0	30.3	
No previous workers' compensation claim [IS/S]	3.0	2.0	30.3	
Clear diagnosis [I/B]	3.0	1.0	27.3	
Early diagnosis [I/B]	3.0	1.0	27.3	
Systems that provide compensation (e.g. wage replacement regardless of the cause) [S/S]	3.0	1.0	27.3	
No exposure to vibration at work [W/S]	3.0	2.0	27.3	
Operation is on non-dominant side [I/B]	3.0	1.0	21.2	
Good cardiovascular fitness [I/B]	3.0	1.0	18.2	
Worker is aware of entitlements [IS/S]	3.0	1.0	18.2	
Being 45 years of age or younger [I/D]	3.0	1.0	15.2	
Living in an urban area [I/D]	2.0	2.0	6.1	
Being a non-smoker [I/B]	2.0	2.0	6.1	
Living in a non-tropical environment [I/D]	1.0	1.0	0.0	

Left – I: individual worker-level; W: workplace-level; S: systems-level
Right – D: demographic; B: biological; P: psychological; S: social.
Bold: Factors rated 'very-to-extremely' influential by equal to or more than two-thirds of experts in Round 2.
Italic: Factors for which there was strong consensus (i.e. >85% agreement) in Round 3.
HCPs: Health Care Providers; IQR: interquartile range; RTW: return-to-work; UE: upper extremity.

Table 3. Agreement regarding barriers to return-to-work.

	Round 2			Round 3
	Median	IQR	% agreement (score 4 or 5)	% agreement (yes/no)
Mood condition (e.g. depression, anxiety) [I/P]	4.0	1.0	**79.4**	*93.5*
Pain or symptoms at more than one musculoskeletal site [I/B]	4.0	0.0	**79.4**	*93.5*
Heavy UE exertions at work [W/S]	4.0	1.0	**73.5**	*93.5*
Lack of flexible RTW arrangements (e.g. working hours, shifts, locations or duties) [W/S]	4.0	2.0	**67.6**	*90.3*
Lack of support from work supervisor or management [W/S]	4.0	1.0	**67.6**	*90.3*
High level of pain catastrophizing [I/P]	4.0	2.0	**67.6**	*87.1*
Low expectations regarding RTW [I/P]	4.0	1.0	**79.4**	83.9
Dissatisfaction with work [I/PS]	4.0	2.0	**73.5**	83.9
Low UE functional capacity following surgery [I/B]	4.0	1.0	**70.6**	80.6
Being unemployed at the time of surgery [IWS/S]	4.0	2.0	**67.6**	80.6
Fear avoidance to RTW [I/P]	4.0	2.0	**67.6**	80.6
Worker dissatisfied with the outcome of the UE surgery [I/BPS]	4.0	2.0	**67.6**	74.2

Table 3. (Continued)

	Round 2			Round 3
	Median	IQR	% agreement (score 4 or 5)	% agreement (yes/no)
Attorney involvement [S/S]	4.0	2.0	64.7	
Low expectations regarding recovery from surgery [I/P]	4.0	2.0	64.7	
High perceived physical workload by the worker [I/PS]	4.0	2.0	64.7	
Lower resilience to life and/or work stressors [I/P]	4.0	2.0	61.8	
Alcohol or drug abuse/addiction [I/BP]	4.0	1.0	61.8	
Fear avoidance to pain and activity [I/P]	4.0	1.0	61.8	
HCPs hold low expectations for recovery and/or RTW [S/S]	4.0	1.0	61.8	
Unresolved symptoms following surgery [I/B]	4.0	1.0	61.8	
Management of the insurance or workers' compensation claim that dissatisfies/displeases the worker [IS/S]	4.0	1.0	61.8	
Repetitive UE use at work [W/S]	4.0	1.0	58.8	
Stigmatization of the injury by colleagues/supervisors [W/S]	4.0	1.0	58.8	
Repeated surgery for the same condition [I/B]	4.0	1.0	55.9	
High levels of pain following surgery [I/B]	4.0	1.0	55.9	
Burnout (emotional exhaustion) [I/P]	4.0	1.0	52.9	
Physical comorbidities (e.g. arthritis, obesity) [I/P]	4.0	1.0	52.9	
Precarious employment or low job security (e.g. casual employment, immigrant worker, contract worker) [W/S]	4.0	1.0	52.9	
Inadequate workplace policies and procedures regarding injury and RTW [W/S]	4.0	1.0	52.9	
Passive locus of control in the RTW process (i.e. having a passive role) [W/PS]	4.0	1.0	50	
Surgical complications [I/B]	4.0	1.0	50	
Personal stressors unrelated to the injury (e.g. divorce, death, finance) [I/PS]	3.5	1.0	50	
Lack of support from work colleagues [W/S]	3.0	1.0	47.1	
No or poor communication between various stakeholders in the RTW process [IW/S]	3.0	1.0	47.1	
Use of narcotics (opioids) to manage pain (e.g. morphine, codeine) [I/B]	3.0	1.0	47.1	
No rehabilitation following surgery [IS/B]	4.0	2.0	47.1	
No or inadequate compensation system for loss of income or treatment costs (e.g. adversarial health or compensation system) [S/S]	3.5	1.0	44.1	
Low perceived quality of life [I/BPS]	3.0	1.0	44.1	
Poor support from family, friends and social networks [I/S]	3.0	1.0	44.1	
Doctor makes RTW recommendation without being fully informed of available work duties [IWS/S]	3.0	1.0	44.1	
More severe symptoms before surgery (e.g. high levels of pain) [I/B]	3.0	1.0	44.1	
Focus on incapacity rather than capacity [WS/B]	3.0	1.0	44.1	
Previous workers' compensation claim [IS/D]	3.0	1.0	44.1	
Having a low socio-economic status [I/D]	3.0	1.0	44.1	
Having a low education level (i.e. not completed secondary/high school) [I/D]	3.0	2.0	44.1	
High psychological job demands [W/PS]	3.0	1.0	41.2	
Limited decision latitude at work [W/PS]	3.0	1.0	38.2	
Worker does not adhere to treatment recommendations [I/BPS]	3.0	1.0	38.2	
Multiple HCPs involved [S/S]	3.0	1.0	38.2	
Being the primary breadwinner [I/D]	3.0	3.0	35.3	
Limited task latitude at work [W/S]	3.0	1.0	32.4	
Longer duration of symptoms before surgery [I/B]	3.0	1.0	32.4	
Low UE functional capacity before surgery [I/B]	3.0	1.0	32.4	
Two or more weeks off work before surgery [I/BPS]	3.0	2.0	32.4	

(Continued)

Table 3. (Continued)

	Round 2			Round 3
	Median	IQR	% agreement (score 4 or 5)	% agreement (yes/no)
Higher number of visits to HCPs (I/B)	3.0	1.0	29.4	
Exposure to vibration at work (W/S)	3.0	2.0	26.5	
No clear diagnosis (I/B)	3.0	1.0	23.5	
More invasive or serious surgery (I/B)	3.0	1.0	23.5	
Operation on the dominant side (I/B)	3.0	2.0	23.5	
Being over 45 years of age (I/D)	3.0	2.0	23.5	
Living in a rural/remote area (I/D)	3.0	2.0	17.6	
Being a smoker (I/B)	2.0	2.0	17.6	
Poor cardiovascular fitness (I/B)	3.0	1.0	14.7	
Cold work environment (W/S)	3.0	2.0	14.7	
Tropical work environment (W/S)	2.0	2.0	5.9	
Being female (I/D)	2.0	2.0	5.9	
Living alone (I/D)	2.0	2.0	5.9	

Left – I: individual worker-level; W: workplace-level; S: systems-level
Right – D: demographic; B: biological; P: psychological; S: social.
Bold: Factors rated 'very-to-extremely' influential by equal to or more than two-thirds of experts in Round 2.
Italic: Factors for which there was strong consensus (i.e. >85% agreement) in Round 3.
HCPs: Health Care Providers; IQR: interquartile range; RTW: return-to-work; UE: upper extremity.

other musculoskeletal conditions (Clay et al., 2010; Peters et al., 2016a; Steenstra et al., 2005).

It is well established that the factors influencing RTW are multi-dimensional and biopsychosocial (Burton et al., 2008; Loisel et al., 2001; Shaw et al., 2013). Using the biopsychosocial model, the 13 facilitators that reached strong consensus, did not include biological factors; six were psychological (high motivation to RTW; high self-efficacy; positive coping skills; no catastrophic thinking; no fear avoidance to RTW; no fear avoidance to pain or activity); six were social (availability of suitable duties; flexible RTW arrangements; no or limited forceful or heavy UE exertions; supportive RTW policies and procedures; supportive supervisor/management; worker can return to meaningful duties); and one factor was an interaction between the psychosocial domains (high level of job satisfaction). Of the six barriers, one was biological (pain or symptoms at more than one musculoskeletal site); two were psychological (mood condition; high level of pain catastrophizing); and three were social (heavy UE exertions at work; lack of flexible RTW arrangements; lack of supervisor or management support). The categorization of these variables reveals the importance of including psychosocial factors in future studies.

There are also other reasons why these variables warrant further study to establish their association with a particular outcome. First, biological and psychological risk factors can be assessed at the level of the worker – through questionnaires (such as, risk-based screening tools) (Linton et al., 2011; Marhold et al., 2002; Shaw et al., 2013), interviews (Durand et al., 2002; Gross et al., 2014) or functional capacity evaluations (Gross et al., 2007; Pransky and Dempsey, 2004). These evaluation methods are simple to use in both research and clinical practice. Furthermore, risk-based questionnaires completed by the worker are not resource intensive or costly. Second, social factors can be assessed at the level of the workplace through methods such as work-place evaluations (e.g. to assess job modification availability) and ergonomic assessments (e.g.,to assess heavy UE loads). Biopsychosocial interventions at a worker- or workplace-level are also easier to implement and less resource intensive than interventions at a systems-level. Interestingly, although the factors identified in this Delphi study were mainly psychosocial, studies that have included RTW as an outcome for workers with UE conditions to date, have focused primarily on clinical interventions to remediate biological factors (Karjalainen et al., 2003; Peters et al., 2016c; Verhagen et al., 2004). This supports the need to study the prognostic value of the psychosocial factors identified in this Delphi study.

In contrast, there were no systems-related variables that reached strong agreement in this Delphi study. Evaluation of systems-related variables can be more difficult and resource-intensive owing to the complexity of healthcare and insurance systems, and

the laws in place to regulate how these systems operate. In addition, these variables are not as easily modifiable.

Another key finding was the high number of facilitators that reached strong consensus, more than double the number of barriers. Notably, while considerable focus in recent years has been on identifying barriers (Linton et al., 2011; Marhold et al., 2002; Shaw et al., 2013), there is a stark lack of studies focusing on facilitators to RTW in the work disability literature regardless of diagnosis (Clay et al., 2010; Iles et al., 2008; Steenstra et al., 2005). Our findings suggest that greater attention is needed in identifying facilitators that build on worker's capabilities and external supports. Focusing excessively on barriers may result in both clinicians and researchers missing the potential benefit of facilitators.

For a number of the factors that reached consensus, their presence was a barrier and their absence was a facilitator and vice versa. This was the case for the following factors: heavy UE exertions at work, flexible RTW arrangements, supervisor or management support and pain catastrophizing. However, this is not the case for all barriers to RTW (Krause et al., 2001). It is a common misconception that for every barrier to RTW, the absence of this barrier consequentially becomes a facilitator or vice versa, the absence of facilitator becomes a barrier to RTW.

Methodological considerations

This study used Delphi methodology, which allowed broad representation of experts from various backgrounds using an accessible electronic format. It may be questioned whether one publication is sufficient to be considered an expert. However, few experts with more than one publication on RTW for workers with UE conditions existed; therefore, a low threshold for the number of publications was necessary. Increasing the threshold would have resulted in too few experts. There was also 13.5% reduction in participant responses from first to third rounds, despite several reminders. It has been suggested that a level of drop-out is inevitable due to unforeseen changes in priorities, illness or life events, and the reduction seen in our study is consistent with that found in previous studies (Wakefield and Watson, 2014). Furthermore, approximately one-third of the participating experts were from Canada. It is unknown how country of origin may have affected the selection and rating of the factors used to generate the final list. Unfortunately, the sample of participants was too small to allow statistical analysis to establish this.

In Round 1, experts indicated that they believed the factors to be relevant regardless of the diagnosis. However, as this was not asked again in later rounds (and although it could be assumed that this holds true), there are no data to support this. It would have been beneficial to ask this question again in Round 3 to establish if the final list was also representative regardless of diagnosis.

A strength of this study is that the factors nominated in the Delphi study were also identified in previous reviews that have explored variables that influence work outcomes (Foreman et al., 2006; Krause et al., 2001), which validates our expert panel. Also, this may mean that the factors identified by 'strong consensus' will generally hold true across other UE diagnoses and settings. However, researchers may also need to deliberate on including some factors that might not have made the cut-off for strong consensus (>85% agreement) in future research studies, which may be plausible when considering their local setting.

In conclusion, a three-round Delphi study determined expert opinion on the barriers and facilitators for RTW following surgery for non-traumatic UE conditions. These factors warrant further investigation on their ability to be prognostic for RTW in prospective studies.

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