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The Role of Patient and Rehabilitation Factors in the Recovery of Home and Family Work Roles Following Distal Radius Fracture

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A thesis submitted in partial fulfillment of the requirements for the Doctor of Philosophy degree in Health and Rehabilitation Sciences

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Abstract

Background: Distal radius fracture (DRF) is a common upper extremity fracture that causes significant impairment and leads to difficulties in fulfilling important life roles such as indoor and outdoor cleaning, meal preparation, grocery shopping, caring for others, and earning and managing family income. However, clinicians do not routinely address home and family life roles after a DRF. Patient and rehabilitation factors are crucial in addressing home and family work roles (HFWRs). The HFWR questionnaire consists of tasks that are typically performed at home.

Objective: The overarching objective of this thesis is to explore the role of patient and rehabilitation factors in the recovery of HFWRs following DRF.

Methods: The first manuscript was an exploratory factor analysis (EFA) of the HFWR questionnaire to determine the structural validity in the DRF population and compare the HFWR by gender. The second manuscript was an observational longitudinal cohort study that explored HFWRs performed one week before (retrospective rating) and recovery of those roles three months after fracture. The third manuscript was a qualitative study that explored patients' and clinicians' perceptions of integrating HFWRs into rehabilitation.

Results: An EFA of 115 participants (women 73%; men 27%; mean age = 56 years; 18 to 89 years) yielded a three-factor solution, namely: traditionally masculine roles, traditionally feminine roles, and caregiving roles. Men performed a greater proportion of items 2, 5, 6, and 12 (outdoor cleaning, home repairs, yard work, and maintaining vehicles), and women performed a greater proportion of item 3 (laundry). The second study showed that the proportion of HFWR

performed decreased significantly one week after the fracture (n = 115) and returned to pre-fracture level at three months (n = 50). Marital and employment status had a significant influence on HFWRs. Finally, the semi-structured interview of eighteen patients and eleven clinicians provided an in-depth understanding of patients' and clinicians' perceptions of integrating HFWRs into rehabilitation. The patient interview yielded five themes: (i) a positive rehabilitation experience (ii) a predetermined expectation of rehabilitation; (iii) varying patient needs for addressing HFWRs; (iv) the determination to return to valued activities driving behavioural choices; and (v) incorporating HFWRs into rehabilitation is perceived as beneficial. The clinician interview yielded five themes: (i) there are challenges in integrating HFWR into rehabilitation; (ii) HFWR is addressed when brought up by a patient; (iii) working context and referral sources influence the rehabilitation plan; (iv) rehabilitation is not explicitly tailored according to sex and gender, and (v) utilizing HFWR as a rehabilitation strategy is perceived as beneficial.

Conclusions: The HFWR questionnaire has demonstrated three-factor structure validity in the DRF population. DRF has a significant short-term impact on HFWR and recovers in three months. Clinicians and patients acknowledge that integrating HFWR into rehabilitation is beneficial but was not a major focus for either the clinician or the expectation of the patients. However, there are challenges in integrating HFWRs into rehabilitation due to the unfavourable working environment, the financial constraints of the patient, and limited time.

Keywords: activities of daily living, function, clinicians, distal radius fracture, sex, gender, factor analysis, life roles

Summary for Lay Audience

A wrist fracture is a common upper limb fracture, leading to difficulties in fulfilling life roles, especially caring for family members, meal preparation, indoor and outdoor cleaning, doing laundry and earning income.

This thesis aimed to understand the impact of wrist fractures on home and family work roles (HFWRs) and the recovery of those tasks following a wrist fracture. Additionally, Patients and clinicians were interviewed to explore their experiences and opinions on addressing and incorporating HFWRs into rehabilitation.

Initially, an exploration of the HFWR questionnaire was conducted to understand the applicability of the questionnaire to people with wrist fractures. A total of 115 people with broken wrists completed the HFWR questionnaire. The analysis of the completed HFWR questionnaire revealed that the questionnaire measures three main roles: traditionally masculine, traditionally feminine, and caregiving roles. The second study aimed to examine the impact of wrist fractures on HFWRs and recovery following a fracture. The patient's ability to perform HFWRs decreased substantially immediately after a wrist fracture. However, the patients were able to resume their HFWRs at three months. Interviews with patients who had wrist fractures showed that patients had a positive rehabilitation experience; they had a view of what to expect in a rehabilitation session and did not expect clinicians to teach them about managing HFWRs. However, some patients with broken wrists may need advice on family tasks, while others were determined to return to the activities they enjoyed. The interviews with clinicians revealed that it can be hard to include household and family tasks in the rehabilitation plan, and they are only addressed when patients bring them up. The workplace and the source of referral can affect the

rehabilitation plan. The patients and the clinicians suggest that addressing HFWRs in rehabilitation is beneficial but not the primary focus of clinicians.

The questionnaire can inform healthcare providers and researchers about the effect of wrist fractures on life roles. A wrist fracture can temporarily impact household tasks, but most patients recover in three months. Although both clinicians and patients agree that addressing HFWRs in rehabilitation is beneficial, unfavourable working environments, patient budget constraints and limited time are hindrances in addressing HFWRs in rehabilitation.

Co-Authorship Statement

Chapter 1: Introduction

Sheena Philip: Primary author

Dr. Joy Mac Dermid: Revised manuscript

Dr. Alison Rushton: Revised manuscript

Dr. Pulak Parikh: Revised manuscript

Chapter 2: Exploratory Factor Analysis of Home and Family Work Role Questionnaire in Distal Radius Fracture Patients.

Sheena Philip: Primary author, study design, data collection, data analysis

Dr. Joy Mac Dermid: Study design, supervised work, revised multiple versions of the manuscript.

Dr. Alison Rushton: Revised manuscript

Dr. Pulak Parikh: Revised manuscript

Hoda Seens: Revised manuscript.

Chapter 3: The Impact of Distal Radius Fracture on Home and Family Work Roles

Sheena Philip: Primary author, study design, data collection, data analysis

Dr. Joy Mac Dermid: Study design, supervised work, revised multiple versions of the manuscript.

Dr. Alison Rushton: Revised manuscript

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Chapter 4: Patients' and Clinicians' Perception of Integrating Home and Family Work Roles into Rehabilitation Following a Distal Radius Fracture.

Sheena Philip: Primary author, study design, data collection, data analysis.

Dr. Joy Mac Dermid: Study design, supervised work, Revised multiple version manuscript.

Dr. Alison Rushton: Study design, Revised manuscript.

Dr. Pulak Parikh: Revised manuscript

Hoda Seens: Revised manuscript.

Chapter 5: Discussion and Conclusion

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Dr. Joy Mac Dermid: Revised manuscript

Dr. Alison Rushton: Revised manuscript

Dr. Pulak Parikh: Revised manuscript

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Chapter 1

1 Introduction

1.1 Epidemiology

Distal radius fractures (DRF) are common upper limb fractures that constitute 15 to 20% of all fractures (Olech, Ciszewski, and Morasiewicz, 2021). DRF is typically a radius fracture within 2 to 3 cm of the wrist joint and can often involve intraarticular fractures (Meena et al., 2014). The age-adjusted incidence of intraarticular fracture is 19 in men (low energy, 12.8 vs. high energy, 6.1) and 74 in women (low energy, 71.1 vs. high energy, 4.0) per 10,000 person-years (Diamantopoulos et al., 2012). There is a bimodal age distribution of fractures due to high-energy trauma, typically in young men (Flinkkilä et al., 2014) and low-energy trauma, typically in older women (Nellans, Kowalski, & Chung, 2012). In the Western world, the incidence of DRF is three times higher in women than in men (Thompson, Taylor & Dawson, 2004). However, in Asia, the incidence of DRF is higher in men than in women (Koo, Tan, & Chong, 2013).

1.2 Biomechanics of Wrist Joint & Mechanism of Injury in DRF

Comprehending the biomechanical characteristics of the wrist joint will allow a better understanding of the mechanism of injury and guide the DRF treatment approach. The radiocarpal joint is a biaxial condyloid joint with two degrees of freedom in the sagittal and frontal planes. Radiocarpal and mid-carpal joints participate in sagittal plane movements, and the carpal bone at the midcarpal joint and radiocarpal joint contribute to frontal plane movements

(Mifsud & Drew, 2015). The distal radioulnar joint is a pivotal uniaxial joint with one degree of freedom for pronation and supination (Mifsud & Drew, 2015). Rikli and Campbell (2007) explained the transmission of load at the distal end of the forearm, which can be explained in a three-column model, namely, the radial, intermediate, and ulnar columns. The radial column consists of a radial styloid and a scaphoid fossa, which provides stability and prevents excessive ulnar and radial deviation. The intermediate column allows for load transmission and consists of the lunate fossa and the sigmoid notch. The ulnar column consists of a distal ulna with a triangular fibrocartilaginous complex (TFCC) and allows for load transmission and stability during forearm rotation (Rikli & Campbell, 2007). In a neutral position, approximately 80% of the axial load is transmitted through the radius and 20% through the ulna (Bunch, Sheehan, Dyer, Sodickson, & Khurana, 2015).

DRF is primarily caused by a fall on an outstretched arm (Boufous et al., 2006), with osteoporosis and the risk of falls being the main predisposing factors (Niempoog et al., 2019). Fracture incidences increase with a decrease in bone mass and compromise in bone structure elements (Kleerekoper, Villanueva, Stanciu, Rao, & Parfitt, 1985), which is more pronounced in women due to cortical and trabecular structural deterioration of the radius (Milovanovic et al., 2015). Other factors contributing to an increased rate of DRF are lifestyle (MacIntyre & Dewan, 2016), environment (Giladi et al., 2014) and increase in life expectancy (Court-Brown, Biant, Bugler & McQueen, 2014).

1.3 Medical and Surgical Management

Mechanism of injury, type of fracture, associated soft tissue injury, patient characteristics, and surgeon's preferences play a role in deciding treatment options (Chhabra & Yildirim, 2021).

These treatment options range from closed reduction and casting, internal fixation with pins, external fixation, and dorsal or volar plating (Meena et al. 2014), followed by an immobilization period ranging from 4 to 8 weeks (Chhabra and Yildirim 2021). The common closed-reduction methods are manual traction and finger trap traction. Percutaneous pinning is chosen for DRF fixation to assist with initial reduction and for DRF without significant intraarticular involvement. When acceptable alignment cannot be achieved through closed or minimal open manipulation, open reduction and internal fixations are done. Arthroscopy-assisted fixation is also used to help identify the associated ligament injury and remove the hematoma and debris from the fracture (Chhabra and Yildirim, 2021). However, clinicians prefer volar plating due to its lower complication rate and this method is generally used for unstable extraarticular and basic intraarticular fractures. For osteoporotic individuals, a volar plate affords early motion (Chhabra and Yildirim, 2021).

1.4 Relationship between Radiological Values and Functional Outcome

Radiographic evaluations are usually performed to confirm healing. Radiological parameters used to evaluate DRF are the degree of volar tilt, ulnar variance, radial inclination, radial height, and articular step-off (Plant, Parsons, & Costa, 2017). A study that examined the correlation of radiological parameters with patient-rated outcomes in health-related quality of life and function

in 50 patients showed a poor correlation. All patients showed a minimal change in radiographic parameters from 6 weeks to 12 months, while patient-reported outcome measures showed a significant improvement at 12 months (Plant et al., 2017). Similarly, Kumar et al. (2008) showed in their study that there is a better functional result despite poor radiological findings. Another study that investigated the relationship of acceptable radiographic reduction with functional outcomes in 74 patients at least 50 years of age showed that acceptable radiographic reduction was not associated with better functional outcomes at six months (Anzarut et al., 2004). On the contrary, a significant correlation was observed between functional outcome and satisfactory radial tilt in young patients (Kumar, Penematsa, Sadri, & Deshmukh, 2008). Alternatively, patient-reported functional outcome measures can provide a comprehensive patient-centered evaluation of the impact of fracture. Outcome measures explicitly designed to capture the impact of fractures on HFWR will provide a better understanding of the extent to which work roles are affected by DRF.

1.5 Impact of DRF on an Individual's Life

Patients with DRF experience severe pain and challenges in performing functional activities and personal care, particularly in the first two months after a fracture (MacDermid, Roth, & Richards, 2003). A comprehensive review of studies involving over 688,000 patients aged 50 and over with wrist fractures found that a significant number continue to experience functional limitations for up to a year or longer post-injury (Babatunde et al., 2021; Gonzalez et al., 2014). This is linked to increased healthcare usage and a decline in quality of life and challenges in executing daily life activities such as lifting pans, pouring liquid, using a screwdriver, opening, and closing lids, mowing the lawn, and personal hygiene (Beaulé et al., 2000). DRF increases the

odds of functional decline by 48% in older women than in those without DRF affecting activities of daily living such as preparing meals, heavy housekeeping, climbing stairs, shopping, and getting out of the car (Edwards, Song, Dunlop, Fink, & Cauley, 2010).

Wrist fractures can significantly impact individuals' personal, social, and financial roles. For instance, a DRF patient may be unable to perform certain tasks at work or may have to take time off, resulting in financial strain. Patients often experience a disruption in their ability to perform work-related tasks, leading to financial stress due to lost wages or the need for time off (Watson, Martin, & Keating, 2018). A qualitative interview with 21 participants with malunited DRF showed that DRF had affected movement, sleep, emotions, self-perception, and relationship (Andreasson, Kjellby-Wendt, Fagevik-Olsén, Karlsson, & Carlsson, 2019) impacting life roles, such as being a parent, grandparent, or worker. (Andreasson et al., 2019).

A growing body of evidence shows that disability correlates with the psychosocial aspect of life more than with impairment or pathophysiology (Farzad et al., 2015; Jayakumar et al., 2018). Most DRF studies focus on impairments such as range of motion and grip strength to assess functional recovery (Bobos, Lalone, Grewal, & Mac Dermid, 2018; Norton, Bugden, & Liu, 2022; Porter, 2013) and rarely focus on functional or social aspects of life or successful return to a meaningful occupation/life role. For instance, the study that analyzed 32 wrist outcome instruments for their content and quality found that 82% of the study contained traditional objective measures. Most instruments fail to adequately assess the functional impact of wrist disorders on individuals. (Bialocerkowski, Grimmer, & Bain, 2000; Andreasson et al., 2019). However, the wrist is an important joint that positions the hands to perform basic functional activities such as buttoning the shirt, cooking, indoor and outdoor cleaning, caring, and earning income. It is crucial that clinicians address these roles in rehabilitation plans, as the primary goal

of patients is to return to their life roles. Focusing on social and family roles will help provide holistic rehabilitation interventions (Farzad et al., 2015) and will promote patient independence and quality of life.

1.6 Outcome Measure Used for DRF

Outcome measures are tools used to measure a patient's health or functional status and help to evaluate the efficacy of the clinical intervention. These outcome measures can be categorized into physical measures that measure range of motion, grip strength, pinch strength, girth volume and sensation, and patient-rated outcome measures (PROMs) that are standardized and validated questionnaires completed by patients that can be generic or region-specific (Kingsley & Patel, 2017). After DRF, several PROMs are commonly employed. The Patient-Rated Wrist Evaluation (Esakki et al., 2018), Disability of Arm, Shoulder, and Hand (DASH), (Michlovitz et al. 2001) and Michigan Hand Outcome Questionnaires (MHQ) (Nolte, Shauver, & Chung, 2017). The Patient-Rated Wrist Evaluation (PRWE) is a region-specific outcome measure with 15-items that measures pain and functional disability in patients with wrist disorders. The pain module has five items, and the function module has ten items that assess activity limitations and usual activities, including personal care, household work, and recreation (Hill and Bialocerkowski 2020).

Disability of the arm, shoulder, and hand (DASH) and its abbreviated form quick DASH is a region-specific self-administered upper extremity disability and symptoms questionnaire. DASH consists of 30 items scored from 0 (no disability) to 100 (severe disability). DASH addresses pain, activity-related pain, weakness, and stiffness, as well as the impact on social activities, work, sleep, and self-image (Gummesson, Atroshi, & Ekdahl, 2003). Another region specific outcome measure is the Michigan Hand Outcomes Questionnaire (MHQ) which evaluates six

health domains: overall hand function, work performance, pain, activities of daily living (ADL), aesthetics, and patient satisfaction (Chung et al., 1998). Lastly, the Short Form Survey (SF 36) is a more encompassing measure of quality of life with 36 items that explore a range of domains from physical activity limitations to mental health (Ware and Sherbourne, 1992). These patient-rated outcome measures are useful for evaluating pain, quality of life, function, and work-related tasks. While current outcome measures provide valuable insights into physical and functional status of patients with DRF, they fall short in evaluating the comprehensive effects on HFWRs. These roles encompassing everyday tasks such as cooking, cleaning, care roles, and earning income are not only essential to daily living but also crucial to an individual's sense of identity and well-being. Moreover, a thorough assessment of HFWRs is instrumental for clinicians to gauge the extent of the impact. It enables clinicians to identify patient's available support networks and facilitates connections with community resources, which can be vital in supporting home responsibilities during recovery.

1.7 Home and Family Work Roles and DRF

HFWRs refer to tasks and responsibilities carried out by family members. These family roles are recurrent patterns of behaviour by which individuals fulfill family requirements (Miller, Ryan, Keitner, Bishop, & Epstein, 2000) (for example, meal preparation, indoor and outdoor cleaning, laundry, vehicle maintenance, childcare, and family earnings). HFWRs also include mental labour such as planning, scheduling, and coordinating events and activities of the home (Daly 2002). The distribution of HFWRs is significantly impacted by family dynamics and depends on factors such as ethnicity, gender, age, and work status. For instance, home and family work is gender-based in many cultures, and women bear a greater burden than men. Gender refers to the

socially constructed roles, behaviours, and identities that influence the distribution of family work roles, power, and resources in society. (Heidari, Babor, De Castro, Tort & Curno, 2016). In many cultures, women are primarily responsible for the household chores. For instance, a study has shown that mothers spend ten times more time than fathers multitasking. This includes supervising children and preparing meals or folding laundry to cope with family work roles which can create stress and negative emotions (Offer and Schneider, 2011).

The impact of DRF on such complex HFWRs is not well understood despite the fact that DRF is threefold in women who already carry a double burden of unpaid and paid work. It is crucial to understand the impact of DRF on HFWRs, as these are essential roles for the well-being of the family and can significantly affect HFWRs, leading to increased dependence. DRF can also affect financial stability, social relationships, and well-being. Evaluating the impact of DRF on HFWRs will help identify areas where patients, particularly women, may need additional support or resources to manage HFWRs. This will enable clinicians to develop a more targeted treatment plan that can lead to better patient outcomes and satisfaction. The HFWR questionnaire, developed by Dr. Joy Mac Dermid with a gender lens, was designed to measure the distribution of unpaid work related to family roles and responsibilities (Dabbagh et al., 2023). In this questionnaire, some items are classified as “traditionally gendered roles,” and some are identified as caregiving roles with a view to better understanding the distribution and nature of work role differences performed by family members. The questionnaire measures the distribution of HFWR within a family, which is dependent on gender, age, ethnicity, family dynamics, lifestyle and other personal and societal factors. Additionally, this questionnaire offers insights into whether an individual is meeting family expectations and demands.

By definition, the HFWR score cannot measure the amount of work performed by a respondent, although supplemental questions associated with the scale on family size, caregiving roles and living accommodations may give further insights into the amount of work performed by individuals. This questionnaire could potentially be used to explore the impact of DRF on the distribution of HFWRs. Accurately assessing one's role performance in family work is inherently challenging, as it requires a comparative analysis of the contributions of other family members. Therefore, the HFWR scoring system has both percentage scoring and numerical scoring from 1 to 10, with even increments from 1 to 9 to capture the proportion of work done at home.

Other common generic measures that are used to assess roles/participation are Impact of Participation and Autonomy (IPA), PROMIS-29: satisfaction with participation in social roles, Patient-Specific Functional Scale (PSFS), Social Role Participation Questionnaire (SRPQ), Utrecht Scale for Evaluation of Rehabilitation-Participation (USER-Participation), Valued Life Activity Scale (VLA) (Björk, Bergström, Sverker, & Brodin, 2020). The IPA is tailored to measure autonomy and participation across five domains: autonomy indoors, family role, autonomy outdoors, social relations, and work and education. Meanwhile, the PSFS captures individual-specific challenges in activity participation, providing a personalized perspective on functional limitations. Social Role Participation Questionnaire (SRPQ), specifically designed for patients with rheumatic diseases, focuses on social role participation, whereas the USER-Participation evaluates both the objective and subjective aspects of participation through 31 items addressing frequency, restrictions, and satisfaction in various life activities. Lastly, the VLA developed from patient interviews, includes 33 activities ranging from daily living to leisure and volunteer work, highlighting the personal value attached to each activity. Despite the wide array of scales available, none offers a comprehensive assessment of HFWRs, underlining

the gap in measuring the full spectrum of family role responsibilities that is critical for individuals recovering from conditions such as DRF.

1.8 Rehabilitation after DRF

DRF rehabilitation has three stages: initial immobilization for edema and pain control, mobilization, and strengthening stages (Ikpeze, Smith, Lee, & Elfar, 2016). During the immobilization stage, the therapy aim is to initiate an active range of motion of the digits, elbow, and shoulder and educate on fine hand motor activities. However, there are controversies regarding the timing of immobilization and the type of rehabilitation for optimal functional recovery (Koval, Haidukewych, Service, & Zirgibel, 2014). A clinical trial comparing mobilization within two weeks and six weeks after volar plate fixation of DRF did not show significant differences between the early and late motion groups (Lozano-Calderón, Souer, Mudgal, Jupiter & Ring, 2008). However, a systematic review showed that immobilization following open reduction and internal fixation of DRF with shorter immobilization (1 to 3 weeks) resulted in better functional outcomes than six weeks of immobilization (Ghaddaf et al., 2023). These findings suggest that early mobilization is beneficial for better functional outcomes. Therapeutic interventions play an essential role in restoring mobility and strength. However, there needs to be more evidence on the difference between supervised inpatient physiotherapy and a home exercise program. A randomized controlled cohort study comparing inpatient physiotherapy and an unassisted home exercise program showed that home exercise is as effective as inpatient physiotherapy (Krischak et al., 2009). In another study, Souer et al., in a randomized control trial of more than 90 patients, showed that supervised physiotherapy is inferior to a home exercise programme in gaining better functional outcomes after DRF (Souer,

Buijze, & Ring, 2011). This might be due to an overly cautious therapist impeding the progress of exercise beyond the pain level, leading to slower recovery in supervised physiotherapy.

Another randomized trial of patients with DRF (n = 56) compared a group receiving a physiotherapist directed advice and exercise program with a control group without intervention. The result did not show significant differences in wrist extension when measured at three weeks and grip strength and activity limitation when measured at six weeks (Kay, McMahon, & Stiller, 2008). These studies discussed above suggest that patients can achieve satisfactory mobility and strength regardless of the type of rehabilitation. A study investigating the challenges in performing activities after DRF showed that the patient had difficulties with self-care at one week and productive activities at five weeks (Dekkers & Søballe, 2004).

Improvement in pain, range of motion or grip strength did not correlate with activity performance, indicating the importance of focusing on functional activities in therapy sessions (Dekkers & Søballe, 2004). Despite extensive research on physical impairments caused by DRF, understanding its impact on daily role function is limited. The immediate effect of DRF on an individual's HFWRs can have significant socioeconomic implications. However, studies have not comprehensively examined patients' role function and family work during immobilization when patients experience severe activity limitation, pain, and shock (Watson et al., 2018). In addition, patients stay off work, which can cause financial distress. A biopsychosocial approach to rehabilitation strategy will enable the therapist to address the patient's role functions. This requires patient-therapist collaboration to develop patient-tailored rehabilitation plans.

The clinical presentation after DRF can range from discrete and well-defined problems such as pain, limited mobility, and strength to complex multifactorial issues such as the inability to fulfill individual role functions. DRF affects activities of daily living, which can differ by sociocultural,

workplace, economic position, and the gender role embraced by the family. These multifactorial problems that are contextual cannot be addressed directly by specific management protocols but can be addressed through biopsychosocial knowledge (Jones, 2019, p. 5). According to the biopsychosocial model, the disease results from biological health conditions, the environment (physical, social, economic, political), and personal factors such as age, gender, ethnicity, culture, education, beliefs, etc. (Jones, 2019, p. 5). The biopsychosocial framework is depicted in the International Classification of Functioning, Disability, and Health (ICF) model. The ICF model has three main domains: body structure and function, activity and participation, and subcategories of environmental and personal factors. The ICF model helps to understand the health effects of the DRF (Harris, Mac Dermid, & Roth, 2005) in three domains and highlights how the ICF concepts specifically apply to DRF, including that HFWRs involve activities but fall primarily under participation (Figure 1).

Rehabilitation after DRF aims to maximize grip strength and range of motion (Kooner & Grewal, 2021). Focusing only on impairments such as range of motion or pain does not necessarily improve daily activity participation or functional roles. For example, a study investigating the correlation of activity limitation with impairment in 33 women (51-87 years) with colles fracture found that 1/3 of patients could not perform basic activities of daily living (ADL) five weeks after removing the cast. The decrease in impairment did not correlate with improved participation in ADL (Dekkers & Søballe, 2004). Rehabilitation focused only on impairment may not be transferred to functional roles by older adults (Liu, Shiroy, Jones, & Clark, 2014). Alternatively, functional training can improve ADL performance in older adults. Functional activities involve coordinated, multiplanar movements incorporating multiple joints, dynamic tasks, and alteration in the base of support to complete the tasks (Sipe, 2012).

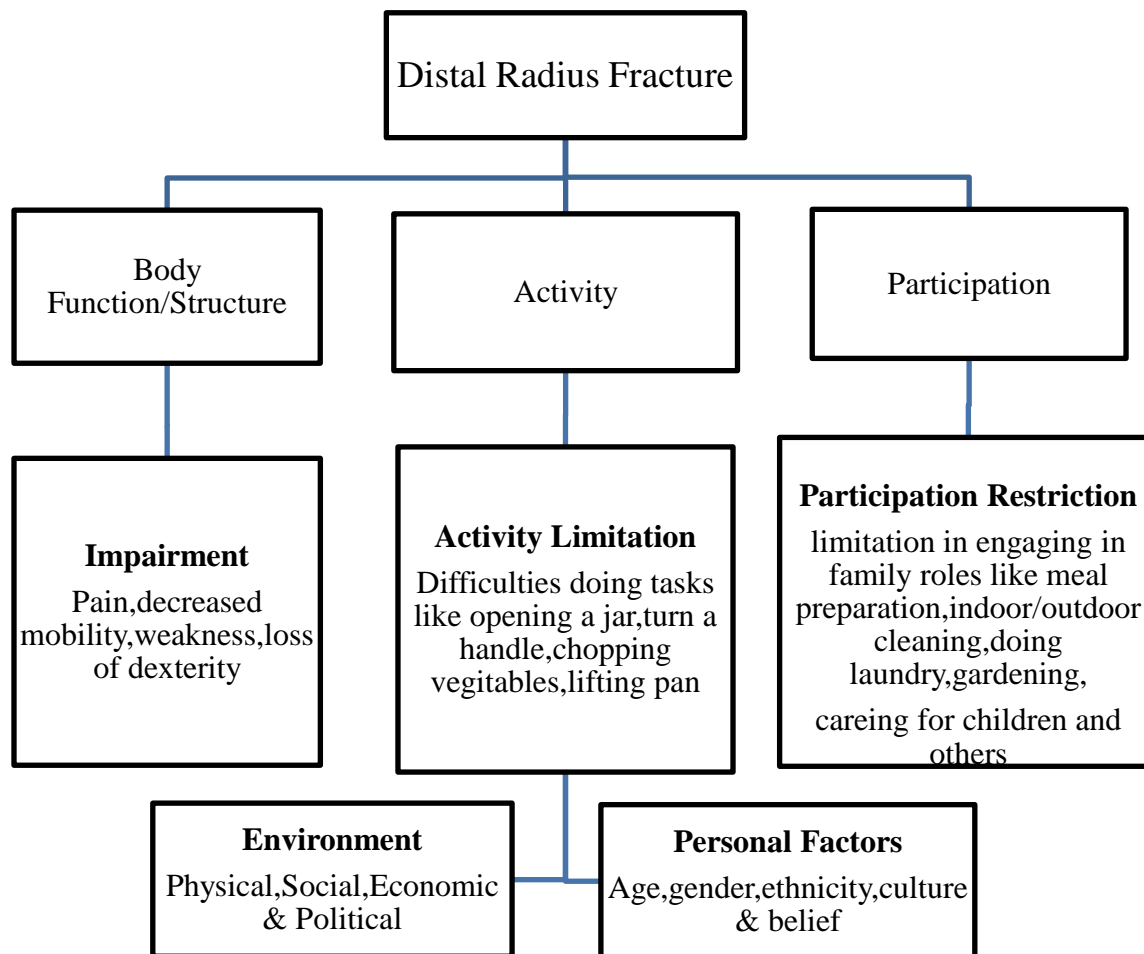


Figure 1. International Classification of Function and Disability (ICF) Model of Distal Radius Fracture.

(Adapted from the World Health Organization, Geneva, 2002). <https://www.who.int/standards/classifications/international-classification-of-functioning-disability-and-health>

A systematic review that included 21 studies with 831 participants with healthy or upper extremity musculoskeletal injuries in the age range of 16 to 81 years showed that movement quantity and quality improved when engaged in purposeful activities than non-purposeful movements (Collis, Signal, Mayland, & Wright-St Clair, 2020). Activities are components or small tasks that construct work role functions (Polatajko et al., 2004). Viewing DRF

rehabilitation through the lens of the ICF model will allow clinicians to provide a holistic, purposeful intervention incorporating three domains: impairment, activity limitation, and participation restrictions.

1.9 Patients' and Clinicians' Perceptions of DRF Rehabilitation

Patients' and clinicians' perceptions of integrating activity and occupation as a rehabilitation strategy have not been fully explored. In general, clinics and hospitals are set for a medical model of care, and therefore, clinicians primarily focus on impairment and overlook the socioeconomic impact of DRF. The essence of this issue is captured by a study conducted by Bamford & Walker (2010), which highlighted a disconnect between strength tests and patients' real-life functional abilities. For instance, one patient could lift weights during rehabilitation but struggled with everyday tasks such as lifting a kettle. This finding underscores the potential gap between clinical measurements of recovery and functional outcomes for patients. Patients experience a sense of dependency. This study also revealed that patients take time off from work, indicating the need for clinicians to assess and address work demands and assist the patient in returning to routine activities (Bamford & Walker, 2010). Another study that interviewed 31 individuals with DRF between the ages of 45 and 72 showed that participants were focused on returning to their pre-injury self and taking back their normal identities (Stern, Njelesani, & Howe, 2022). This study suggests that rehabilitation interventions should facilitate engagement in meaningful activities after DRF (Stern et al., 2022). Overall, patients have mixed opinions about the objective measurement used by the therapist; some patients consider these measurements to be encouraging, while others feel that daily activity is a better gauge for monitoring progress (Stern et al., 2022).

A mixed-method survey of 105 occupational therapists working in hand therapy revealed that occupation-based intervention facilitates functional activity and meaningful experience and allows a holistic approach to treatment. Occupation refers to the activities that individuals perform in their day-to-day lives. However, there are barriers to occupational-based interventions, including reimbursement issues, limitations imposed by health conditions and treatment protocol, and the need for more credibility in occupational-based interventions (Colaiani & Provident, 2010). Another survey of two hundred forty-two therapists revealed a tendency within the profession to prioritize impairment-focused intervention over functional outcomes, even though the latter may be more aligned with patients' goals (Michlovitz et al., 2001). This preference is reflected in the more frequent use of physical impairment outcome measures rather than functional outcome questionnaires.

Gaps

Previous research and interventions have prioritized DRF impairments (Bobos et al., 2018; Michlovitz et al., 2001; Porter, 2013) while giving inadequate emphasis on the impact of DRF on HFWRs. To effectively integrate HFWRs into rehabilitation, it is essential to understand the impact of DRF on HFWRs and the recovery period, clinicians', and patients' perceptions of integrating HFWRs into rehabilitation. However, incorporating daily activities into a rehabilitation strategy is not widely adopted by clinicians as an intervention (Collis et al., 2020). One of the barriers to task-based intervention is the lack of clinician knowledge of utilizing daily or occupational tasks as a tool for designing rehabilitation protocol (Colaiani & Provident, 2010). It is essential to examine the impact of DRF on HFWRs and the recovery of HFWRs following DRF, including patients' and clinicians' perceptions of integrating HFWRs as a rehabilitation strategy. Although the structural validity of HFWRs is excellent in the general

population, its validity in the DRF population is unknown. This thesis aims to fill these knowledge gaps.

1.10 Objective

The overarching objective of the study is to understand HFWRs, the impact and recovery of HFWRs following DRF and, finally, to explore patients' and clinicians' perceptions of how HFWRs integrate into rehabilitation and recovery.

1.11 Research Questions

The research questions and the sequence of the studies are illustrated in Figure 2.

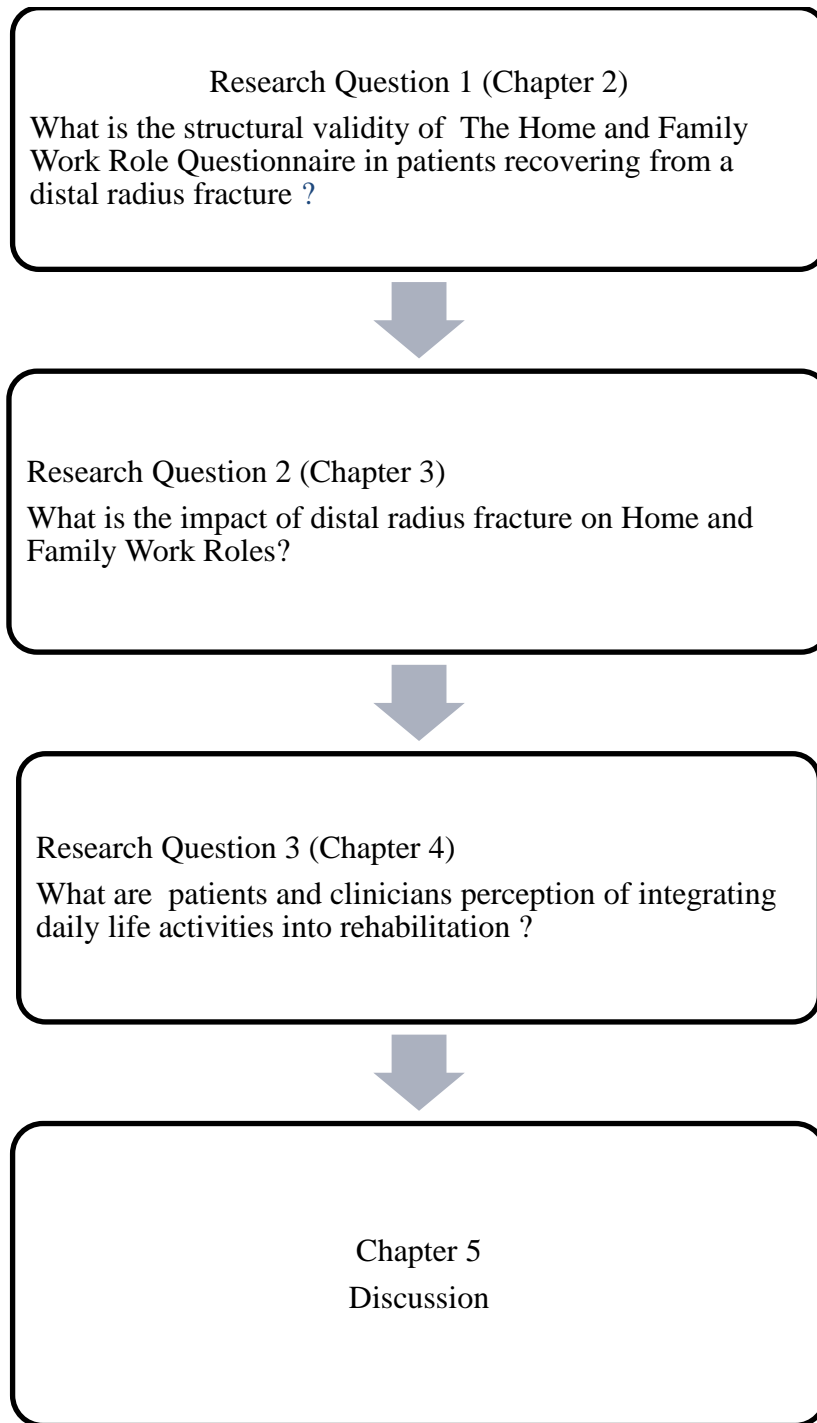


Figure 2. The Research Questions.

1.12 References

- Andreasson, I., Kjellby-Wendt, G., Fagevik-Olsén, M., Karlsson, J., & Carlsson, G. (2019). Life has become troublesome – my wrist bothers me around the clock: an interview study relating to daily life with a malunited distal radius fracture. *Disability and Rehabilitation*, 42(16), 2344–2350. <https://doi.org/10.1080/09638288.2018.1561954>
- Anzarut, A., Johnson, J. A., Rowe, B. H., Lambert, R. G. W., Blitz, S., & Majumdar, S. R. (2004). Radiologic and patient-reported functional outcomes in an elderly cohort with conservatively treated distal radius fractures. *Journal of Hand Surgery*, 29(6), 1121–1127. doi:[10.1016/j.jhsa.2004.07.002](https://doi.org/10.1016/j.jhsa.2004.07.002)
- Anzarut, A., Johnson, J. A., Rowe, B. H., Lambert, R. G. W., Blitz, S., & Majumdar, S. R. (2004). Radiologic and patient-reported functional outcomes in an elderly cohort with conservatively treated distal radius fractures. *Journal of Hand Surgery*, 29(6), 1121–1127. doi:[10.1016/j.jhsa.2004.07.002](https://doi.org/10.1016/j.jhsa.2004.07.002)
- Bialocerkowski, A. E., Grimmer, K. A., & Bain, G. I. (2000). A systematic review of the content and quality of wrist outcome instruments. *International Journal for Quality in Health Care*, 12(2), 149–157. doi:10.1093/intqhc/12.2.149
- Bamford, R., & Walker, D.-M. (2010). A qualitative investigation into the rehabilitation experience of patients following wrist fracture. *Hand Therapy*, 15(3), 54–61. doi:[10.1258/ht.2010.010013](https://doi.org/10.1258/ht.2010.010013)
- Beaulé, P. E., Dervin, G. F., Giachino, A. A., Rody, K., Grabowski, J., & Fazekas, A. (2000). Self-reported disability following distal radius fractures: The influence of hand dominance. *Journal of Hand Surgery*, 25(3), 476–482. doi:[10.1016/S0363-5023\(00\)70027-X](https://doi.org/10.1016/S0363-5023(00)70027-X)

- Björk, M., Bergström, M., Sverker, A., & Brodin, N. (2020). Measures of participation in persons with musculoskeletal conditions. *Arthritis Care & Research*, 72(S10), 486–498. doi:10.1002/acr.24226
- Bobos, P., Lalone, E. A., Grewal, R., & MacDermid, J. C. (2018). Recovery, age, and gender affect hand dexterity after a distal radius fracture. A 1-year prospective cohort study. *Journal of Hand Therapy*, 31(4), 465–471. doi:[10.1016/j.jht.2017.08.002](https://doi.org/10.1016/j.jht.2017.08.002)
- Boufous, S., Finch, C., Lord, S., Close, J., Gothelf, T., & Walsh, W. (2006). The epidemiology of hospitalised wrist fractures in older people, New South Wales, Australia. *Bone*, 39(5), 1144–1148. doi:[10.1016/j.bone.2006.05.011](https://doi.org/10.1016/j.bone.2006.05.011)
- Bruder, A. M., Taylor, N. F., Dodd, K. J., & Shields, N. (2013). Physiotherapy intervention practice patterns used in rehabilitation after distal radial fracture. *Physiotherapy*, 99(3), 233–240. doi:[10.1016/j.physio.2012.09.003](https://doi.org/10.1016/j.physio.2012.09.003)
- Bunch, P. M., Sheehan, S. E., Dyer, G. S., Sodickson, A., & Khurana, B. (2016). A biomechanical approach to distal radius fractures for the emergency radiologist. *Emergency Radiology*, 23(2), 175–185. doi:[10.1007/s10140-015-1363-0](https://doi.org/10.1007/s10140-015-1363-0)
- Chhabra, A. B., & Yildirim, B. (2021). Adult distal radius fracture management. *Journal of the American Academy of Orthopaedic Surgeons*, 29(22), e1105–e1116. doi:[10.5435/JAAOS-D-20-01335](https://doi.org/10.5435/JAAOS-D-20-01335)
- Chung, K. C., Pillsbury, M. S., Walters, M. R., & Hayward, R. A. (1998). Reliability and validity testing of the Michigan Hand Outcomes Questionnaire. *Journal of Hand Surgery*, 23(4), 575–587. doi:[10.1016/S0363-5023\(98\)80042-7](https://doi.org/10.1016/S0363-5023(98)80042-7)

- Chung, K. C., & Spilson, S. V. (2001). The frequency and epidemiology of hand and forearm fractures in the United States. *Journal of Hand Surgery*, 26(5), 908–915. doi:[10.1053/jhsu.2001.26322](https://doi.org/10.1053/jhsu.2001.26322)
- Collis, J. M., Signal, N., Mayland, E., & Wright-St Clair, V. A. (2020). Influence of purposeful activities on upper extremity motor performance: A systematic review. *OTJR: Occupation, Participation and Health*, 40(4), 223–234. doi:[10.1177/1539449220912187](https://doi.org/10.1177/1539449220912187)
- Court-Brown, C. M., Biant, L., Bugler, K. E., & McQueen, M. M. (2014). Changing epidemiology of adult fractures in Scotland. *Scottish Medical Journal*, 59(1), 30–34. doi:[10.1177/0036933013518148](https://doi.org/10.1177/0036933013518148)
- Dabbagh, A., Seens, H., Fraser, J., & MacDermid, J. C. (2023). Construct validity and internal consistency of the HFWRs Questionnaires: A cross-sectional study with exploratory factor analysis. *BMC Women's Health*, 23(1), 56. doi:[10.1186/s12905-023-02199-1](https://doi.org/10.1186/s12905-023-02199-1)
- Daly, K. (2002). Time, gender, and the negotiation of family schedules. *Symbolic Interaction*, 25(3), 323–342. doi:[10.1525/si.2002.25.3.323](https://doi.org/10.1525/si.2002.25.3.323)
- Diamantopoulos, A. P., Rohde, G., Johnsrud, I., Skoie, I. M., Hochberg, M., & Haugeberg, G. (2012). The epidemiology of low- and high-energy distal radius fracture in middle-aged and elderly men and women in southern Norway. *PLOS ONE*, 7(8), e43367. doi:[10.1371/journal.pone.0043367](https://doi.org/10.1371/journal.pone.0043367)
- Dekkers, M. K., & Søballe, K. (2004). Activities and impairments in the early stage of rehabilitation after Colles' fracture. *Disability and Rehabilitation*, 26(11), 662–668. doi:[10.1080/09638280410001683173](https://doi.org/10.1080/09638280410001683173)

- Edwards, B. J., Song, J., Dunlop, D. D., Fink, H. A., & Cauley, J. A. (2010). Functional decline after incident wrist fractures—Study of Osteoporotic Fractures: Prospective cohort study. *BMJ*, *341*(jul08 1), c3324–c3324. doi:[10.1136/bmj.c3324](https://doi.org/10.1136/bmj.c3324)
- Esakki, S., MacDermid, J. C., Vincent, J. I., Packham, T. L., Walton, D., & Grewal, R. (2018). Rasch analysis of the patient-rated wrist evaluation questionnaire. *Archives of Physiotherapy*, *8*(1), 5. doi:[10.1186/s40945-018-0046-z](https://doi.org/10.1186/s40945-018-0046-z)
- Farzad, M., Asgari, A., Dashab, F., Layeghi, F., Karimlou, M., Hosseini, S. A., & Rassafiani, M. (2015). Does disability correlate with impairment after hand injury? *Clinical Orthopaedics and Related Research*, *473*(11), 3470–3476. doi:[10.1007/s11999-015-4228-7330](https://doi.org/10.1007/s11999-015-4228-7330), doi:[10.1093/ptj/84.4.312](https://doi.org/10.1093/ptj/84.4.312)
- Flinkkilä, T. (2014). Classification distal radius fractures. In L. M. Hove, T. Lindau & P. Hølmer (Eds.), *Distal radius fractures* (pp. 83–91). Berlin, Heidelberg: Springer Berlin Heidelberg. doi:[10.1007/978-3-642-54604-4_10](https://doi.org/10.1007/978-3-642-54604-4_10)
- Ghaddaf, A. A., Abdulhamid, A. S., Alomari, M. S., Alquhaibi, M. S., Alshehri, A. A., & Alshehri, M. S. (2023). Comparison of immobilization periods following open reduction and internal fixation of distal radius fracture: A systematic review and meta-analysis. *Journal of Hand Therapy*, *36*(1), 23–32. doi:[10.1016/j.jht.2021.06.004](https://doi.org/10.1016/j.jht.2021.06.004)
- Giladi, A. M., Shauver, M. J., Ho, A., Zhong, L., Kim, H. M., & Chung, K. C. (2014). Variation in the incidence of distal radius fractures in the U.S. Elderly as related to slippery weather conditions. *Plastic and Reconstructive Surgery*, *133*(2), 321–332. doi:[10.1097/01.prs.0000436796.74305.38](https://doi.org/10.1097/01.prs.0000436796.74305.38)
- Gummesson, C., Atroshi, I., & Ekdahl, C. (2003). The disabilities of the arm, shoulder and hand (DASH) outcome questionnaire: Longitudinal construct validity and measuring self-rated

- health change after surgery. *BMC Musculoskeletal Disorders*, 4(1), 11. doi:[10.1186/1471-2474-4-11](https://doi.org/10.1186/1471-2474-4-11)
- Harris, J. E., MacDermid, J. C., & Roth, J. (2005). The International Classification of Functioning as an explanatory model of health after distal radius fracture: A cohort study. *Health and Quality of Life Outcomes*, 3(1), 73. doi:[10.1186/1477-7525-3-73](https://doi.org/10.1186/1477-7525-3-73)
- Heidari, S., Babor, T. F., De Castro, P., Tort, S., & Curno, M. (2016). Sex and gender equity in research: Rationale for the sager guidelines and recommended use. *Research Integrity and Peer Review*, 1(1). doi:[10.1186/s41073-016-0007-6](https://doi.org/10.1186/s41073-016-0007-6)
- Hill, B., & Bialocerkowski, A. (2020). Assessment of functional outcomes. In *Cooper's fundamentals of hand therapy* (pp. 66–77). Amsterdam: Elsevier. doi:[10.1016/B978-0-323-52479-7.00005-3](https://doi.org/10.1016/B978-0-323-52479-7.00005-3)
- Ikpeze, T. C., Smith, H. C., Lee, D. J., & Elfar, J. C. (2016). Distal radius fracture outcomes and rehabilitation. *Geriatric Orthopaedic Surgery and Rehabilitation*, 7(4), 202–205. doi:[10.1177/2151458516669202](https://doi.org/10.1177/2151458516669202)
- Jayakumar, P., Overbeek, C. L., Lamb, S., Williams, M., Funes, C. J., Gwilym, S., Vranceanu, A. M. (2018). What factors are associated with disability after upper extremity injuries? A systematic review. *Clinical Orthopaedics and Related Research*, 476(11), 2190–2215. doi:[10.1097/CORR.0000000000000427](https://doi.org/10.1097/CORR.0000000000000427)
- Kingsley, C., & Patel, S. (2017). Patient-reported outcome measures and patient-reported experience measures. *BJA Education*, 17(4), 137–144. doi:[10.1093/bjaed/mkw060](https://doi.org/10.1093/bjaed/mkw060)
- Kay, S., McMahon, M., & Stiller, K. (2008). An advice and exercise program has some benefits over natural recovery after distal radius fracture: A randomised trial. *Australian Journal of Physiotherapy*, 54(4), 253–259. doi:[10.1016/S0004-9514\(08\)70004-7](https://doi.org/10.1016/S0004-9514(08)70004-7)

- Kleerekoper, M., Villanueva, A. R., Stanciu, J., Rao, D. S., & Parfitt, A. M. (1985). The role of three-dimensional trabecular microstructure in the pathogenesis of vertebral compression fractures. *Calcified Tissue International*, 37(6), 594–597. doi:[10.1007/BF02554913](https://doi.org/10.1007/BF02554913)
- Koo, O. T., Tan, D. M. K., & Chong, A. K. S. (2013). Distal radius fractures: An epidemiological review. *Orthopaedic Surgery*, 5(3), 209–213. doi:[10.1111/os.12045](https://doi.org/10.1111/os.12045)
- Kooner, P., & Grewal, R. (2021). Is therapy needed after distal radius fracture treatment, what is the evidence? *Hand Clinics*, 37(2), 309–314. doi:[10.1016/j.hcl.2021.02.012](https://doi.org/10.1016/j.hcl.2021.02.012)
- Koval, K., Haidukewych, G. J., Service, B., & Zirgibel, B. J. (2014). Controversies in the management of distal radius fractures. *Journal of the American Academy of Orthopaedic Surgeons*, 22(9), 566–575. doi:[10.5435/JAAOS-22-09-566](https://doi.org/10.5435/JAAOS-22-09-566)
- Krischak, G. D., Krasteva, A., Schneider, F., Gulkin, D., Gebhard, F., & Kramer, M. (2009). Physiotherapy after volar plating of wrist fractures is effective using a home exercise program. *Archives of Physical Medicine and Rehabilitation*, 90(4), 537–544. doi:[10.1016/j.apmr.2008.09.575](https://doi.org/10.1016/j.apmr.2008.09.575)
- Kumar, S., Penematsa, S., Sadri, M., & Deshmukh, S. C. (2008). Can radiological results be surrogate markers of functional outcome in distal radial extra-articular fractures? *International Orthopaedics*, 32(4), 505–509. doi:[10.1007/s00264-007-0355-4](https://doi.org/10.1007/s00264-007-0355-4)
- Liu, C., Shiroy, D. M., Jones, L. Y., & Clark, D. O. (2014). Systematic review of functional training on muscle strength, physical functioning, and activities of daily living in older adults. *European Review of Aging and Physical Activity*, 11(2), 95–106. doi:[10.1007/s11556-014-0144-1](https://doi.org/10.1007/s11556-014-0144-1)

- Loisel, F., & Obert, L. (2021). Biomechanics of distal radius fractures. In *Distal radius fractures* (pp. 31–41). Amsterdam: Elsevier. doi:[10.1016/B978-0-323-75764-5.00039-1](https://doi.org/10.1016/B978-0-323-75764-5.00039-1)
- Lozano-Calderón, S. A., Souer, S., Mudgal, C., Jupiter, J. B., & Ring, D. (2008). Wrist mobilization following volar plate fixation of fractures of the distal part of the radius. *Journal of Bone and Joint Surgery. American Volume*, 90(6), 1297–1304. doi:[10.2106/JBJS.G.01368](https://doi.org/10.2106/JBJS.G.01368)
- MacDermid, J. C., Roth, J. H., & Richards, R. S. (2003). Pain and disability reported in the year following a distal radius fracture: A cohort study. *BMC Musculoskeletal Disorders*, 4(1), 24. doi:[10.1186/1471-2474-4-24](https://doi.org/10.1186/1471-2474-4-24)
- MacIntyre, N. J., & Dewan, N. (2016). Epidemiology of distal radius fractures and factors predicting risk and prognosis. *Journal of Hand Therapy*, 29(2), 136–145. doi:[10.1016/j.jht.2016.03.003](https://doi.org/10.1016/j.jht.2016.03.003)
- Meena, S., Sharma, P., Sambharia, A. K., & Dawar, A. (2014). Fractures of distal radius: An overview. *Journal of Family Medicine and Primary Care*, 3(4), 325–332. doi:[10.4103/2249-4863.148101](https://doi.org/10.4103/2249-4863.148101)
- Michlovitz, S. L., LaStayo, P. C., Alzner, S., & Watson, E. (2001). Distal radius fractures: Therapy practice patterns. *Journal of Hand Therapy*, 14(4), 249–257. doi:[10.1016/S0894-1130\(01\)80002-8](https://doi.org/10.1016/S0894-1130(01)80002-8)
- Mifsud, C., & Drew, T. (2015). Pathomechanics of the wrist following fractures of the distal radius. *Hand Therapy*, 20(1), 11–23. doi:[10.1177/1758998315574352](https://doi.org/10.1177/1758998315574352)
- Milovanovic, P., Adamu, U., Simon, M. J. K., Rolvien, T., Djuric, M., Amling, M., & Busse, B. (2015). Age- and sex-specific bone structure patterns portend bone fragility in radii and

- tibiae in relation to osteodensitometry: A high-resolution peripheral quantitative computed tomography study in 385 individuals. *Journals of Gerontology. Series A, Biological Sciences and Medical Sciences*, 70(10), 1269–1275. doi:[10.1093/gerona/glv052](https://doi.org/10.1093/gerona/glv052)
- Nellans, K. W., Kowalski, E., & Chung, K. C. (2012). The epidemiology of distal radius fractures. *Hand Clinics*, 28(2), 113–125. doi:[10.1016/j.hcl.2012.02.001](https://doi.org/10.1016/j.hcl.2012.02.001)
- Nolte, M. T., Shauver, M. J., & Chung, K. C. (2017). Normative values of the Michigan Hand Outcomes Questionnaire for patients with and without hand conditions. *Plastic and Reconstructive Surgery*, 140(3), 425e–433e. doi:[10.1097/PRS.0000000000003581](https://doi.org/10.1097/PRS.0000000000003581)
- Norton, B., Bugden, B., & Liu, K. P. (2022). Functional outcome measures for distal radius fractures: A systematic review. *Hong Kong Journal of Occupational Therapy*, 35(2), 115–124. doi:[10.1177/15691861221114264](https://doi.org/10.1177/15691861221114264)
- Offer, S., & Schneider, B. (2011). Revisiting the gender gap in time-use patterns: Multitasking and well-being among mothers and fathers in dual-earner families. *American Sociological Review*, 76(6), 809–833. doi:[10.1177/0003122411425170](https://doi.org/10.1177/0003122411425170)
- Olech, J., Ciszewski, M., & Morasiewicz, P. (2021). Epidemiology of distal radius fractures in children and adults during the COVID-19 pandemic – A two-center study. *BMC Musculoskeletal Disorders*, 22(1), 306. doi:[10.1186/s12891-021-04128-5](https://doi.org/10.1186/s12891-021-04128-5)
- Plant, C. E., Parsons, N. R., & Costa, M. L. (2017). Do radiological and functional outcomes correlate for fractures of the distal radius? *Bone and Joint Journal*, 99–B(3), 376–382. doi:[10.1302/0301-620X.99B3.35819](https://doi.org/10.1302/0301-620X.99B3.35819)

- Polatajko, H. J., Davis, J. A., Hobson, S. J. G., Landry, J. E., Mandich, A., Street, S. L., . . . Yee, S. (2004). Meeting the responsibility that comes with the privilege: Introducing a taxonomic code for understanding occupation. *Canadian Journal of Occupational Therapy. Revue Canadienne d'Ergotherapie*, 71(5), 261–268. doi:[10.1177/000841740407100503](https://doi.org/10.1177/000841740407100503)
- Rikli, D., & Campbell, D. (2007). distal radius and wrist. *CMS*. Retrieved from aot-start.org. Retrieved from <https://cms.aot-start.org/assets/Uploads/Distal-radius-and-wrist-AO Principles Of Fracture Management.pdf>, 6.3.3.
- Niempoog, S., Sukkarnkosol, S., & Boontanapibul, K. (2019) Prevalence of Osteoporosis in Patients with Distal Radius Fracture from Low-Energy Trauma. *Malaysian Orthopaedic Journal*, 13(3), 15–20. doi:[10.5704/MOJ.1911.003](https://doi.org/10.5704/MOJ.1911.003)
- Sipe, C., & Ritchie, D. (2012). The significant 7 principles of functional training for mature adults. *Idea Fitness Journal*, 9, 42–49.
- Souer, J. S., Buijze, G., & Ring, D. (2011). A prospective randomized controlled trial comparing occupational therapy with independent exercises after Volar Plate fixation of a fracture of the distal part of the radius. *Journal of Bone and Joint Surgery. American Volume*, 93(19), 1761–1766. doi:[10.2106/JBJS.J.01452](https://doi.org/10.2106/JBJS.J.01452)
- Stern, B. Z., Njelesani, J., & Howe, T. H. (2022). Transitioning from hurting to healing: Self-management after distal radius fracture. *Disability and Rehabilitation*, 44(21), 6277–6286. doi:[10.1080/09638288.2021.1962990](https://doi.org/10.1080/09638288.2021.1962990)
- Thompson, P. W., Taylor, J., & Dawson, A. (2004). The annual incidence and seasonal variation of fractures of the distal radius in men and women over 25 years in Dorset, UK. *Injury*, 35(5), 462–466. doi:[10.1016/S0020-1383\(03\)00117-7](https://doi.org/10.1016/S0020-1383(03)00117-7)

Watson, N. J., Martin, S. A., & Keating, J. L. (2018). The impact of wrist fracture, surgical repair and immobilization on patients: A qualitative study. *Clinical Rehabilitation*, 32(6), 841–851. doi:[10.1177/0269215518754614](https://doi.org/10.1177/0269215518754614)

Chapter 2

2 Exploratory Factor Analysis of Home and Family Work Role Questionnaire in Distal Radius Fracture Patients

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2.1 Abstract

Introduction: The home and family work role (HFWR) questionnaire measure proportional and gendered workload in home and care tasks. Prior research demonstrated factor validity in the general population.

Objective: This study examined the factor structure of the HFWR questionnaire in patients with distal radius fracture (DRF) and compared gendered role performance.

Methods: A sample of 115 DRF participants completed an 18-item HFWR questionnaire. The Bartlett's test of sphericity and the Kaiser-Meyer-Olkin measure of sampling adequacy were performed to determine if the data was factorable. Principal axis factor analysis with oblimin rotation was used to examine the factor structure of the questionnaire. An independent sample t-test was performed to compare gendered HFWRs.

Results: Our sample consisted of 84 (73%) women and 31(27%) men with a mean age of 56 years (SD = 19.6, range 18 to 89 years). EFA yielded three-factor solution fitting theoretical conceptualizations. Seven items focused on Traditionally Masculine tasks/roles (home repairs, maintaining vehicles, yard works, gardening, outdoor cleaning, home decorating, and driving the family to appointments). Four items focused on Caregiving roles (caring for children when sick, helping children with homework, supervising children in the home, care for other family members). Six items focused on Traditionally Feminine tasks/roles (preparing meals, laundry, house cleaning, shopping for groceries and supplies, arranging family appointments, managing family finances). Men performed a greater proportion of outdoor cleaning, home repairs, yard

work, and maintaining vehicles ($p = <0.5$), while women performed a greater proportion of laundry.

Conclusions: The HFWR Questionnaire established three factors, namely the Caregiving and Traditionally Masculine or Traditionally Feminine tasks/roles in the DRF population, consistent with the structural validity established in the general population. Gendered role differences were also found.

Keywords: Factor analysis, distal radius fracture, family roles

2.2 Introduction

Distal radius fracture (DRF) is a common upper extremity fracture that occurs most frequently in women aged 50 years and older (MacDermid, McClure, Richard, Faber, & Jaglal, 2021; Philip, MacDermid, Nair, Walton, & Grewal, 2019) and in children and adolescents (Azad et al., 2019). DRF affects an individual's ability to perform domestic activities, personal hygiene, self-care, and other caregiving roles (Dekkers & Nielsen, 2010). Various outcome measures are used to evaluate DRF treatment outcomes. These include range of motion, grip strength (Norton, Bugden, & Liu, 2022), the patient-rated wrist evaluation (PRWE) and the Disabilities of the Arm, Shoulder, and Hand (DASH) questionnaire (Kleinlugtenbelt et al., 2018). Other common outcome measures include the Canadian Occupational Performance Measure (Nielsen & Dekkers, 2012), the Michigan Hand Questionnaire (Roh, Noh, Gong, & Baek, 2017), the Jebsen Taylor Hand Function Test (Chung et al., 2006) and performance-based outcome measures. Most of the patient reported outcome measures (PROMs) do not exclusively capture the impact of DRF on HFWRs. HFWRs are unique to each individual and are defined by family traditions, gender roles, culture, and societal norms. (McMunn, Bird, Webb, & Sacker, 2020; Craig & Mullan, 2011). These roles encompass a diverse range of responsibilities, both paid and unpaid tasks including earning income, managing household chores, fulfilling caregiving responsibilities, and performing various other family duties. The disruption of HFWRs following DRF has a physical and social impact. On the physical level, individual may face challenges in executing routine chores and participating in personal and caregiving roles. Meanwhile, the social impact involves the inability to participate in social activities thereby disrupting personal and social roles within the family and broader social context.

An appropriate evaluation method to explore the impact of wrist fractures on family roles and responsibilities is imperative in comprehending the effect of DRF on HFWRs. It will contribute to providing appropriate functional rehabilitation and social assistance after the fracture event. A scoping review of the physical, psychological, and social impact of long bone fractures, particularly DRF, showed that a fracture prevents a person from fulfilling financial obligations, pre-injury functioning, and social interactions (Singaram & Naidoo, 2019). Particularly, middle aged women with DRF have challenges in fulfilling role function in the first three months following DRF (Morris, 2000). A study that evaluated the outcome measures that effectively correlates with patient satisfaction after wrist fracture showed that the ability to perform household chores, usual occupation, opening packets, cutting meat were identified as the predictors of patient satisfaction when assessed at 12 weeks (Buchanan, Prothero, & Field, 2015). However, there is no PROM that exclusively assesses family roles. The HFWR questionnaires consist of items measuring paid and unpaid tasks, which can help capture some of the physical, functional and social impacts of DRF.

The HFWR questionnaire can be utilized to understand the proportion of work an individual performs and the impact of fracture or other impairments on fulfilling family roles and responsibilities (Dabbagh et al., 2021). Additionally, the total work done at home can be calculated by adding the individual scores and dividing it by 180. When measured at different time points after fracture and rehabilitation, the HFWR score can help gauge functional progression and the outcome of therapy interventions. The response to the HFWR questionnaire is unique to each participant, as the HFWR can differ by age, gender, ethnicity, employment status, marital status, and lifestyle.

Creating an outcome measure consists of several steps; among the most important is identifying the key factor structure (Howard, 2016). Exploratory factor analysis (EFA) is a multivariate statistical method that seeks to identify unobservable constructs underlying observed variables that can parsimoniously describe the covariation of measured variables (Watkins, 2018). In other words, factor analysis reduces the variable into meaningful categories. As hand and wrist functions are crucial in fulfilling HFWRs, and a wrist fracture can adversely affect these basic role functions, evaluating the structural validity of the HFWR questionnaire in the DRF population is essential. EFA was performed as the structural validity of the HFWR questionnaire is unknown for the DRF population. DRF predominantly affects women 50 years and older (Mac Dermid, McClure, Richard, Faber, & Jaglal, 2021), constituting a distinct demographic from the general population. This specific population characteristic necessitates an explanation of the underlying factor structure of the HFWR questionnaire tailored to the nuances of patients with DRF. Understanding the factor structure within this demographic is crucial for tailoring rehabilitation strategies to address the specific needs and challenges faced by patients with DRF, particularly women above the age of 50 years. Additionally recognizing that DRF is more prevalent in women, the study seeks to uncover potential gender-based differences in how HFWRs are impacted. This will contribute to more effective and personalized care based on gender specific factors.

HFWR Questionnaire developed by Dr. Joy MacDermid is grounded in the theoretical framework encompassing three distinct categories: Traditionally Masculine, Traditionally Feminine, and Caregiving roles. The 18-item HFWR Questionnaire consists of home and family work items such as indoor and outdoor cleaning, meal preparation, grocery shopping, caring for others, and earning and managing family income (Appendix 1). The HFWR questionnaire was

developed in consultation with patients and clinicians. The questionnaire has shown factor validity and strong internal consistency in the general population (Cronbach's alpha > 0.90) (Dabbagh, Seens, Fraser, & MacDermid, 2023). Items comprise tasks typically performed at home, including paid work. Items are scored from 0 to 10 with even increments from 1 to 9, and a percentage scoring system that can be utilized to understand the proportion of HFWR shared by family members. Items 1,3,4 and 8 (Appendix 1) and items 2,5,6 and 12 (Appendix 1) of the family role responsibilities questionnaires constitute traditional feminine and traditional masculine gendered tasks, respectively. Items 11,13,14,15,and 16 comprise caregiving roles.

Objectives

- (1) To describe the underlying factor structure measured by the Home and Family Work Role Questionnaire in the DRF population.
- (2) To identify the gender differences between factors.

2.3 Materials and Methods

2.3.1 Study Design and Ethics

This study used a cohort design to explore the impact of DRF on HFWRs. An EFA of the HFWR questionnaire was performed to determine the factor structure of the questionnaire. The study was approved by the Western University Research Ethics Board, London, Ontario, Canada (Project Number #114561, Date of Approval: 1 November 2019).

2.3.2 Participants and Recruitment

Participants with DRF were recruited from St Joseph Hospital Hand and Upper Limb Centre

(HULC). Participants were patients with DRF, 18 years and older, with the ability to speak, read/write English, and with the ability to provide informed consent. Participants under the age of 18 years, with an inability to speak, read/write English, and with a cognitive inability to give consent, were excluded from the study. Patients with DRF waiting to see the clinician at the urgent clinic were approached by the first author to introduce the study and obtain informed consent. Participants completed the HFWR questionnaire (Appendix 1) one-week post-fracture while waiting to see the physician. Participants were recruited from 28-10-2021 to 10-02-2023.

2.3.3 Measures

Consented patients received a copy of demographic (Appendix 3) and HFWRs questionnaires (Appendix 1) to complete while waiting to see the physician. The first author explained the questionnaire to the participants with filling instructions to reduce the potential for misinterpretation. Participants were given 15 to 20 minutes to complete the paper-based questionnaire independently to facilitate a genuine and unbiased response.

The HFWR Questionnaire consists of 18 questions. The items in the questionnaire address house cleaning, outdoor cleaning, laundry, home decorating, home repairs, yard works, gardening, preparing meals, shopping for groceries and supplies, driving the family to activities and appointments, maintaining vehicles, helping children with homework, supervise children in the home, care for children when sick, care for other family members, earn family income, manage family finances, and bills. The response options are none, a little, some, about half, quite a bit, most, all, and do not apply to me and a corresponding numerical scale, which is from 0 to 10 with an even increment from 1 to 9.

2.3.4 Statistical Analysis

Statistical analysis was performed using SPSS version 29. The following a priori decisions were made before conducting EFA.

2.4 Assumptions of EFA

- (1) Data inspection techniques: Barlett's test of sphericity (Bartlett, 1950; Dziuban & Shirkey, 1974) was significant, indicating that data were not an identical matrix. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.78, which is above the minimum requirement of 0.6 (Dziuban & Shirkey, 1974).
- (2) Factor analytic method: Principal axis factoring was selected as the factor analytic method, as principal axis factoring attempts to reproduce the common variance within a correlation matrix (Howard, 2016).
- (3) Factor retention method: Eigenvalue and scree plot (Figure 1) yielded four factors. However, only two items were loaded into one of the four factors. The statistical identification of a factor typically necessitates a minimum of three items (Izquierdo, Olea, & Abad, 2014). Consequently, three factors were predetermined, and neither eigenvalues nor scree plot were employed to determine the number of factors. This decision was based on the understanding that three factors offer a satisfactory statistical explanation of the covariance matrix yielding a theoretically meaningful solution (Finch, 2020).
- (4) Factor rotation method: The HFWR Questionnaire items can be correlated; hence, the Oblimin rotation method was used (Jennrich & Sampson, 1966)

- (5) Factor loading cut-off: The factor loading cut-off point was set at 0.3 (Hinkin, 1995, 1998). This loading level corresponds to approximately 10% overlapping variance with the other items in that factor and is considered statistically meaningful (Tabachnick & Fidell, 2001).

2.4.1 The gender difference between factors

An independent t-test was performed to compare the total work performed by men and women. No participants had identified their gender as other or nonbinary.

2.4.2 Sample size Calculations

A sample size of 100 and above was predetermined, as an accurate estimate of population parameters can be obtained with a sample size of 100 when common factors are overdetermined and commonalities are high (Costello & Osborne, 2005; Fabrigar, Wegener, MacCallum, & Strahan, 1999).

2.5 Results

2.5.1 Demographic Statistics

A total of 115 participants with a mean age of 56 years (age range = 18 to 89 years; SD = 19 years) participated in the study. The characteristics of the population are detailed in Table 1 below.

Table 1

Demographic Characteristics

Gender	Frequency	percentage
Men	31	27%
Women	84	73%
Marital Status		
Single	34	30%
Common law partner	06	05%
Married	57	50%
Divorced	05	04 %
Widowed	11	10 %
Unknown	02	01%
Number of dependent children		
0	86	75%
1	18	16%
2	08	07%
3	02	01%

Unknown	02	01%
<hr/>		
Working Status		
<hr/>		
Full-time	35	30%
Part time	15	13%
Voluntary work	04	04%
Not working / retired	61	53%
<hr/>		

2.5.2 EFA Results

The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.78, indicating the adequacy of the sample. The Bartlett test of sphericity produced a p-value of < 0.001 . The chi-square for this model was 1280 (df =153). The eigenvalue method and the scree plot (Figure 3) yielded four factors. However, eigenvalue or scree plot was not used to determine the number of factors. The final EFA revealed a three-factor solution for the HFWR questionnaire (Table 2).

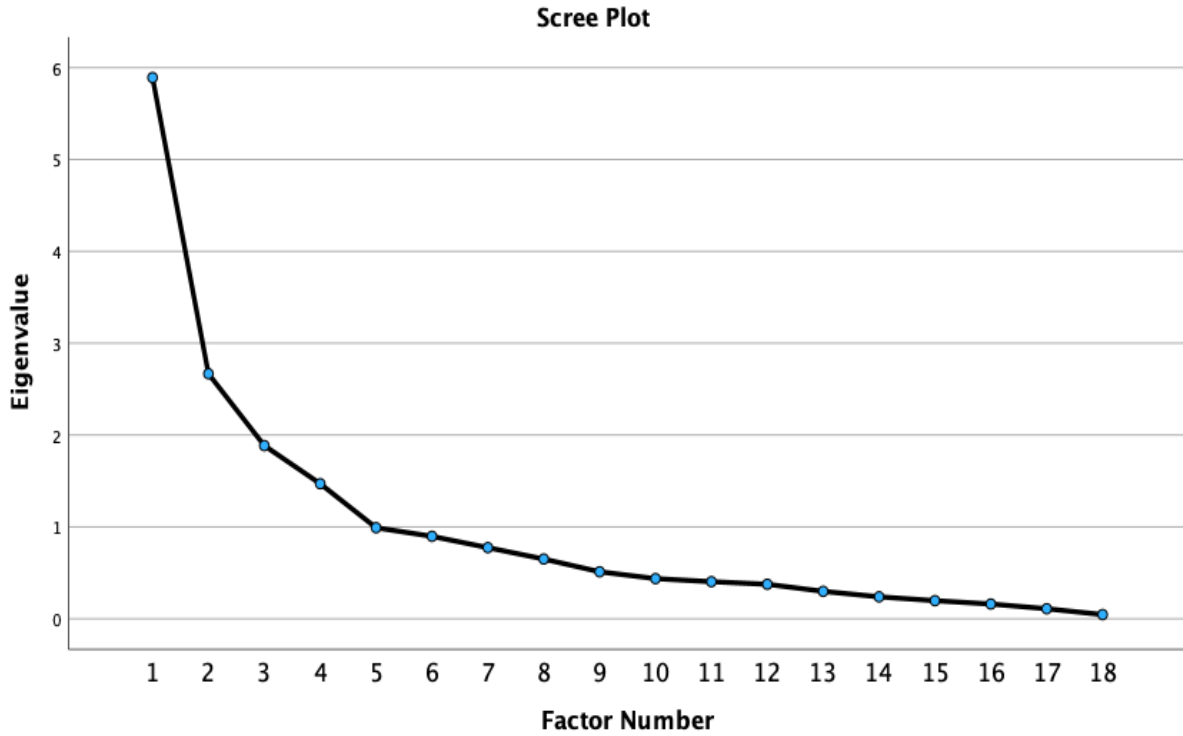


Figure 3. Scree Plot for Home and Family Work Role Questionnaire.

Table 2

Exploratory Factor Analysis of the Home & Family Work Role Questionnaire

No	Items	Traditional Feminine Roles	Caregiving Roles	Traditional Masculine Roles
Q8	Prepare meals	0.71	-0.09	-0.11
Q3	Laundry	0.70	-0.09	0.13
Q1	House cleaning (floors, dishes, bathrooms, etc.)	0.66	-0.11	-0.26

Q9	Shop for groceries and supplies	0.63	-0.01	-0.18
Q11	Arrange family appointments and activities.	0.39	0.19	-0.19
Q18	Manage family finances/bills	0.34	0.09	0.18
Q17	Earn family income			
Q15	Care for children when they are sick	-0.08	1.01	0.02
Q13	Help children with homework	-0.07	0.94	-0.01
Q14	Supervise children in the home	-0.04	0.89	-0.02
Q16	Care for other family members (parent, spouse, or others)	0.34	0.35	-0.08

Q5	Home repairs (install doors or lights, fix bathroom, etc.)	-0.08	0.11	-0.79
Q12	Maintain vehicles (repair, change oil, clean, etc.)	-0.09	-0.01	-0.77
Q6	Yard work	-0.05	0.05	-0.74
Q7	Garden (plant, weed, etc.)	0.26	-0.02	-0.59
Q2	Outdoor cleaning (garage, garbage, windows, etc.)	0.39	-0.12	-0.52
Q4	Home decorating (painting, wallpapering, etc.)	.029	0.20	-0.42
Q10	Drive family to activities or appointments.	0.35	0.20	-0.39

Note: Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalization.

The component correlation matrix between the factors was low (< 0.34), indicating that all three factors are distinct. Using the conservative threshold of 0.3 to determine factor loading, seventeen questionnaire items significantly loaded on one of the factors. Three items cross-loaded (2,10, and 16), and one item (17) did not load on any factors. The three-factor model is the most fit model. It meets the underlying theory of the questionnaire, the criteria, and the assumptions of conducting the EFA. Factors with less than three items are generally undesirable (Yong & Pearce, 2013), and therefore, we excluded the fourth factor, which had only two items. The three identified factors were Traditionally Masculine, Caregiving, and Traditionally Feminine roles.

Traditionally Masculine Roles: Seven items (5,12,6,7,2,4,10) were classified as Traditionally Masculine tasks/roles (Figure 4). These items were about home repairs, maintaining vehicles, yard work, gardening, outdoor cleaning, home decorating, and driving the family to activities or appointments.

Caregiving Roles: Four items (15,13,14 and 16) were labelled as Caregiving roles (Figure 4). These are care for children when sick, helping children with homework, supervising children at home, and care for other family members (parent, spouse, or others).

Traditionally Feminine Roles: Six items (8,3,1,9,11,18) were classified as Traditionally Feminine Roles. These items covered preparing meals, doing laundry, house cleaning, shopping for groceries and supplies, arranging family appointments and activities, and managing family finances and bills (Figure 4).

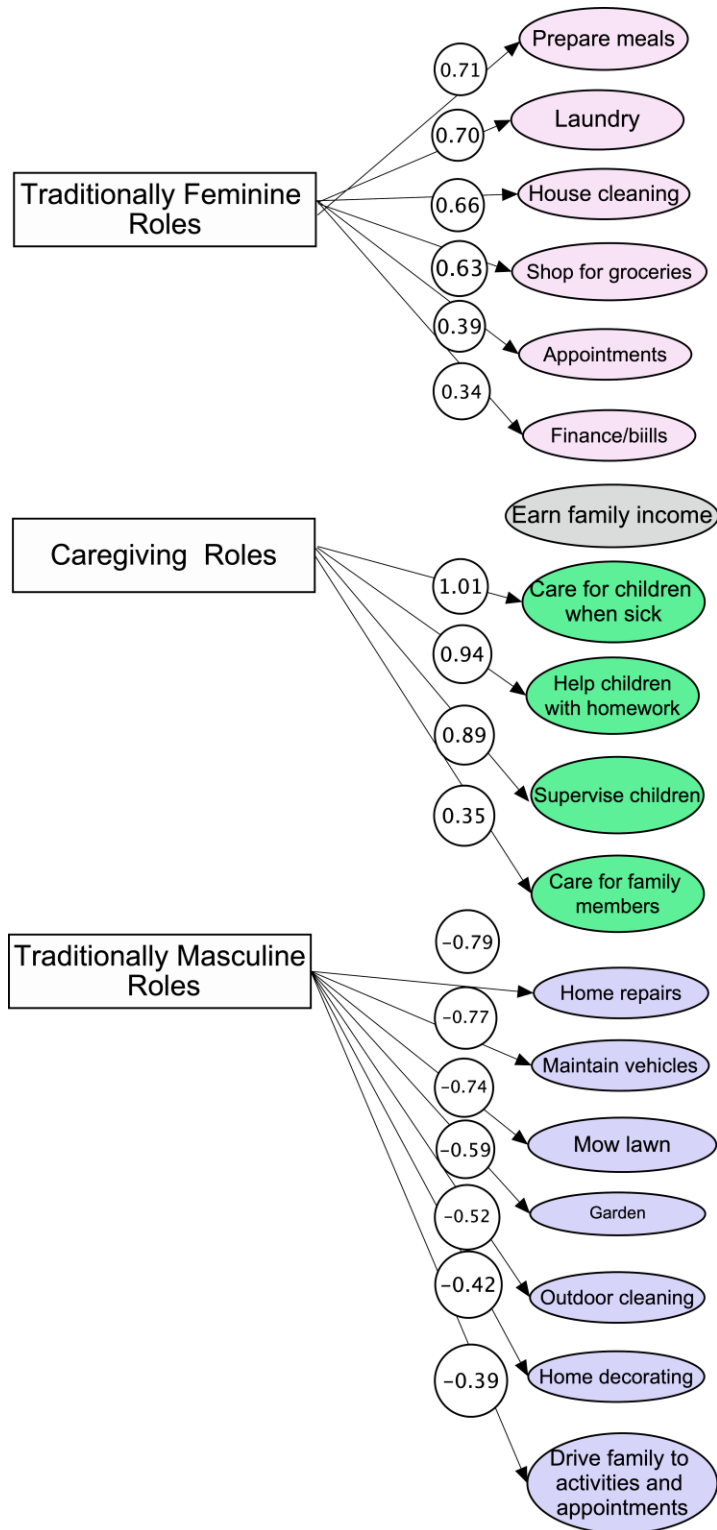


Figure 4. Exploratory Factor Analysis Model of Home and Family Work Roles for Distal Radius

Fracture Population

Gender Differences

In examining gender differences for each item, the assumptions of normality and homogeneity of variance were unmet. However, the sample size was large, and a sample size >30 is robust to the violation of normality (Ghasemi & Zahediasl, 2012), which justified the use of the parametric independent sample t-test. The results indicate that five items in the questionnaire (2,3,5,6,12) showed a statistically significant difference between men and women. Men performed a statistically significant greater proportion of work related to outdoor cleaning (small effect size), home repairs (medium effect size), yard work, and maintaining vehicles (large effect size). Women performed a significantly greater proportion of laundry work (medium effect size) (Table 3).

Table 3

Gender Differences in Proportion of Work for Specific Tasks

HFWR Questionnaire Items	Mean Men	Mean Women	Two- Sided p value	Std. Error Difference	95% CI Lower	95% CI Upper	Cohen's d
House cleaning	3.0	3.9	0.23	0.75	2.39	0.59	-0.25
Outdoor cleaning	3.1	1.7	0.04*	0.70	0.06	2.83	0.44
Laundry	3.1	5.4	0.01*	0.82	3.98	0.74	-0.61
Home Decorating	1.6	1.0	0.37	0.59	0.64	1.71	0.19
Home repairs	2.0	0.2	0.00*	0.57	0.67	2.99	1.06

Yard work	1.8	0.3	0.04*	0.66	0.11	2.80	0.66
Garden	1.4	1.1	0.59	0.57	0.82	1.43	0.11
Prepare meals	3.7	4.2	0.56	0.78	1.99	1.08	-0.12
Shop for groceries and supplies	3.7	4.0	0.74	0.82	1.89	1.34	-0.07
Drive family to activities or appointments.	3.5	2.1	0.10	0.83	0.28	3.05	0.38
Arrange family appointments and activities.	3.2	3.4	0.77	0.85	1.94	1.44	-0.06
Maintain Vehicles	2.7	0.3	0.00*	0.72	0.95	3.88	1.04
Help children with homework	1.2	0.6	0.24	0.55	0.45	1.77	0.30
Supervise children in the home	1.8	0.7	0.11	0.63	0.24	2.31	0.40
Care for children when sick	1.4	0.6	0.17	0.58	0.36	1.98	0.34

Care for other family members.	1.6	1.4	0.73	0.62	1.02	1.45	0.07
Earn family income	4.5	3.4	0.24	0.91	0.74	2.94	0.28
Manage family finances/bills	4.3	5.7	0.10	0.88	3.20	0.28	0-.35

Note.CI: Confidence interval

2.6 Discussion

This study has established the factor validity of the Home and Family Work Role Questionnaire for DRF participants, confirming three factors that address Traditionally Masculine, Traditionally Feminine and Caregiving roles, explaining 58% of the variance in the data. The majority of items aligned according to the underlying theory of the questionnaire. An important note is that Traditionally Feminine and Traditionally Masculine labels reflect societal norms that may not be grounded in equity or biology and that differ by culture and society. The distribution of HFWR in the DRF population can be influenced by gender, age, and family dynamics. Family dynamics like the number of children, marital status, employment status and lifestyle also play a significant role in the distribution of HFWRs. These factors might have influenced the factor loading.

In the DRF population, seven items (home repairs, maintaining vehicles, yard work, gardening, outdoor cleaning, home decorating, and driving the family to activities and appointments) loaded on to Traditionally Masculine roles. In contrast to the original questionnaire, items 4, 7 and 10 (home decorating, gardening & drive family to activities or appointments) were additionally categorized into Traditionally Masculine roles. This may indicate differences between subgroups of the DRF population or differences over time, or a chance finding. Home decorating was originally classified under traditionally feminine roles by the questionnaire developer. However, the inclusion of these (4,7 & 10) in the Traditionally masculine roles suggests that men are participating in some of the Traditionally feminine roles, reflecting potential changes over time in how these activities are perceived and engaged. For instance, a study that used longitudinal data from the German Socio-Economic Panel research (n =1,302 couples) showed that retired

husbands increased their total hours of household labour with a smaller decline in domestic tasks performed by their wives, reflecting a decrease in the gender gap in household tasks based on work status. This study also showed that men spent more hours in the domain of repairs and gardening (Leopold & Skopek, 2015).

Six items (preparing meals, laundry, house cleaning, shopping for groceries and supplies, arranging family appointments and activities, and managing family finances/bills) were loaded into the Traditionally Feminine gendered roles. Although men's participation in HFWRs has increased over the past decades, there is still a gender role expectation that women still perform the traditionally feminine roles (Del Boca, Oggero, Profeta & Rossi, 2020; Marks, Lam, & McHale, 2009; Sullivan, Gershuny, & Robinson, 2018). The incidence of DRF is three to five times higher in women than in men (Brogren, Petranek, & Atroshi, 2007; Wilcke, Hammarberg, & Adolphson, 2013), and women, even after fracture, perform Traditionally feminine roles.

Therefore, it is essential to highlight HFWR in rehabilitation sessions and engage family members or social support systems in assisting with HFWR while recovering from DRF.

Four items (care for children when sick, help children with homework, supervise children at home, and care for other family members) were loaded into the caregiving roles. This finding is consistent with the theory underlying the questionnaire and the construct validity established in the general population, except for item eleven (arrange family appointments and activities), which is categorized under the Traditionally Feminine role in this study. Item seventeen (earn family income) did not load into single factors. In this study, 53% of participants were retired or not working, and this might be the reason that item seventeen failed to load on any factor.

Gender role differences across the items reflected some gender differences that aligned with gendered role expectations. Although men performed a greater proportion of seven items

labelled as Traditionally Masculine tasks/roles, only five items (outdoor cleaning, home repairs, yard work, arrange family appointments, maintain vehicle) were statistically significant.

Similarly, women performed a greater proportion of six items (preparing meals, laundry, house cleaning, shopping for groceries and supplies, arranging family appointments and activities, and managing family finances/bills), although only one item (laundry) was statistically significant.

The sample size was calculated for factor analysis and the data were 'strong', as it had a high communality score (average: 0.6) and only three cross loadings (Costello & Osborne, 2005; De Winter et al., 2009). However, the analysis may have been underpowered to detect differences in individual item scores for the second objective. On the other hand, the result may indicate that men's participation in housework has increased (Man Yee Kan, Sullivan, & Gershuny, 2011; Sullivan, Gershuny, & Robinson, 2018). There are studies showing egalitarian gender attitudes in families (Donnelly et al., 2016), indicating that work is shared more equally among family members.

There was no significant difference between men and women in childcare roles. More than 70% of the participants did not have children to care for, which could be a reason that this study did not identify a significant difference. Patients with DRF are less likely to have demands that require childcare for young children since DRF occurs primarily in women older than 50 years (Philip, McDermid, Nair, Walton & Grewal, 2019); although some may provide childcare in their role as grandmothers. This might also indicate an egalitarian attitude toward childcare. For example, a survey of Italian working women where both partners work showed that childcare activities are more equally shared than housework, and men and women were shown to spend less time with children even when they were homeschooled (Del Boca., 2020). Similarly, a

survey of 1245 Canadian parents indicates a shift to a more equal division of unpaid work, with fathers spending more time in domestic and childcare work (Shafer, Scheibling, & Milkie, 2020).

Strengths and Limitations

This study included a large age range to provide diversity in role demands and was adequately powered for factor analysis. However, there are some limitations. Most participants were women, which is consistent with the nature of DRF but may have affected analyses. In particular, the test of item differences may have been underpowered as effect sizes of clinical significance were not all statistically significant. The design of the HFWR questionnaire can also impose challenges since it assesses the proportion of workload, not the absolute amount of work. Thus, it can detect changes in the distribution of work due to a DRF but is not comparable across people since the amount of work performed is unique to each individual and family and can be influenced by family dynamics, age, gender, and ethnicity.

2.7 Implications

The home and family work role questionnaire may help clinicians identify limitations in activity and participation domain of the International Classification of Functioning, disability and Health framework and make unpaid family work roles more attended to during recovery and rehabilitation. Researchers can use this tool to capture unpaid work role functioning, which is generally neglected in current measures focusing on “function” or “work.”

2.8 Conclusion

Factor analysis and tested subscale differences supported the structural validity of the

HFWR Questionnaire in a sample of patients with DRF having three subscales, namely Traditionally Masculine, Caregiving, and Traditionally Feminine roles. Gendered role differences were also found, with men performing a significantly greater proportion of outdoor cleaning, home repairs, yard work, arranging family appointments, and maintaining vehicles. Women performed a significantly greater proportion of laundry compared to men. The study population consisted of a large proportion of retired older women, which may have affected the observed subscale differences. Future research should include reliability and confirmatory factor analysis on DRF populations.

2.9 References

- Azad, A., Kang, H. P., Alluri, R. K., Vakhshori, V., Kay, H. F., & Ghiassi, A. (2019). Epidemiological and treatment trends of distal radius fractures across multiple age groups. *Journal of Wrist Surgery*, 8(4), 305–311. doi:[10.1055/s-0039-1685205](https://doi.org/10.1055/s-0039-1685205)
- Bartlett, M. S. (1950). Tests of significance in factor analysis. *British Journal of Statistical Psychology*, 3(2), 77–85. doi:[10.1111/j.2044-8317.1950.tb00285.x](https://doi.org/10.1111/j.2044-8317.1950.tb00285.x)
- Brogren, E., Petranek, M., & Atroshi, I. (2007). Incidence and characteristics of distal radius fractures in a southern Swedish region. *BMC Musculoskeletal Disorders*, 8(1), 48. doi:[10.1186/1471-2474-8-48](https://doi.org/10.1186/1471-2474-8-48)
- Buchanan, D., Prothero, D., & Field, J. (2015). Which are the most relevant questions in the assessment of outcome after distal radial fractures? *Advances in Orthopedics*, 2015, 1–6. doi:10.1155/2015/460589
- Chung, K. C., Watt, A. J., Kotsis, S. V., Margaliot, Z., Haase, S. C., & Kim, H. M. (2006). Treatment of unstable distal radial fractures with the volar locking plating system. *Journal of Bone and Joint Surgery. American Volume*, 88(12), 2687–2694. doi:[10.2106/JBJS.E.01298](https://doi.org/10.2106/JBJS.E.01298)
- Costello, A. B., & Osborne, J. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research and Evaluation*, 10, 1–9.
- Craig, L., & Mullan, K. (2011). How mothers and fathers share childcare: A cross-national time-use comparison. *American Sociological Review*, 76(6), 834–861. doi:[10.1177/0003122411427673](https://doi.org/10.1177/0003122411427673)

- Dabbagh, A., Seens, H., Fraser, J., & MacDermid, J. C. (2022). What are work-related predictors of post-Covid-19 home and family work roles? A cross-sectional survey. *Journal of Occupational and Environmental Medicine*, 64(1), 19–25.
doi:[10.1097/JOM.0000000000002406](https://doi.org/10.1097/JOM.0000000000002406)
- Dabbagh, A., Seens, H., Fraser, J., & MacDermid, J. C. (2023). Construct validity and internal consistency of the Home and Family Work Roles Questionnaires: A cross-sectional study with exploratory factor analysis. *BMC Women's Health*, 23(1), 56. doi:[10.1186/s12905-023-02199-1](https://doi.org/10.1186/s12905-023-02199-1)
- Dekkers, M. K., & Nielsen, T. L. (2011). Occupational Performance, pain, and global quality of life in women with upper extremity fractures. *Scandinavian Journal of Occupational Therapy*, 18(3), 198–209. doi:[10.3109/11038128.2010.510205](https://doi.org/10.3109/11038128.2010.510205)
- Del Boca, D., Oggero, N., Profeta, P., & Rossi, M. (2020). Women's and men's work, housework and childcare, before and during COVID-19. *Review of Economics of the Household*, 18(4), 1001–1017. doi:[10.1007/s11150-020-09502-1](https://doi.org/10.1007/s11150-020-09502-1)
- De Winter, J. C., Dodou, D., & Wieringa, P. A. (2009). Exploratory factor analysis with small sample sizes. *Multivariate Behavioral Research*, 44(2), 147–181.
doi:[10.1080/00273170902794206](https://doi.org/10.1080/00273170902794206)
- Donnelly, K., Twenge, J. M., Clark, M. A., Shaikh, S. K., Beiler-May, A., & Carter, N. T. (2016). Attitudes toward women's work and family roles in the United States, 1976–2013. *Psychology of Women Quarterly*, 40(1), 41–54. doi:[10.1177/0361684315590774](https://doi.org/10.1177/0361684315590774)
- Dziuban, C. D., & Shirkey, E. C. (1974). When is a correlation matrix appropriate for factor analysis? Some decision rules. *Psychological Bulletin*, 81(6), 358–361.
doi:[10.1037/h0036316](https://doi.org/10.1037/h0036316)

- Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods*, 4(3), 272–299. doi:[10.1037/1082-989X.4.3.272](https://doi.org/10.1037/1082-989X.4.3.272)
- Finch, W. H. (2020). Using fit statistic differences to determine the optimal number of factors to retain in an exploratory factor analysis. *Educational and Psychological Measurement*, 80(2), 217–241. doi:[10.1177/0013164419865769](https://doi.org/10.1177/0013164419865769)
- Ghasemi, A., & Zahediasl, S. (2012). Normality tests for statistical analysis: A guide for non-statisticians. *International Journal of Endocrinology and Metabolism*, 10(2), 486–489. doi:[10.5812/ijem.3505](https://doi.org/10.5812/ijem.3505)
- Hinkin, T. R. (1995). A review of scale development practices in the study of organizations. *Journal of Management*, 21(5), 967–988. doi:[10.1177/014920639502100509](https://doi.org/10.1177/014920639502100509)
- Hinkin, T. R. (1998). A brief tutorial on the development of measures for use in survey questionnaires. *Organizational Research Methods*, 1(1), 104–121. doi:[10.1177/109442819800100106](https://doi.org/10.1177/109442819800100106)
- Howard, M. C. (2016). A review of exploratory factor analysis decisions and overview of current practices: What we are doing and how can we improve? *International Journal of Human-Computer Interaction*, 32(1), 51–62. doi:[10.1080/10447318.2015.1087664](https://doi.org/10.1080/10447318.2015.1087664)
- Izquierdo, I., Olea, J., & Abad, F. J. (2014). Exploratory factor analysis in validation studies: Uses and recommendations. *Psicothema*, 26(3), 395–400. doi:[10.7334/psicothema2013.349](https://doi.org/10.7334/psicothema2013.349)
- Jennrich, R. I., & Sampson, P. F. (1966) Sep. Rotation for simple loadings. *Psychometrika*, 31(3), 313–323. doi:[10.1007/BF02289465](https://doi.org/10.1007/BF02289465)
- Kleinlugtenbelt, Y. V., Krol, R. G., Bhandari, M., Goslings, J. C., Poolman, R. W., & Scholtes, V. A. B. (2018). Are the patient-rated wrist evaluation (PRWE) and the disabilities of the

- arm, shoulder and hand (DASH) questionnaire used in distal radial fractures truly valid and reliable? *Bone and Joint Research*, 7(1), 36–45. doi:[10.1302/2046-3758.71.BJR-2017-0081.R1](https://doi.org/10.1302/2046-3758.71.BJR-2017-0081.R1)
- Leopold, T., & Skopek, J. (2015). Convergence or continuity? the gender gap in household labour after retirement. *Journal of Marriage and Family*, 77(4), 819–832.
doi:[10.1111/jomf.12199](https://doi.org/10.1111/jomf.12199)
- MacDermid, J. C., McClure, J. A., Richard, L., Faber, K. J., & Jaglal, S. (2021). Fracture Profiles of a 4-year cohort of 266,324 first incident upper extremity fractures from population health data in Ontario. *BMC Musculoskeletal Disorders*, 22(1), 996. doi:[10.1186/s12891-021-04849-7](https://doi.org/10.1186/s12891-021-04849-7)
- McMunn, A., Bird, L., Webb, E., & Sacker, A. (2020). Gender divisions of paid and unpaid work in contemporary UK couples. *Work, Employment and Society*, 34(2), 155–173.
doi:[10.1177/0950017019862153](https://doi.org/10.1177/0950017019862153)
- Morris, N. S. (2000). Distal radius fracture in adults. *Orthopaedic Nursing*, 19(4), 37–48.
doi:10.1097/00006416-200019040-00008
- Kan, M. Y., Sullivan, O., & Gershuny, J. (2011). Gender convergence in domestic work: Discerning the effects of interactional and institutional barriers from large-scale data. *Sociology*, 45(2), 234–251. doi:[10.1177/0038038510394014](https://doi.org/10.1177/0038038510394014)
- Marks, J., Bun, L. C., & McHale, S. M. (2009). Family patterns of gender role attitudes. *Sex Roles*, 61(3–4), 221–234. doi:[10.1007/s11199-009-9619-3](https://doi.org/10.1007/s11199-009-9619-3)
- Nielsen, T. L., & Dekkers, M. K. (2013). Progress and prediction of occupational performance in women with distal radius fractures: A one-year follow-up. *Scandinavian Journal of Occupational Therapy*, 20(2), 143–151. doi:[10.3109/11038128.2012.748823](https://doi.org/10.3109/11038128.2012.748823)

- Norton, B., Bugden, B., & Liu, K. (2022). Functional outcome measures for distal radius fractures: A systematic review. *Hong Kong Journal of Occupational Therapy*, 35(2), 115–124. doi:10.1177/15691861221114264
- Philip, S. S., MacDermid, J. C., Nair, S., Walton, D., & Grewal, R. (2019). What factors contribute to falls-related distal radius fracture? *Journal of Aging and Physical Activity*, 27(3), 392–397. doi:[10.1123/japa.2017-0428](https://doi.org/10.1123/japa.2017-0428)
- Roh, Y. H., Noh, J. H., Gong, H. S., & Baek, G. H. (2017). Effect of low appendicular lean mass, grip strength, and gait speed on the functional outcome after surgery for distal radius fractures. *Archives of Osteoporosis*, 12(1), 41. doi:[10.1007/s11657-017-0335-2](https://doi.org/10.1007/s11657-017-0335-2)
- Shafer, K., Scheibling, C., & Milkie, M. A. (2020). The division of domestic labour before and during the Covid-19 pandemic in Canada: Stagnation versus shifts in fathers' contributions. *Canadian Review of Sociology – Revue Canadienne de Sociologie*, 57(4), 523–549. doi:[10.1111/cars.12315](https://doi.org/10.1111/cars.12315)
- Singaram, S., & Naidoo, M. (2019). The physical, psychological and social impact of long bone fractures on adults: A review. *African Journal of Primary Health Care and Family Medicine*, 11(1), e1–e9. doi:[10.4102/phcfm.v11i1.1908](https://doi.org/10.4102/phcfm.v11i1.1908)
- Sullivan, O., Gershuny, J., & Robinson, J. P. (2018). Stalled or uneven gender revolution? A long-term processual framework for understanding why change is slow. *Journal of Family Theory and Review*, 10(1), 263–279. doi:[10.1111/jftr.12248](https://doi.org/10.1111/jftr.12248)
- Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics* (4th ed). Allyn and Bacon.
- Watkins, M. W. (2018). Exploratory factor analysis: A guide to best practice. *Journal of Black Psychology*, 44(3), 219–246. doi:[10.1177/0095798418771807](https://doi.org/10.1177/0095798418771807)

Wilcke, M. K., Hammarberg, H., & Adolphson, P. Y. (2013). Epidemiology and changed surgical treatment methods for fractures of the distal radius: A registry analysis of 42,583 patients in Stockholm County, Sweden, 2004–2010. *Acta Orthopaedica*, 84(3), 292–296.
doi:[10.3109/17453674.2013.792035](https://doi.org/10.3109/17453674.2013.792035)

Yong, A. G., & Pearce, S. (2013). A beginner's guide to factor analysis: Focusing on exploratory factor analysis. *Tutorials in Quantitative Methods for Psychology*, 9(2), 79–94.
doi:[10.20982/tqmp.09.2.p079](https://doi.org/10.20982/tqmp.09.2.p079)

Chapter 3

3 The Impact of Distal Radius Fracture on Home and Family Work Roles

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3.1 Abstract

Objective: To investigate the effects of distal radius fracture (DRF) on home and family work roles (HFWRs) and to determine return to HFWRs following DRF.

Methods: This study used an observational longitudinal cohort design. The HFWR questionnaire was administered at three time points: before the fracture (retrospective rating), 1- week, and 3 months after the fracture. Differences between before and one week after fracture were evaluated using a paired sample t-test ($n = 115$). A general linear model repeated measure analysis of variance assessed recovery of participants' HFWRs over time ($n = 50$), controlling for age, gender, marital, and employment status.

Results: There was a significant decrease in the percentage of HFWRs performed at 1-week post-fracture ($M = 23$, $SD = 18$) compared to pre-fracture level ($M = 42$, $SD = 17$) and a return to pre-fracture level at 3 months post - fracture ($M=43$, $SD=13$). Marital and employment status influence HFWRs, with the married/common-law partner group ($M = 15$) scoring lower than the single/widowed/divorced group ($M = 33$) at 1-week post-fracture. However, the married/common-law partner group scored higher than the single/widowed/divorced group before and 3 months after the fracture. A follow-up test conducted to examine the difference between the employed and unemployed groups revealed a significant difference, with the employed group scoring higher ($M = 43$; $SE = 3.1$) than the unemployed group ($M = 34$; $SE = 2.7$).

Conclusions: DRF significantly impacts an individual's ability to fulfill HFWRs, with the

resumption of roles at three months. Marital and employment status has a significant impact on HFWRs. Engaging family members and local resources to support patients may help patients and their families during early recovery.

Keywords: Distal radius fracture, activities of daily living, life roles

3.2 Introduction

Distal Radius Fractures (DRFs) are common fractures throughout life, and the incidence of DRF is increasing (MacIntyre & Dewan, 2016). In 2013, more than 25,000 Ontarians 18 years and older sustained DRF (Armstrong et al., 2019). A total of 23,394 DRF were identified in Sweden between 2015 and 2017 (Rundgren, Bojan, Mellstrand Navarro & Enocson, 2020) while in the US, the average annual incidence of DRF treatment claims is 112,406 (Azad et al., 2019). There is a bimodal age distribution of DRF with a peak incidence in young adults and postmenopausal women. DRFs often occur in older adults due to a fall on an outstretched hand and in young adults due to high-energy trauma such as a fall from a height (Azad et al., 2019; Candela et al., 2022). The standard treatment approach for DRF includes cast immobilization, percutaneous pinning, open reduction, internal fixation (ORIF), and external fixation (Armstrong et al., 2019; Rundgren, Bojan, Mellstrand Navarro, & Enocson, 2020). After immobilization in a plaster cast (Quadlbauer et al., 2020), most patients are referred for physiotherapy to restore strength and mobility. The incidence of DRFs is three to five times higher in women than in men (Brogren et al., 2007; Wilcke et al., 2013), and women spend more time on household tasks (Del Boca, Oggero, Profeta, & Rossi, 2020; Marks, Lam, & McHale, 2009). These household tasks are rarely addressed following DRF. Household tasks are gendered and invisible, and women are often expected to assume these roles (Seedat & Rondon, 2021). Globally, women spend more

time on household tasks (Marks, Lam, & McHale, 2009; Del Boca, Oggero, Profeta, & Rossi, 2020) and take three times more domestic and care work than men (Seedat & Rondon, 2021). Home and family work roles (HFWRs) can be repetitive, time-consuming, and physically demanding, adversely impacting mental health and quality of life (Seedat & Rondon, 2021). The impact of this inequity in the distribution of family work roles is substantial as the incidence of DRF is three to fivefold in women than men (Modin, Ramos, & Stomberg, 2009; Brogren, Petranek, & Atroshi, 2007; Wilcke, Hammarberg, & Adolphson, 2013). Some studies have investigated the impact of DRFs on activities of daily living (Collis, Mayland, Wright-St Clair, & Signal, 2021; Ohno, Saito, Matsumoto, Tomori, & Sawada, 2021). However, HFWRs are complex, comprising indoor and outdoor work, care roles, and earning and managing family income, and differ based on the family dynamics of each person. Therefore, it is essential to understand the impact of DRFs on HFWRs and the recovery timeline of HFWRs following DRFs.

Wrist fractures increase the odds of functional decline in activities of daily living by 48% (Edwards, Song, Dunlop, Fink & Cauley, 2010), which can have physical, social, and emotional impacts. For instance, patients with DRF encounter challenges in everyday tasks. These challenges range from having difficulties with food preparation, lifting pots and pans, opening, and closing jars, performing housekeeping, shopping, getting out of the car, and personal hygiene activities (Beulé et al., 2000; Edwards, Song, Dunlop, Fink, & Cauley, 2010). Struggles with daily chores, particularly HFWRs, and relying on others following DRF decreases the quality of life (Modin, Ramos, & Stomberg, 2009). However, physiotherapists frequently use a medical model of care focusing on exercise therapy to restore movement and function (Bruder, Taylor, Dodd, & Shields, 2013). Understanding how fractures affect patients' functional roles,

particularly HFWRs, is important for patient care and effective rehabilitation strategies (Modlin, Ramos, & Stomberg, 2009). It is essential to know how patients with DRF cope with family role responsibilities immediately after a fracture to identify the potential challenges that patients may encounter with HFWR and to provide appropriate support and resources to assist in their roles. Additionally, setting realistic expectations for the HFWR timeline after DRF is paramount. It helps to manage patient expectations and plan a gradual return to functional role recovery. Therefore, an effective rehabilitation strategy for patients with DRF must encompass both the restoration of activity and the facilitation of patient participation in daily life roles. HFWRs include indoor and outdoor cleaning, meal preparation, laundry, grocery shopping, care for children and others, and earning and managing family income. A comprehensive assessment of the impact of DRFs on HFWRs can inform clinicians about unique challenges and guide the rehabilitation process. For example, clinicians can provide adaptive equipment and other strategies to facilitate HFWR while recovering from DRF. Clinicians can work with patients to develop realistic goals for returning to HFWRs, prioritizing tasks and delegating responsibilities to family members or caregivers. This can improve patient outcomes and overall quality of life. Various patient-reported outcome measures assess individuals' ability to perform self-care and paid work roles after DRFs (Ziebart, Bobos, Furtado, Dabbagh, & MacDermid, 2023). A systematic review showed that most frequently used functional outcome measures in DRFs are the disabilities of the arm, shoulder, and hand questionnaires; range of motion; and grip strength (Norton, Bugden, & Liu, 2022). There were no measures explicitly addressing family work roles, although the Canadian Occupational Performance Measure addresses some aspects of family roles (Norton, Bugden, & Liu, 2022). Another study exploring the relationship between the Michigan Hand Outcome Questionnaire and impairment measures showed that overall hand

function and work performance did not correlate strongly with objective measures at 12 weeks (Eraslan, Usta, Demirkan, Kitis, & Baskoc, 2022). These findings suggest that DRF evaluation and management should encompass multiple dimensions not just limited to impairments but also consider patients' life roles, particularly those related to HFWRs. The literature review shows that while the DRF impairments are well documented there is a notable gap concerning how these fractures specifically influence HFWRs.

3.2.1 Objective

To identify the acute (1-week post-fracture) impact of DRFs on an individual's ability to resume HFWRs and to examine the recovery of HFWRs during the first three months post-DRF while considering age, gender, marital status, and employment status as covariates.

3.3 Methodology

3.3.1 Study design

This study used an observational longitudinal cohort design to explore the HFWR performed by Patients with DRF a week before (retrospective rating) fracture and recovery of these roles at three months.

3.3.2 Ethics

The Western University Research Ethic board (REB) approved the study (Project Number:114561, Date of Approval: 1 November 2019).

3.3.3 Study Participants

3.3.3.1 Inclusion criteria

Participants with a DRF diagnosis, 18 years or older, who can speak and read/write in English and provide informed consent were included in the study.

3.3.3.2 Sample size

A priori analysis was performed using G power for repeated measures ANOVA within factor interaction, with an effect size of 0.25, alpha of 0.05, and power of 0.80. The total sample size initially required was 30 participants; however, a larger sample ($n = 50$) was recruited, which increased the statistical power and allowed for a more robust analysis to determine statistical significance.

3.3.3.3 Recruitment

All participants were recruited from the Hand and Upper Limb Centre (HULC), St Joseph's Health Center, London, Ontario, between October 2021 and February 2023. We approached patients with DRF waiting to see the physician in the urgent clinic. The author explained the study and obtained informed consent from Patients with DRF who were interested in participating in the study. Participants completed the HFWR questionnaire (Appendix 1) for pre-fracture and one-week post-fracture time points while waiting to see the physician.

3.3.4 Study Measures

The HFWR questionnaire is an 18-item questionnaire that consists of items such as indoor and outdoor cleaning, meal preparation, grocery shopping, care of dependents, and earning and managing family income. Items are scored from 0 to 10 with even increment from 1 to 9. The questionnaire has items that have respondents self-report their tasks/roles in managing their home/family. Recognizing that these vary by many factors, internal and external to the family, the scale consciously included items that focused on family caregiving roles, as well as tasks that are traditionally masculine or feminine differentiated. Items 1,3,4, and 8 (Appendix 1) and items 2,5,6, and 12 (Appendix 1) of the questionnaires constituted “traditionally feminine” and “traditionally masculine” gendered tasks, respectively. Items numbered 11, 13, 14, 15, and 16 highlighted caregiving roles. Additionally, the questionnaire had a percentage scoring system utilized to understand the proportion of HFWR shared by family members. The total work done at home was calculated by adding the individual scores and dividing by 180. The HFWR questionnaire was developed in consultation with patients and clinicians. The questionnaire has demonstrated factor validity and excellent internal consistency in the general population (Cronbach’s $\alpha > 0.90$). (Dabbagh, Seens, Fraser, & MacDermid, 2023).

3.3.5 Study Procedures

At the first appointment, patients received demographic information (Appendix 3) and two copies of the HFWR Questionnaire (Appendix 1). The demographic questionnaire included age, gender, sex, employment status, and marital status, among other factors. Age, gender, employment, and marital status were the covariates used in the analysis to understand the impact of those factors on HFWRs. Additionally, patients were given two copies of the HFWR

questionnaire (Appendix 1) at the first appointment. The patients completed a copy of the questionnaire representing the proportion of work performed a week before the fracture (retrospective rating). The second copy represented the proportion of work done one week after the fracture. Finally, a follow-up survey was conducted three months after the fracture. DRF participants were virtually contacted (via telephone call) for the three-month follow-up evaluation. In general, data were collected for three time points (one week before and after the fracture and three months after the DRF) on two occasions.

3.3.6 Data Analysis

A paired sample t-test was performed to compare pre-fracture and post-fracture (week 1) HFWR scores. Additionally, general linear model repeated measures ANOVA over three time points (pre-fracture, 1-week and 3 months post-fracture), controlling for age, gender, employment status, and marital status as covariates were used to determine the impact and recovery of HFWRs following DRF. A two-stage analysis was performed due to the substantial loss to follow-up. SPSS version 29 was used for statistical analysis.

3.4 Results

3.4.1 Descriptive Statistics

A total of 115 participants (30 men and 85 women, 18 to 89 years) were recruited for the study who completed the questionnaire twice (rating their pre-fracture and one-week post-fracture tasks/roles) in the first visit. At 3 months of follow-up, there were 50 participants (14 men and 36 women; 18 to 89 years; 21 single / widowed / divorced, 29 married/common-law partners; 18

employed, and 32 unemployed/ retired) who completed the questionnaire virtually (via telephone).

3.4.2 Assumptions

The Shapiro-Wilk normality test was significant for pre-fracture and 1-week post-fracture HFWR scores, indicating that the assumption of normality was not met. However, the sample size ($n = 115$ for the paired sample t-test and $n = 50$ for the GLM repeated measure ANOVA), was large. A sample size >30 was robust to the violation of normality (Ghasemi & Zahediasl, 2012). Mauchly's test of sphericity indicated that the assumption of sphericity was met $X^2(2) = 0.5$, $p = 0.8$. The Levene's test for equality of variance was not significant (>0.05), indicating that the assumption of homogeneity of variance was also met. No significant outliers were detected by visually analyzing the box plot (Figure 5).

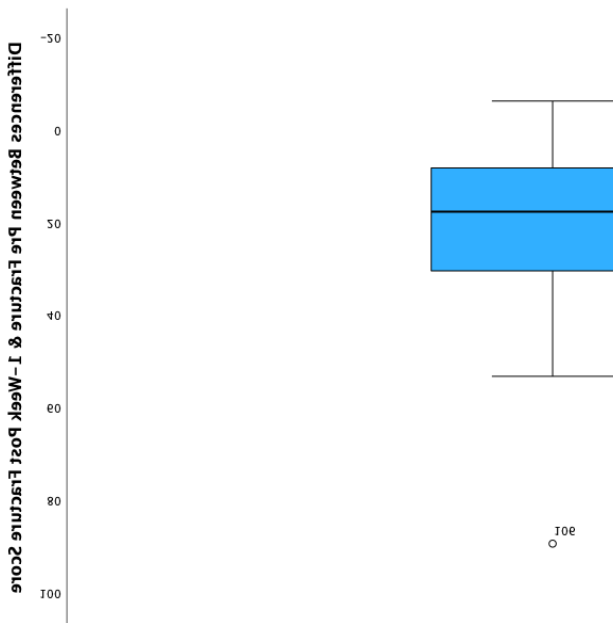
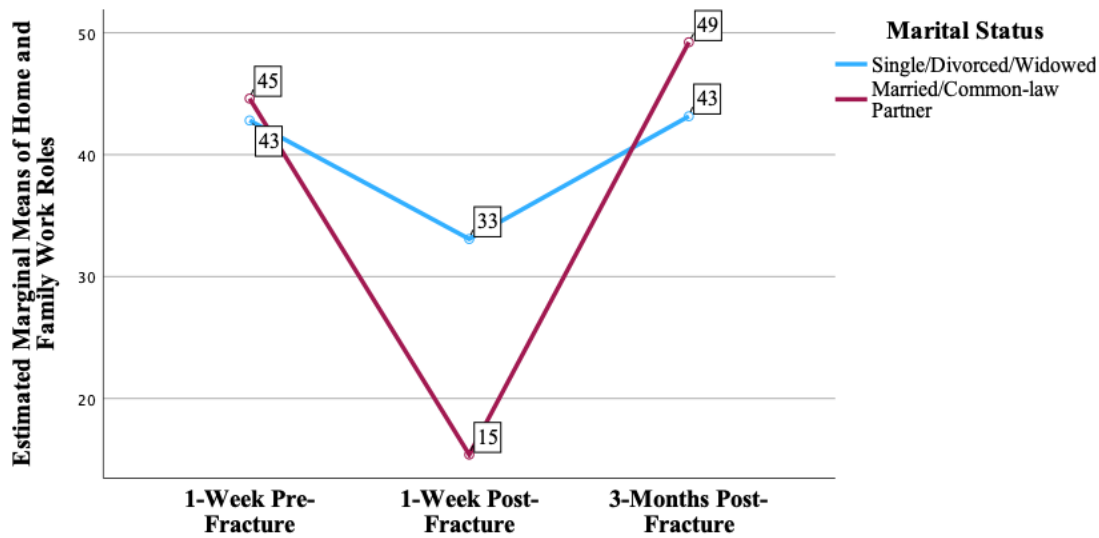


Figure 5. Differences in Pre-fracture & One Week Post-fracture Home & Family Work Role Scores.

A paired sample t-test showed a significant decrease in the proportion of HFWR at 1-week after fracture ($M = 23$, $SD = 18$) compared to the 1-week pre-fracture level ($M = 42$, $SD = 17$), $t(114) = 13.3$, $p < 0.001$ (one-tailed) with Cohen's d of 1 indicating a large effect size.

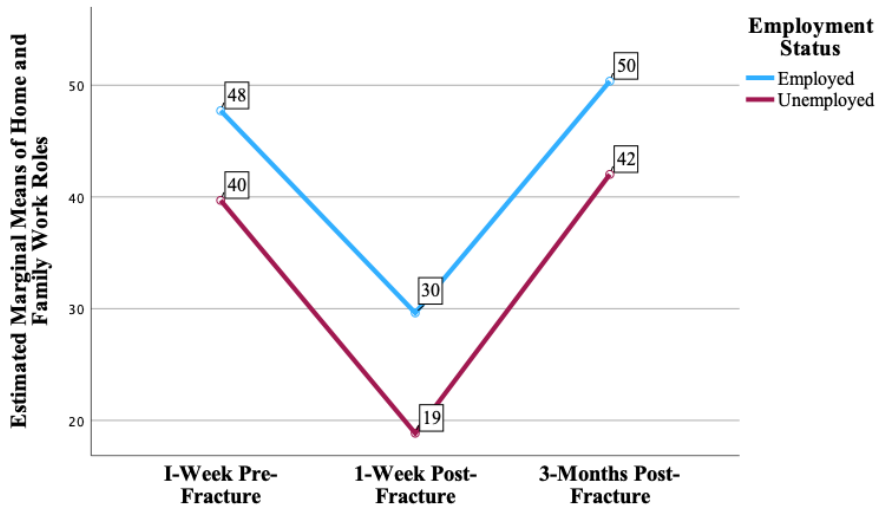
Repeated measure ANOVA indicates that HFWRs were significantly affected by DRF ($F(2, 82) = 13$, $p < 0.001$). HFWRs decreased significantly in the first week after the fracture ($M = 22$, $SD = 16$) compared to the 1-week pre-fracture level ($M = 43$, $SD = 16$) and increased to 1-week pre-fracture level at 3 months after the fracture ($M = 43$, $SD = 13$). There is a significant interaction between time and marital status in the proportion of the HFWR score ($F(2, 82) = 9$, $p < 0.001$, $\eta^2 = 0.19$). The HFWR score decreased significantly at 1-week after the fracture compared to the 1-week pre-fracture score and increased significantly at 3 months for both married / common law partners group and single/divorced and widowed group. There were no significant differences in HFWRs between 1-week pre-fracture and 3 months post-fracture scores. The single/widowed/divorced group (one-week pre-fracture and three months post-fracture mean = 43) scored lower than the married/common-law partner group (pre-fracture mean $M = 45$ and, 3 months post-fracture mean $M = 49$) at pre-fracture and 3 months post-fracture levels. However, 1-week after fracture, the married / common law partner group scored significantly lower ($M = 15$) than the single/widowed/divorced group ($M = 33$) (Figure 6).



Covariates appearing in the model are evaluated at the following values: age = 56.82

Figure 6. Marital Status and Home and Family Work Roles.

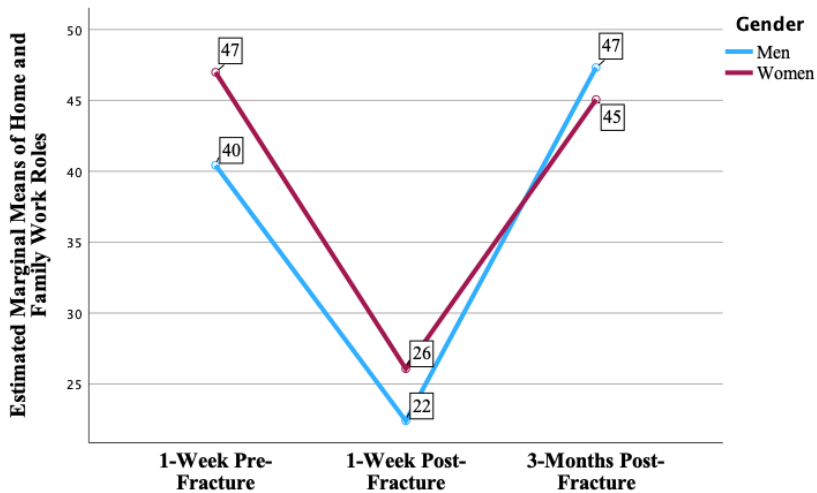
Additionally, there was a significant main effect of employment status on HFWRs ($F(1,41) = 5. P < 0.05$, partial $\eta^2 = 0.11$). A follow-up test conducted to examine the difference between the employed and unemployed group found a significant difference between the employed ($M = 43$; $SE = 3.1$) and the unemployed group ($M = 34$; $SE = 2.7$) with a mean difference of 9.05, $SE = 4$; where the employed group scored significantly higher in HFWRs (figure 7).



Covariates appearing in the model are evaluated at the following values: age = 56.82

Figure 7. Employment Status and Home and Family Work Roles.

However, age ($F(2,82) = 2.3, p = 0.1, \text{partial } \eta^2 = 0.05$) and gender ($F(2,82) = 1.1, P = 0.35, \text{partial } \eta^2 = 0.03$) (figure 8) did not show any significant effect on HFWR score.



Covariates appearing in the model are evaluated at the following values: age = 56.82

Figure 8. Gender and Home and Family Work Roles.

3.5 Discussion

This study demonstrated that DRFs cause a significant short-term reduction in the ability to perform usual family roles and responsibilities, but that people resume their pre-injury percentage of family work, on average, by 3 months post-fracture. This result aligns with previous research findings highlighting the challenges patients face after sustaining DRF (Beaulé et al., 2000). For example, a study of patients with DRF with a mean age of 51 years, evaluated between 2- and 6 months post-fracture, showed challenges in daily activities such as lifting pots, pouring water, opening and closing jars, using work tools, lawnmowing, carrying heavy objects, and maintaining personal hygiene. Additionally, leisure and social activities were affected by DRFs (Beaulé et al., 2000). Presumably, many of these tasks are essential to family roles and responsibilities. This was clear in a qualitative study examining the effect of acute hand injuries on patients' roles as caregivers, spouses, and workers who showed role reversal and loss of independence (Schier & Chan, 2007; Watson, Martin, & Keating, 2018). Although subjective outcomes improve over time, most patients have some form of functional disability when followed up for a mean of 5.5 years (Landgren, Teurneau, Abramo, Geijer & Tägil, 2019), and patients experienced pain at rest and during activities (Sh Ahmed et al., 2020; Ydreborg, Engstrand, Steinvall & Larsson, 2015) .

DRFs affect both paid and unpaid work. McDermid et al. (2007) showed that patients with DRFs lost an average of 9.2 weeks from work, and patients working in an office typically take sick leave for two months (Loisel et al., 2018). Although work loss depends on occupational demands, paid and unpaid work are affected in the first few months following DRFs (McDermid et al., 2007).

Blomstrand et al. (2022) found that hand function and activities of daily living improved significantly in the first 3-months following DRFs, as measured using a Patient-Rated Wrist

Evaluation Questionnaire. Similarly, Nielsen and Dekkers (2013) showed that the greatest improvement in occupational performance occurred in the first 3 months when measured using the Canadian Occupational Performance Measure and the DASH questionnaire. Consistent with the findings of Blomstrand et al. (2022) and Nielsen and Dekkers (2013), our participants resumed their HFWRs at 3 months. However, the HFWR questionnaire, in contrast to region-specific measures such as the DASH and PRWE, assesses routine home tasks that are essential, repetitive, and time-consuming and is focused on activity participation, facilitating a holistic approach to rehabilitation. Additionally, the HFWR questionnaire encompasses the more intricate responsibility of caring for other family members, setting it apart from the PRWE, DASH, and COPM in its scope and complexity. These findings imply that educational materials that outline the expected activity and participation limitations and recovery timelines following DRFs and possible adaptation strategies for HFWRs will promote patient empowerment, set realistic goals, and contribute to a successful and smooth recovery process.

The proportion of patients with DRFs referred for rehabilitation during the immobilization period was less than 10% (Michlovitz, LaStayo, Alzner & Watson, 2001). In our study, the HFWR score decreased significantly one week after DRF (immobilization period), which may be when they needed the most support in managing personal and family tasks. While it might be possible for life roles to be addressed by the acute care team in the clinic, it may be challenging to address individual circumstances, given the volume and time allocated to each patient. This may be reinforced by the presumption, empirically confirmed by our data, that problems may be transient, and that help may come from family or social support. Some patients, such as those with limited self-efficacy, poor social support, severe injury, or early signs of risk for poor outcomes, may benefit from early referral to rehabilitation to address their personal needs and

risk trajectories. Our study and the existing literature highlight the functional impact of DRFs, suggesting the need for rehabilitation strategies that move beyond objective findings (Ikpeze, Smith, Lee, & Elfar, 2016) and embrace patient-tailored approaches incorporating the three domains of function (impairment, activity, and participation restrictions).

Our study revealed a significant interaction between time and marital status on the proportion of HFWR scores at all three time points. Both the married/common-law partners and single/widowed/divorced groups scored significantly lower at one-week post-fracture compared to the pre-fracture scores, and the HFWR scores dropped substantially lower in the married/common-law partner group than those in the single/widowed/divorced group. A possible reason for the sharp drop in HFWR scores in the married/common-law partner group is the availability of partners to support household tasks. This suggests clinicians should be aware of the family's role in the DRF recovery process and explore patient's family roles and responsibilities during assessment and intervention.

Another interesting finding of our study was the impact of employment status on HFWRs following DRFs. Employed participants consistently scored higher than unemployed participants at all three-time points. Employment increases the total workload. Employed participants had a higher HFWR score despite having a fracture than unemployed participants. Participants in the employed group (mean age = 49 years) were significantly younger than those in the unemployed group (mean age = 62 years). They might have had more familial responsibilities, potentially motivating them to regain their functional abilities to fulfill work commitments and caregiving roles, whether paid or unpaid.

Age and gender did not significantly affect HFWRs. The literature presents conflicting evidence on the impact of age and gender on functional outcomes. A retrospective functional outcome

analysis of 183 patients with DRFs using the DASH and modified MAYO wrist score (Phadnis et al., 2012) and a prospective cohort study that evaluated the association between patient characteristics and patient-rated pain and disability following DRFs showed that age and gender were not significant predictors of functional outcomes (MacDermid, Donner, Richards & Roth, 2002). Functional outcomes, such as the DASH score, do not comprehensively address HFWR. However, age and female gender are associated with poor functional outcomes (Cowie, Anakwe & McQueen, 2015; Jayakumar et al., 2020). A prospective evaluation of the DASH score of 581 patients with DRF showed that age was associated with poorer outcomes (Abramo, Kopylov, & Tägil, 2008). Specifically, patients aged > 65 years had slower fracture healing times (Tang, Chiow, Lai, & Chia, 2022). Studies on women older than 65 years of age experiencing DRFs showed that DRFs increased the likelihood of functional decline by 50%. This was reflected in difficulties in preparing meals, performing heavy housework, grocery shopping, and climbing stairs (Amorosa, Vitale, Brown, & Kaufmann, 2011).

In our study, HFWR scores among men at 3 months exceeded their pre-fracture scores. This score increase is likely attributable to patients catching up on HFWR tasks that were postponed during their time in the cast. This is because many traditionally masculine tasks, such as yard works care and vehicle maintenance, maybe more easily postponed than traditionally feminine tasks, such as meal preparation and laundry. The HFWR questionnaire assesses the perceived percentage of work accomplished at home, and quantifying the HFWR in absolute numbers can pose challenges.

There may be several reasons why we did not observe as much of a gender disparity as expected. The main reason for this finding is that DRFs are more common in older adults. The mean age of women with DRFs was 59 years, and some tasks for women may decrease over time as their

children leave the home. Conversely, after retirement, men increase their contributions to family roles and responsibilities (Leopold & Skopek, 2015). Furthermore, older adults may receive support for family roles from family, friends, and service systems. Men and women rated their perceived proportions of their work role performance. Thus, there are inherent difficulties in doing so accurately because one's work must be compared to others contributing to family work. Finally, we may have been underpowered to detect gender differences, as most participants were women. Gendered roles change over the lifespan and as society changes. A larger sample size may have allowed us to explore gender differences in different age subgroups.

This study serves as a reminder to consider HFWR when assessing patients with DRF. Clinicians can provide advice, adaptive equipment, and other strategies to facilitate HFWRs while recovering from DRFs. Clinicians can work with patients to develop realistic goals for resuming HFWRs, prioritize tasks, and delegate responsibilities to family members or caregivers. This may improve the overall quality of life during the fracture recovery process. A previous study found that the loss of independence while recovering from an orthopedic injury causes psychological distress, and the need to redistribute personal and family work can cause discord between partners (Vincent, Horodyski, Vincent, Brisbane, & Sadasivan, 2015). Therefore, additional support may be necessary in certain cases.

3.5.1 Strengths

Although numerous studies have investigated activities of daily living, no studies have explicitly studied the impact of DRFs on an individual's ability to fulfill HFWRs. A large sample with a broad range of participants was recruited to investigate the impact of DRF on their ability to perform HFWRs. A standardized questionnaire was used to examine HFWRs.

3.5.2 Limitations

Although a virtual follow-up at three months allowed participants to provide feedback in a relaxed environment, it might have affected the score as the data collection for pre-fracture and one-week follow-up was collected in person, causing methodological inconsistency that might have impacted participant response. There was a substantial loss to follow-up at three months, affecting the generalizability of the study findings. The effect of DRFs on HFWRs in patients who did not complete the 3 months follow-up remains unclear. They may have resumed HFWR before the 3 months mark or faced challenges in fully resuming all aspects of their pre-fracture HFWRs.

3.6 Conclusions

The findings demonstrate the impact of DRF on HFWRs, particularly immediately after a fracture. However, participants were able to resume HFWRs to a pre-fracture level in 3 months. The study also revealed the significance of marital status on HFWRs, with married/common-law partners scoring lower at 1-week post-fracture than the single/divorced and widowed group. Additionally, the study found a significant main effect of employment status on HFWRs, with the employed group scoring higher than the unemployed group at pre-fracture, 1-week and 3 months post-fracture time points. However, age and gender did not significantly affect the proportion of HFWRs.

3.7 Implications

These findings highlight the importance of developing patient-tailored rehabilitation strategies to address these challenges. Educational material that outlines the expected limitations of HFWRs after DRF and strategies to adapt or delay certain family roles and tasks is necessary. Engaging family members and local resources in providing support to patients may help patients and their families during the early recovery process. Clinicians should not only focus on DRF impairments but also consider the impact of fracture on family roles and develop comprehensive rehabilitation approaches that consider individual circumstances such as potential demographic factors, marital and employment status and thus better support patients in managing HFWRs.

3.8 References

- Abramo, A., Kopylov, P., & Tägil, M. (2008). Evaluation of a treatment protocol for distal radius fractures. *Acta Orthopaedica*, 79(3), 376–385. doi:[10.1080/17453670710015283](https://doi.org/10.1080/17453670710015283)
- Azad, A., Kang, H. P., Alluri, R. K., Vakhshori, V., Kay, H. F., & Ghiassi, A. (2019). Epidemiological and treatment trends of distal radius fractures across multiple age groups. *Journal of Wrist Surgery*, 8(4), 305–311. doi:[10.1055/s-0039-1685205](https://doi.org/10.1055/s-0039-1685205)
- Amorosa, L. F., Vitale, M. A., Brown, S., & Kaufmann, R. A. (2011). A functional outcomes survey of elderly patients who sustained distal radius fractures. *Hand*, 6(3), 260–267. doi:[10.1007/s11552-011-9327-7](https://doi.org/10.1007/s11552-011-9327-7)
- Armstrong, K. A., Von Schroeder, H. P., Baxter, N. N., Zhong, T., Huang, A., & McCabe, S. J. (2019). Stable rates of operative treatment of distal radius fractures in Ontario, Canada: A population-based retrospective cohort study (2004–2013). *Canadian Journal of Surgery. Journal Canadien de Chirurgie*, 62(6), 386–392. doi:[10.1503/cjs.016218](https://doi.org/10.1503/cjs.016218)
- Beaulé, P. E., Dervin, G. F., Giachino, A. A., Rody, K., Grabowski, J., & Fazekas, A. (2000). Self-reported disability following distal radius fractures: The influence of hand dominance. *Journal of Hand Surgery*, 25(3), 476–482. doi:[10.1016/s0363-5023\(00\)70027-x](https://doi.org/10.1016/s0363-5023(00)70027-x)
- Blomstrand, J., Kjellby Wendt, G., Karlsson, J., Wangdell, J., & Fagevik Olsén, M. (2023). Pain, hand function, activity performance and apprehensiveness in patients with surgically treated distal radius fractures. *Journal of Plastic Surgery and Hand Surgery*, 57(1–6), 247–252. doi:[10.1080/2000656X.2022.2060992](https://doi.org/10.1080/2000656X.2022.2060992)
- Brogren, E., Petranek, M., & Atroshi, I. (2007). Incidence and characteristics of distal radius fractures in a southern Swedish region. *BMC Musculoskeletal Disorders*, 8(1), 48. doi:[10.1186/1471-2474-8-48](https://doi.org/10.1186/1471-2474-8-48)

- Bruder, A. M., Taylor, N. F., Dodd, K. J., & Shields, N. (2013). Physiotherapy intervention practice patterns used in rehabilitation after distal radial fracture. *Physiotherapy*, 99(3), 233–240. doi:[10.1016/j.physio.2012.09.003](https://doi.org/10.1016/j.physio.2012.09.003)
- Candela, V., Di Lucia, P., Carnevali, C., Milanese, A., Spagnoli, A., Villani, C., & Gumina, S. (2022). Epidemiology of distal radius fractures: A detailed survey on a large sample of patients in a suburban area. *Journal of Orthopaedics and Traumatology*, 23(1), 43. doi:[10.1186/s10195-022-00663-6](https://doi.org/10.1186/s10195-022-00663-6)
- Collis, J. M., Mayland, E. C., Wright-St Clair, V., & Signal, N. (2021). “The more i do, the more I can do”: Perspectives on how performing daily activities and occupations influences recovery after surgical repair of a distal radius fracture. *Disability and Rehabilitation*, 44(19), 5440–5449. doi:10.1080/09638288.2021.1936219
- Cowie, J., Anakwe, R., & McQueen, M. (2015). Factors associated with one-year outcome after distal radial fracture treatment. *Journal of Orthopaedic Surgery*, 23(1), 24–28. doi:[10.1177/230949901502300106](https://doi.org/10.1177/230949901502300106)
- Dabbagh, A., Seens, H., Fraser, J., & MacDermid, J. C. (2023). Construct validity and internal consistency of the Home and Family Work Roles Questionnaires: A cross-sectional study with exploratory factor analysis. *BMC Women’s Health*, 23(1), 56. doi:[10.1186/s12905-023-02199-1](https://doi.org/10.1186/s12905-023-02199-1)
- Del Boca, D., Oggero, N., Profeta, P., & Rossi, M. (2020). Women’s and men’s work, housework and childcare, before and during COVID-19. *Review of Economics of the Household*, 18(4), 1001–1017. doi:[10.1007/s11150-020-09502-1](https://doi.org/10.1007/s11150-020-09502-1)

- Edwards, B. J., Song, J., Dunlop, D. D., Fink, H. A., & Cauley, J. A. (2010). Functional decline after incident wrist fractures: Study of osteoporotic fractures: Prospective cohort study. *BMJ*, *341*(Jul08 1), C3324–C3324. doi:[10.1136/bmj.c3324](https://doi.org/10.1136/bmj.c3324)
- Eraslan, U., Usta, H., Demirkan, A. F., Kitis, A., & Baskoc, A. (2022). Association between perceived and objective hand-wrist function in distal radius fracture. *Hand Surgery and Rehabilitation*, *41*(5), 582–588. doi:10.1016/j.hansur.2022.08.002
- Ghasemi, A., & Zahediasl, S. (2012). Normality tests for statistical analysis: A guide for non-statisticians. *International Journal of Endocrinology and Metabolism*, *10*(2), 486–489. doi:[10.5812/ijem.3505](https://doi.org/10.5812/ijem.3505)
- Ikpeze, T. C., Smith, H. C., Lee, D. J., & Elfar, J. C. (2016). Distal radius fracture outcomes and rehabilitation. *Geriatric Orthopaedic Surgery and Rehabilitation*, *7*(4), 202–205. doi:[10.1177/2151458516669202](https://doi.org/10.1177/2151458516669202)
- Jayakumar, P., Teunis, T., Vranceanu, A. M., Lamb, S., Ring, D., & Gwilym, S. (2020). Early psychological and social factors explain the recovery trajectory after distal radial fracture. *Journal of Bone and Joint Surgery. American Volume*, *102*(9), 788–795. doi:[10.2106/JBJS.19.00100](https://doi.org/10.2106/JBJS.19.00100)
- Landgren, M., Teurneau, V., Abramo, A., Geijer, M., & Tägil, M. (2019). Intermediate-term outcome after distal radius fracture in patients with poor outcome at 1 year: A register study with a 2- to 12-year follow-up. *Journal of Hand Surgery*, *44*(1), 39–45. doi:[10.1016/j.jhsa.2018.10.015](https://doi.org/10.1016/j.jhsa.2018.10.015)
- Leopold, T., & Skopek, J. (2015). Convergence or continuity? the gender gap in household labor after retirement. *Journal of Marriage and Family*, *77*(4), 819–832. doi:10.1111/jomf.12199

- Loisel, F., Bourgeois, M., Rondot, T., Nallet, J., Boeckstins, M., Rochet, S., . . . Lepage, D. (2018). Treatment goals for distal radius fractures in 2018: Recommendations and practical advice. *European Journal of Orthopaedic Surgery and Traumatology: Orthopedie Traumatologie*, 28(8), 1465–1468. doi:[10.1007/s00590-018-2196-9](https://doi.org/10.1007/s00590-018-2196-9)
- MacDermid, J. C., Donner, A., Richards, R. S., & Roth, J. H. (2002). Patient versus injury factors as predictors of pain and disability six months after a distal radius fracture. *Journal of Clinical Epidemiology*, 55(9), 849–854. doi:[10.1016/s0895-4356\(02\)00445-6](https://doi.org/10.1016/s0895-4356(02)00445-6)
- MacDermid, J. C., Roth, J. H., & McMurtry, R. (2007). Predictors of time lost from work following a distal radius fracture. *Journal of Occupational Rehabilitation*, 17(1), 47–62. doi:[10.1007/s10926-007-9069-0](https://doi.org/10.1007/s10926-007-9069-0)
- MacIntyre, N. J., & Dewan, N. (2016). Epidemiology of distal radius fractures and factors predicting risk and prognosis. *Journal of Hand Therapy*, 29(2), 136–145. doi:[10.1016/j.jht.2016.03.003](https://doi.org/10.1016/j.jht.2016.03.003)
- Marks, J., Bun, L. C., & McHale, S. M. (2009). Family patterns of gender role attitudes. *Sex Roles*, 61(3–4), 221–234. doi:[10.1007/s11199-009-9619-3](https://doi.org/10.1007/s11199-009-9619-3)
- Michlovitz, S. L., LaStayo, P. C., Alzner, S., & Watson, E. (2001). Distal radius fractures: Therapy practice patterns. *Journal of Hand Therapy*, 14(4), 249–257. doi:[10.1016/s0894-1130\(01\)80002-8](https://doi.org/10.1016/s0894-1130(01)80002-8)
- Modin, M., Ramos, T., & Stomberg, M. W. (2009). Postoperative impact of daily life after primary treatment of proximal/distal tibia fracture with Ilizarov external fixation. *Journal of Clinical Nursing*, 18(24), 3498–3506. doi:[10.1111/j.1365-2702.2009.02859.x](https://doi.org/10.1111/j.1365-2702.2009.02859.x)

- Nielsen, T. L., & Dekkers, M. K. (2013). Progress and prediction of occupational performance in women with distal radius fractures: A one-year follow-up. *Scandinavian Journal of Occupational Therapy*, 20(2), 143–151. doi:[10.3109/11038128.2012.748823](https://doi.org/10.3109/11038128.2012.748823)
- Norton, B., Bugden, B., & Liu, K. P. (2022). Functional outcome measures for distal radius fractures: A systematic review. *Hong Kong Journal of Occupational Therapy*, 35(2), 115–124. doi:10.1177/15691861221114264
- Ohno, K., Saito, K., Matsumoto, H., Tomori, K., & Sawada, T. (2021). The clinical utility of a decision-aid to facilitate the use of the hand in real-life activities of patients with distal radius fractures: A case study. *Journal of Hand Therapy*, 34(3), 341–347. doi:10.1016/j.jht.2020.03.002
- Phadnis, J., Trompeter, A., Gallagher, K., Bradshaw, L., Elliott, D. S., & Newman, K. J. (2012). Mid-term functional outcome after the internal fixation of distal radius fractures. *Journal of Orthopaedic Surgery and Research*, 7(1), 4. doi:[10.1186/1749-799X-7-4](https://doi.org/10.1186/1749-799X-7-4)
- Quadlbauer, S., Pezzei, C., Jurkowitsch, J., Rosenauer, R., Kolmayr, B., Keuchel, T. (2020). Rehabilitation after distal radius fractures: Is there a need for immobilization and physiotherapy? *Archives of Orthopaedic and Trauma Surgery*, 140(5), 651–663. doi:[10.1007/s00402-020-03367-w](https://doi.org/10.1007/s00402-020-03367-w)
- Rundgren, J., Bojan, A., Mellstrand Navarro, C., & Enocson, A. (2020). Epidemiology, classification, treatment and mortality of distal radius fractures in adults: An observational study of 23,394 fractures from the National Swedish Fracture Register. *BMC Musculoskeletal Disorders*, 21(1), 88. doi:[10.1186/s12891-020-3097-8](https://doi.org/10.1186/s12891-020-3097-8)
- Seedat, S., & Rondon, M. (2021). Women’s wellbeing and the burden of unpaid work. *BMJ*. doi:10.1136/bmj.n1972

- Sh Ahmed, O., Cinotto, G., Boczar, D., Huayllani, M. T., Trigg, S. D., Forte, A. J., & McVeigh, K. (2020). Defining outcomes following distal radius fractures: Correlation of function, pain, and hand therapy utilization. *Cureus*, 12(6), e8718. doi:[10.7759/cureus.8718](https://doi.org/10.7759/cureus.8718)
- Tang, C. Q. Y., Chiow, S. M., Lai, S. H. S., & Chia, D. S. Y. (2022). The effect of hand dominance, age, gender, fracture comminution and ASA status on time to fracture healing following surgical fixation of distal radius fractures. *Journal of Hand Surgery Asian-Pacific Volume (Asian-Pacific Volume)*, 27(03), 459–465. doi:[10.1142/S2424835522500461](https://doi.org/10.1142/S2424835522500461)
- Vincent, H. K., Horodyski, M., Vincent, K. R., Brisbane, S. T., & Sadasivan, K. K. (2015). Psychological distress after orthopedic trauma: prevalence in patients and implications for rehabilitation. *PM&R*, 7(9), 978–989. <https://doi.org/10.1016/j.pmrj.2015.03.007>
- Watson, N. J., Martin, S. A., & Keating, J. L. (2018). The impact of wrist fracture, surgical repair and immobilization on patients: A qualitative study. *Clinical Rehabilitation*, 32(6), 841–851. doi:[10.1177/0269215518754614](https://doi.org/10.1177/0269215518754614)
- Wilcke, M. K., Hammarberg, H., & Adolphson, P. Y. (2013). Epidemiology and changed surgical treatment methods for fractures of the distal radius: A registry analysis of 42,583 patients in Stockholm County, Sweden, 2004–2010. *Acta Orthopaedica*, 84(3), 292–296. doi:[10.3109/17453674.2013.792035](https://doi.org/10.3109/17453674.2013.792035)
- Ydreborg, K., Engstrand, C., Steinvall, I., & Larsson, E. L. (2015). Hand function, experienced pain, and disability after distal radius fracture. *American Journal of Occupational Therapy*, 69(1), 6901290030. doi:[10.5014/ajot.2015.013102](https://doi.org/10.5014/ajot.2015.013102)

Ziebart, C., Bobos, P., Furtado, R., Dabbagh, A., & MacDermid, J. (2023). Patient-reported outcome measures used for hand and wrist disorders: An overview of systematic reviews. *Journal of Hand Therapy, 36*(3), 719–729. doi:10.1016/j.jht.2022.10.007

Chapter 4

4 Patients' and Clinicians' Perception of Integrating Home and Family Work Roles into Rehabilitation Following a Distal Radius Fracture.

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4.1 Abstract

Purpose: To explore distal radius fracture (DRF) patients' and hand therapist/occupational therapist/physiotherapists' perceptions of integrating home and family work roles (HFWR) into rehabilitation.

Methods: Eighteen patients and eleven clinicians completed a semi-structured telephone interview three months after DRF. Reflexive thematic analysis of the interviews and triangulation of patients' and clinicians' themes was performed. The discussions centered on the perceptions of integrating HFWR into rehabilitation.

Results: The patient interviews yielded five themes: (i) the experience of rehabilitation, (ii) predetermined expectations of rehabilitation, (iii) incorporate HFWR into therapy sessions, (iv) the determination to return to valued activities driving behavioural choices and (v) incorporating HFWRs into rehabilitation is perceived beneficial. The clinicians' interview yielded five themes: (i) there are challenges in integrating HFWR into rehabilitation (ii) HFWR is addressed when brought up by a patient (iii) working context and referral sources influence the rehabilitation plan (iv) rehabilitation is not explicitly tailored according to sex and gender, and (v) utilizing HFWR as a rehabilitation strategy is perceived beneficial.

Conclusions: Patients have predetermined rehabilitation expectations primarily focused on mobility and strengthening exercises. Clinicians and patients agree that adapting HFWRs is

beneficial but was not a major expectation for either group during therapy. An unfavorable working environment, patient budget constraints, and limited time were identified as challenges to integrating family roles.

Keywords: activities of daily living; function; clinicians; distal radius fracture; sex; gender

4.2 Introduction

Human life expectancy has increased, and people want to stay active (Aburto, Villavicencio, Basellini, Kjærgaard, & Vaupel, 2020). The number of active elderly individuals has significantly increased the prevalence of distal radius fracture (DRF) (Nellans, Kowalski & Chung, 2012). The average DRF treatment claim in the United States is 112,406 per year, with a bimodal distribution of fracture by age, reflecting peaks for children/adolescents and the elderly (Azad et al., 2019). The incidence of fracture is higher in male between the ages of 0 and 19 and in female over the age of 40 (Azad et al., 2019). DRF is common in healthy, active, and functionally independent individuals (Edwards, Song, Dunlop, Fink, & Cauley, 2010; Karagiannopoulos, Sitler, Michlovitz & Tierney, 2013; Philip, Mac Dermid, Nair, Walton & Grewal, 2019). Some individuals experience significant pain in the first two months after DRF (MacDermid, Roth, & Richards, 2003), resulting in functional decline (Crockett et al., 2019). Functional decline is profound in patients with comorbidity, polypharmacy, and low health-related quality of life (Vergara et al., 2016). Elderly women with DRF demonstrate a 50% annual functional decline compared to women without DRF (Edwards, Song, Dunlop, Fink & Cauley, 2010). An upper limb fracture, specifically DRF, has an impact on productivity, self-care, and leisure (Dekkers & Nielsen, 2011). An observational study of women with DRF shows that participants have problems with cooking, handling utensils, cleaning, hygiene, laundry, and

transportation when measured a week after cast removal (Dekkers & Nielsen, 2011). However, rehabilitation after DRF focuses mainly on pain management, mobility, strength, and function (Collis, Mayland, Wright-St Clair & Signal, 2021; Bruder, Shields, Dodd & Taylor, 2017; Ikpeze, Smith, Lee & Elfar, 2016; Michlovitz, LaStayo, Alzner & Watson, 2001) and does not explicitly address family roles. Only less than 10% of individuals with DRF are referred for rehabilitation during the initial period of immobilization (Michlovitz, LaStayo, Alzner & Watson, 2001) when home and family roles are compromised the most, leading to increased dependence on other family members. A study investigating the experience of patients following wrist fracture and immobilization revealed that immobilization is challenging with consequent changes in social roles and increased dependence (Watson, Martin, & Keating, 2018).

Clinical outcome measures after a DRF typically focus on objective measures such as range of motion and grip strength (Ikpeze, Smith, Lee, & Elfar, 2016), but patients are more interested in knowing how to cope with daily functions (Ikpeze, Smith, Lee, & Elfar, 2016). Rehabilitation strategies should be patient-specific targeting daily activities to inform patients about expected limitations, and coping strategies and facilitate an early return to functional roles (Collis, Mayland, Wright-St Clair & Signal, 2021). Utilizing patient-specific daily activities as a rehabilitation strategy may be particularly effective, as it involves familiar movement patterns (Collis, Signal, Mayland, & Clair, 2020). Therefore, it is necessary to shift the focus of rehabilitation after DRF to patient-centered goals that consider the impact of the injury on family work roles. Despite the potential benefits, barriers to implementing daily life engagement as a rehabilitation strategy exist, including lack of awareness among both patients and clinicians about its potential to enhance recovery (Collis, Mayland, Wright-St Clair & Signal, 2021).

Moreover, rehabilitation sessions are often constrained by time due to patient overload (Dale et al., 2002) and lack of space and equipment (Aas and Bonsaksen, 2022) for activity-based intervention. Therefore, understanding both the clinician and patient perceptions is essential to overcome the barriers and promote the adoption of daily life engagement as a rehabilitation strategy. The patient's voice, as highlighted by Collis et al. (2021), further supports the potential benefits of addressing activities of daily living in a rehabilitation programme.

Daily life activities are organized around household members, which creates different family roles and responsibilities for its members. A family role can be defined as repeated patterns of activities (For example, meal preparation, indoor and outdoor cleaning, laundry, vehicle maintenance, childcare, and family earnings) displayed by its members to accomplish family requirements (Mestdag & Vandeweyer, 2005; Peterson & Green, 2014). Family roles and responsibilities have multiple perspectives that are contextual and differ by age, gender, marital status, and the number of households (Furtado, Seens, Ziebart, Fraser, & MacDermid, 2022). In this study, family roles refer to both paid and unpaid work. Daily functional activities of an individual vary by sociocultural, geopolitical, family, workplace, economic position, and gender roles embraced by society and family. As noted by Crotty (1998, p.69), each person's experience of fracture and return to function can be shaped by their unique perception and interpretation of the situation. In other words, the meaning that each individual assigns to their experience can affect how they cope with the injury and their expectations for recovery. An individual's experience of DRF also differs depending on its severity, age, gender, and general health. i.e., the experience of fracture and return to function differ according to the patient's circumstances (Crotty, 1998, p.69). Clinicians, while evaluating and treating patients following DRF should have an understanding of the complex network in which a patient is positioned as the recovery

path and pain intensity and perception are influenced by these contextual factors (Thaler, 2013). Rehabilitation strategies following DRF are also contextually defined by policies, clinician experience, and knowledge (Ferguson-Pell & Armstrong, 2021). Understanding patients' and clinicians' perceptions of utilizing everyday life activities as a rehabilitation strategy will enable us to understand its utility, barriers, and facilitators. However, there are not many studies that have evaluated both clinician and patient perceptions of addressing and utilizing family role function in rehabilitation following DRF.

Aim

1. To explore patient perceptions of the extent to which clinicians evaluate and address family role functioning and identify unmet needs, barriers, and facilitators in addressing HFWRs during therapy.
2. To explore how clinicians (physiotherapists/occupational therapists/hand therapists) evaluate the HFWRs and what actions they initiate to support patients in maintaining the HFWRs, including integration of family role function into the rehabilitation plan.
3. Comparison of clinicians and patient perspectives to identify shared and divergent points of view on the integration of HFWRs into DRF rehabilitation.

4.3 Methods

4.3.1 Study design

This is a qualitative analysis that used an interpretive descriptive methodology. An interpretive description (ID) can be used to drive clinically useful information, in this case, an in-depth understanding of the integration of HFWRs into rehabilitation programs. According to Thorne (2016), the interpretive paradigm is a highly adaptable approach that can provide insights that go beyond surface-level observations. ID enables conceptual links between subject, object, and experience within healthcare (Thorne,2016). Realities are constructed, contextual, complex, and changing. An ID approach captures the subjective experience and is non-categorical, allowing it to be reevaluated according to varying contexts and concepts (Thompson Burdine, Thorne, and Sandhu, 2021).

For this study, a relativist perspective of ontology and subjectivist epistemology (Guba & Lincoln, 1994; Ponterotto, 2005) was adopted, which implies that the understanding of reality is subjective and context-dependent, and that knowledge is constructed through individuals' experiences and perspectives rather than being an objective truth. This approach allows us to explore the complexities and nuances of participants' experiences and understandings and examine the multiple meanings they attach to their lives and situations. The researcher has given priority to the participant data and descriptions in interpreting the data. This recognition of the influence of the researchers' and participants' interpretations on data collection and analysis demonstrates a thorough and thoughtful approach to research.

4.3.2 Positionality

As a researcher, I am aware that my profession and personal experience could have influenced my interpretation of the data. Being in the field of rehabilitation for two decades and working with different ethnic groups in different countries, and having experience working in clinics, hospitals and communities, personally trying to balance between paid and unpaid roles, caregiving roles, it is inevitable that my perspective must have influenced the data analysis. However, being aware of my positionality allowed me to be mindful of my potential biases and strive to develop codes and themes that emerge directly from the data sources while minimizing personal influence. I believe that embracing my influence as essential to the analysis and being mindful of it helped me achieve a more nuanced understanding of the data.

4.3.3 Ethics

The Western University Research Ethic (REB) approved the study (Project Number #114561, Date of Approval: 1 November 2019).

4.3.4 Study Setting and Participants

Patients: In this study, individuals with DRF receiving rehabilitation and clinicians who have treated Patients with DRF were interviewed. From this list, a purposeful sampling strategy was utilized to recruit diverse participants for interviews based on age and gender, as HFWR is influenced by age and gender. All participants were recruited from the Hand and Upper Limb Center (HULC), St Joseph's Health Center, London, Ontario, from February 2022 to December 2022 according to predetermined inclusion and exclusion criteria (Table 4). Patients who completed the second study "The Impact of Distal Radius Fracture on Home and Family Work

Roles” were asked if they were willing to participate in a qualitative study. The wrist is immobilized for 4 to 6 weeks after a DRF and is routinely referred for therapy after the immobilization period. The patients underwent interviews following their period of immobilization and after participating in two to three standard therapy sessions. Patients who consented to participate in the interview were contacted via telephone or Webex to adhere to the COVID-19 pandemic safety guidelines. All patients opted for a telephone interview. Interested participants received a letter of information (Appendix 1) and sufficient time to make an informed decision to participate in the study.

Clinicians: Clinicians who treat patients with DRF were invited to participate in the study (Table 6). The initial recruitment targeted clinicians working at HULC. Subsequently, the researcher expanded the recruitment efforts through professional and social networks. A letter of information (Appendix 2) was disseminated to potential clinicians, and consent was obtained. The interviews were conducted over the phone, recorded, and stored on a password-protected computer in an encrypted file.

4.3.5 Sample size and saturation

A total of 18 patients with DRF and 11 clinicians who have treated patients with DRF were interviewed over the phone. Patient interviews were coded after completing 2 to 3 interviews. To ensure data saturation, the interviews continued until two consecutive interviews did not yield additional insights. The decision to stop interviewing was based on achieving theoretical data saturation, which is a commonly accepted approach in qualitative research (Morse, 2000). A total of 30 patients and 13 clinicians consented to participate in the interview. More than ten DRF

participants and two hand clinicians who consented to participate did not answer the phone calls. However, saturation was reached after interviewing 15 DRF participants and ten clinicians.

Table 4

Eligibility Criteria

Patient Inclusion Criteria	Clinician Inclusion Criteria
Participants with a diagnosis of DRF.	Participants must be a practicing clinician in Canada (treating or having experience with upper extremity patients).
Participants must be 18 years of age or older.	
Participants must speak and read/write in English.	
Participants must be able to provide informed consent.	Participants must be 18 years or older.
	Participants must speak and read/write in English.
	Participants must be able to provide informed consent.
Patient Exclusion Criteria	Clinician Exclusion Criteria
Participants under the age of 18 years.	Clinicians with lack of experience treating patients with upper extremity problems.
Participants who are unable to speak or read/write in English.	
Participants who are not cognitively able to give consent.	Participants who are unable to speak or read/write in English will be excluded.

4.3.6 Procedure

To develop a separate semi-structured interview guide for patients and clinicians, the research team first conducted a thorough review of the relevant literature to identify key themes and concepts related to patients' and clinicians' perceptions of integrating HFWRs into rehabilitation plans (Appendix 2). Based on this review, the team developed a preliminary set of questions and prompts relevant to patient and clinician perspectives. The team then consulted with several experts in the field of rehabilitation, including clinicians and researchers, to gather feedback and refine the interview guide. This feedback helped to ensure that the questions were clear, relevant, and appropriate for the study population.

The research team received feedback and suggestions from peer groups and clinicians on the interview guide to identify areas that required further clarification or refinement. The patient interview guide primarily focused on the experience of fracture, rehabilitation, and patients' perception of addressing family roles by the treating clinicians. The clinicians' interview guide focused on rehabilitation strategy and clinicians' perception of addressing and utilizing the family roles and responsibilities in rehabilitation (Appendix 2). The participants were coded to maintain anonymity and privacy. The patients were coded as DRF1 and DRF 2.. etc., and the clinicians were coded as C1, C2,..etc. Patients with DRF were interviewed at a 3-month follow-up. The duration of the patient and clinician interviews was between 10 and 20 minutes.

4.3.7 Data Analysis

The interviews were recorded and transcribed verbatim. The audio record was imported into Microsoft Word format and counter-checked several times to identify audio-to-script translation

errors. Braun and Clarke's six-stage thematic analysis was used as a guideline for interview analysis because it is a method and not a methodology; therefore not tied to a particular epistemological or theoretical perspective, making it a flexible method to generate clinically useful insights by interpreting the data in light of existing clinical knowledge and practice (Maguire, 2017). The six stages of analysis are familiarizing with the data, generating codes, finding themes from the codes, reviewing themes, defining and naming themes and producing the reports (Braun & Clarke, 2012, p.57-69). Data familiarization was performed by reviewing the audio record and reading the scripts several times. The codes were then generated using descriptive and interpretive labels. Similar codes were clustered to form themes. The themes were finalized on the basis of agreement between the authors.

4.3.8 Study rigour, crystallization, reflexivity, and transparency

The authors consisted of experienced academics and clinicians. The authors reviewed sections of the data and confirmed themes. The collaborative reflexive approach ensured quality and rigour. To achieve crystallization, a reasonable number of DRF participants and clinicians working in different work settings (clinics, hospitals, community care), with experience ranging from 1 to 50 years (Tracy, 2010) were interviewed. Reflexive journaling was carried out and was referenced frequently in the process of analysis. Transparency was achieved by discussing the analytic process with a peer group, supervisory committee, and research committee (Tracy, 2010).

4.4 Results

4.4.1 Characteristics of the Participants

A total of 18 Patients with DRF and 11 clinicians participated in the study. The demographic breakdown of the patient and clinician participants is given in Tables 5 and 6, respectively.

Table 5:

Characteristics of Patient Participants.

Patient ID	Gender	Age	Employment Status	Marital status
DRF 2	Man	57	Full time	Married
DRF 6	Woman	77	Retired	Married
DRF 16	Woman	65	Full time	Married
DRF 17	Woman	65	Retired	Married
DRF 21	Woman	65	Retired	Married
DRF 23	Man	18	Student	Single
DRF 25	Woman	21	Full time	Single
DRF 26	Woman	68	Retired	Married
DRF 27	Women	59	Part time	Widowed

DRF 33	Woman	67	Retired	Single
DRF 46	Woman	62	Part time	Married
DRF 63	Woman	72	Retired	Married
DRF 68	Woman	62	Not employed	Married
DRF 70	Woman	55	Not Employed	Married
DRF 77	Woman	61	Full time	Common low partner
DRF 99	Man	52	Full time	Married
DRF 92	Woman	37	Full time	Single
DRF 94	Woman	73	Retired	Divorced

*Table 6:
Characteristics of Clinicians Participants*

Clinician ID	Gender	Age	Occupation	Work Environment/Province	Years in Practice
C1	Woman	44	Occupational Therapist	Hospital/Ontario	17

C2	Man	37	Physiotherapist	Private Clinic/Ontario	4
C3	Man	46	Physiotherapist	Private Clinic/Ontario	17
C4	Man	37	Physiotherapist	Private Clinic/Manitoba	5
C5	Woman	46	Physiotherapist	Private Clinic/British Columbia	10
C6	Man	32	Physiotherapist	Private Clinic/Manitoba	1
C7	Man	39	Physiotherapist	Private clinic/Ontario	5
C8	Woman	39	Physiotherapist	Hospital/Clinic/ Home care	16
C9	Woman	52	Occupational therapist	Hospital	20
C10	Woman	44	Occupational therapist	Hospital	17
C11	Woman	77	Occupational therapist/physiotherapist	Hospital/Clinic	50

4.4.2 Patient Perspectives

Patient interviews generated five themes (figure 9).

Theme 1: *Rehabilitation experience*

Subtheme 1: Reassurance

The participants in the study expressed that the rehabilitation sessions provided them with a sense of reassurance. Regular measurements taken during the sessions served as tangible evidence of their progress, offering the assurance that they were on the right path toward recovery.

“I felt physio was very helpful; even mentally, it was reassuring like they were very kind, and you know they made me feel better and that I could get my movement back.” DRF 17.

“It(fracture) was very depressing. Like it just doesn’t seem to be making any progress. But then she would do the measurements and every time I went, she would give me more exercises to do. So, you really do start to think that maybe you are making some progress. Yes, when you see those measurements that reassure you right?” DRF 63.

Subtheme 2: Motivational Factor

Participants perceived rehabilitation sessions to be a significant motivational factor in the recovery process. They described feeling stuck and dependent due to the injury but attending the physiotherapy sessions provided a sense of progress.

“It (the fracture) was very depressing. I’m very independent like I like driving myself. My husband and I don’t do everything together and I like to go out on my own and all of that

was affected. So I kind of felt that I was stuck in the house for a month. And you know I had an appointment with physio, and you know I felt like okay I am getting better.”DRF 1

Subtheme 3: Patient Satisfaction

The participants expressed satisfaction with the rehabilitation program. The participants found value in the exercises recommended to them, acknowledging that they wouldn't have thought of them on their own.

“I think the physio really helped; she gave me exercises I wouldn't think to do. And some of them I could tell immediately that they were helping with mobility.” DRF 26.

“I can't think of anything different. It has been a very positive experience. ‘DRF 70.

Theme 2: Predetermined expectations of rehabilitation

Subtheme 1: Clinicians are not expected to give lessons on family roles and responsibilities.

Participants in the study presumed clinicians are not expected to provide HFWR lessons. Participants assume that HFWR is a private matter that individuals should handle on their own, relying on common sense and personal adaptability.

“Common sense. I wouldn't even think that they would, that is not important, something that we can figure out.” DRF 77.

“I mean if you can't do it, you can't do it. I wasn't able to do chopping and stuff, but I was able to eat, I have to eat so I was able to hold a fork and eat with my left hand and cut my food with a fork. I don't think that Clinicians should give lessons.” DRF27.

“Clinicians are focusing on getting bones working. I don’t think they should have to give advice on cutting vegetables. Yeah, but we are giving our bones better movement, better to do our daily activities. Well, any questions I had asked they answered and that was one thing I didn’t ask.” DRF 70.

“I don’t think so (clinicians addressing HFWR) it is something you have to privately learn yourself. Therapy has nothing to do with that.” DRF46.

“I think I mean most of that is common sense, just try it out and if it is too difficult you know, I don’t.” DRF 23.

Subtheme 2: Clinicians are expected to provide exercise instructions.

Patients prefer exercise interventions as exercise is like a scaffold; there is no scaffolding with HFWRs. They viewed exercise interventions as a critical component of the rehabilitation process.

“Exercise is better at the beginning because I wouldn’t have been able to do those activities without doing the exercise first. Just getting those mobilities back will enable you to do the rest of the things.” DRF26.

“You get the exercise you do them and then you go from there” DRF33.

“I don’t think focusing on function would be beneficial, exercise help with function.” DRF16.

“Well, you can have your view up there and still do your exercises.” DRF6.

Theme 3: Incorporating HFWR into therapy sessions.

Some patients believe that addressing HFWR is beneficial, given the challenges they encounter in performing some of the daily tasks, such as carrying heavy pans or caring for children.

“May be both of them (exercise and daily function) would be effective for me.” That (daily function) would be 100% beneficial too. Yeah, Yeah because there are things that are hurting me right? That are still uncomfortable to do so like, I think yeah, like for sure, I do think that things with everyday living like you know, even just picking up a heavy frying pan or driving and stuff like that. I mean that would be beneficial.” DRF92.

“Giving examples and ideas of things to do, even suggesting that you can do that (childcare). You can be overprotective, and you are not moving along the strengthening of the arm, showing how to look after a child would be beneficial. I was unable to really care for him(grandchild). Normally I would look after and play with him. I was unable to do that (childcare) at the beginning.” DRF 99.

Theme 4: *Patients differ in terms of their need for addressing HFWR.*

According to patient-participants, addressing HFWR is important for patients who live alone, have cognitive problems, or have a dominant hand fracture. It is important that clinicians recognize the potential challenges and provide the appropriate support and guidance to ensure that patients can manage their HFWRs.

“Addressing daily function may be important for someone else. Seniors who live by themselves. So just keep it open and ask so that we know who needs and who doesn’t need it.” DRF77.

“Not in my case may be in some cases because I have broken wrist before, and I am a nurse and I sort of understand more than the average person.” DRF 63.

“For lot of people with dominant hand, I mean that would be quite helpful to have that input. I would think, you know I mean also, especially people live on their own or have any sort of cognitive or other conditions, I think overall it would be helpful, but I mean, on the other hand, then there’s always people who kind of can figure things out on their own.” DRF 28.

“Probably I didn’t need to ask the physio because I had very helpful friends who were over the phone or in person.” DRF94.

Theme 5: *The determination to return to valued activities drives behavioural choices.*

Multiple patient participants reported they were able to return to their occupational and leisure activities and resumed activities regardless of the clinician’s guidance. One patient reported being resilient and discovering things for themselves.

“I took it upon myself, she (Clinician)said we are not yet in the strength training yet, but I took it upon myself cause I ‘m gonna, you know get out and do gardening.” DRF 21.

“So you are a farmer and she(clinician) said well you are gonna be stubborn she said, and you are probably not gonna come back.” DRF 2.

I already cut my cast before I came in so it depends on who you are. If you are a Canadians that don’t want to work anymore. If they wanna use it to collect money from the government cause they had a broken arm well they are gonna do that” DRF2.

“My philosophy is that if you stop doing things you go downhill so you gotta keep doing”

“I am a kind of resilient and kind of discover” DRF77.

4.4.3 Clinician’s perspective

Clinician interviews yielded five themes (figure 9).

Theme 1: *Challenges in integrating HFWR into rehabilitation.*

Subtheme 1: Unfavorable environment

The hospital and clinic settings are restricted by policies that do not favor the integration of HFWR into rehabilitation. Other obstacles are limited patient budget and unfavorable contextual environment. A clinician in this study reported that hospitals and clinics are more structured and rushed and that clinicians are unable to incorporate HFWR into rehabilitation.

“In the hospital, it is more structured, home care is unstructured, relaxed environment, so people are more honest.”C8.

“It is such a physical discipline. I am always trying to add a function to rehab”C10.

Subtheme 2: Budget constraints of the patient

The financial situation of the patient impacts the rehabilitation session.

“I also count on their ability to pay for the sessions”C7.

“For some patients who do not have good coverage doesn’t have any benefits, PT sessions can be hard on their pockets”C7.

Subtheme 2: Limited time.

Clinicians in the study expressed that the clinic setting presents limitations in addressing family role responsibilities. They perceived the clinic environment as rushed and impersonal,

which might restrict the extent to which clinicians can address and discuss family role responsibilities.

“In the clinic, it is rushed. It is a kind of colder environment so maybe people don’t tell you quite as much.” C8.

“Addressing family role responsibilities is not within the scope of the clinic there is no time for that.” C10.

Theme 2: *HFWRs are addressed when brought up by a patient.*

Subtheme 1: There is no formal process for addressing family roles and responsibilities.

Clinicians in the study highlighted that HFWRs are addressed when brought up by the patient themselves. Clinicians primarily focus on objective findings.

“My part is more objective, specific goals and functions are on the patient’s side.” C3

“Patients ask about vacuuming, I tell them not to put too much pressure, and ask them to use both hands.” C6

“Patients define their function” C3

“Details of family roles, meal preparation is addressed only if patients bring it up and identify it as an issue.” C10

Subtheme 2: HFWR is addressed in unique situations.

Family role responsibilities are not universally incorporated into the rehabilitation process but rather addressed selectively in unique situations.

“Daily function is addressed in an elderly patient.” C3

In the initial assessment, we ask questions about their functional goals for e.g some patients have hard time doing household chores, so I will be focusing on that.”C2.

Theme 3: Working context and referral sources influence the rehabilitation plan

Return to work, and functional goals are addressed during the initial assessment, mainly in patients under the workplace safety and insurance board. This theme highlights that work policies and procedures influence rehabilitation plans.

“Occupation important for WSIB patients; those who operate heavy equipment. Work hardening activities are done for patients with workplace injuries so that patients can get back to work faster.”C2

“In my generation, we weren’t as integrated as we are now. It was pretty much you started in physio then you went to OT, then you went to a vocational counsellor and it literally and it literally was those steps, nowadays you go to a physio or an OT and you’re putting everything together very quickly.”C11.

Theme 4: Rehabilitation is not explicitly tailored according to sex and gender.

The rehabilitation plan is based on the initial assessment and patient goals, which usually differ according to sex and gender. However, gendered family roles are not explicitly addressed in rehabilitation sessions.

“No, I never thought about it. My goal is to return to work.” C7.

“The answer is yes because for females they want faster recovery compared to males that is my experience because most people(females) they want to do activities.” C4.

I don’t think about gender I think about the patient’s functional goal for e.g some patients say they have problem with tying hair. Then I focus on that.C2.

“The male person playing baseball or the female person playing volleyball probably they both need the same level of function. My goal is based on patients’ priority. What goal you formed while assessing the patient and not gender though.”C3.

*“Hmm... well we always have to decide based on patients’ occupation or vocation or role in the family is that is the key thing that any therapist would have to be aware of.”
C11.*

Theme 5: *Utilizing HFWR as a rehabilitation strategy is perceived beneficial*

Subtheme 1: Meaningful to the patient.

Clinicians believe that utilizing HFWR as a rehabilitation strategy is meaningful to the patient and facilitates coordinated movement of the fractured extremity.

“I prioritise function it adds meaning to patients; likely to do at home.”C10.

“Strategy that would be like telling them you know stuff they can do with their hand. I mean just the fun stuff. the best thing you can do is go home and get your hand in some nice warm water. Do some dishes. If they are working then I need to include hmm what they do for work and include those activities and at home it is usually getting that hand back into their normal activates of daily living, like using their hand to eat, brush their hair, brush their teeth, folding cloths.”C9.

“like all of us, have difficulty asking for help. But this is the time when you know personal care, dressing, washing, etc. etc. etc. you definitely need somebody else around to help you from safety standpoint and from a functional standpoint, so those issues become pretty universal for everyone and so I think as the therapist we have to assess the home situation, who the caregiver is. Is there a caregiver? Do we need to engage

somebody else into this little plan and reassure the patient that it with help and with not essentially exacerbating their symptoms, they will recover faster. So, but I think many of us all of us almost we are at the giving end, but always hard at the receiving end. And when patients are suddenly put into having to need help, it's something that a therapist has to really help them get through. So, I try and use day-to-day.”C11.

Subtheme 2: Daily functional activities facilitate mobility.

Engaging in activities enhance mobility and promote utilization of different joints and movements fostering a more holistic recovery.

“Yeah I definitely believe in that (daily function) especially in home care. People goals are to return to activities of daily living and leisure activities, but definitely using it as much as possible is important to make sure that all those limbs like all joints like elbow and shoulder are used as much, I think it is definitely a big part of rehab.” C8.

“You know, cleaning counter tops will encourage both wrist extension and ulnar deviation and radial deviation. I also ask them to do window cleaning. Bilateral activities like folding laundry and dry laundry. So, that is definitely a part of the program. I encourage patients to do because most of them have a very guarded posture.” C5

Triangulation of Patients’ and Clinicians’ Perspectives

Themes 2 “predetermined expectations of rehabilitation” (patients’ perspective) and “HFWR addressed when brought up by a patient” (clinicians' perspectives), converge and complement each other.

Converging Aspect

Both themes highlight that HFWRs are not the primary focus of clinicians or patient expectations. The patient assumes that clinicians are not expected to provide specific lessons or advice on family roles and responsibilities, and clinicians confirm that their primary focus is on objective findings and exercise interventions. Both themes emphasize that exercise interventions are a critical component of the rehabilitation process, and patients view exercise as beneficial for regaining mobility and functional abilities. Moreover, patients perceive HFWR as a private matter and should be managed individually, while clinicians address HFWR when the patient brings it up.

Theme 3, 'Incorporating HFWR in therapy sessions (patients' perspectives) and theme 5, 'Utilizing HFWR as a rehabilitation strategy is perceived beneficial' (Clinicians' perspectives) converge. The convergence between Theme 3 and Theme 5 lies in the shared focus on the benefits of incorporating HFWR into the rehabilitation process. One, from the clinician's perspective, considering meaningfulness and functional benefits, and the other, from the patient's perspective, is that incorporating HFWR naturally aligns with daily activities and helps overcome obstacles.

However, Theme 3, "Incorporating HFWR into therapy sessions" (Patients' perspective) and Theme 1, "The challenges in integrating HFWR into rehabilitation." (Clinicians' perspective), diverge. Theme 3 focuses on the perspective of some patients who believe that addressing HFWR in therapy sessions would be beneficial, as it fits naturally to what a person is doing. Theme 1, on the other hand, explores clinicians' challenges in integrating HFWR into rehabilitation. There are obstacles related to the unfavourable environment of hospitals and clinics, patient budget constraints, and limited time in hospital and clinic settings.

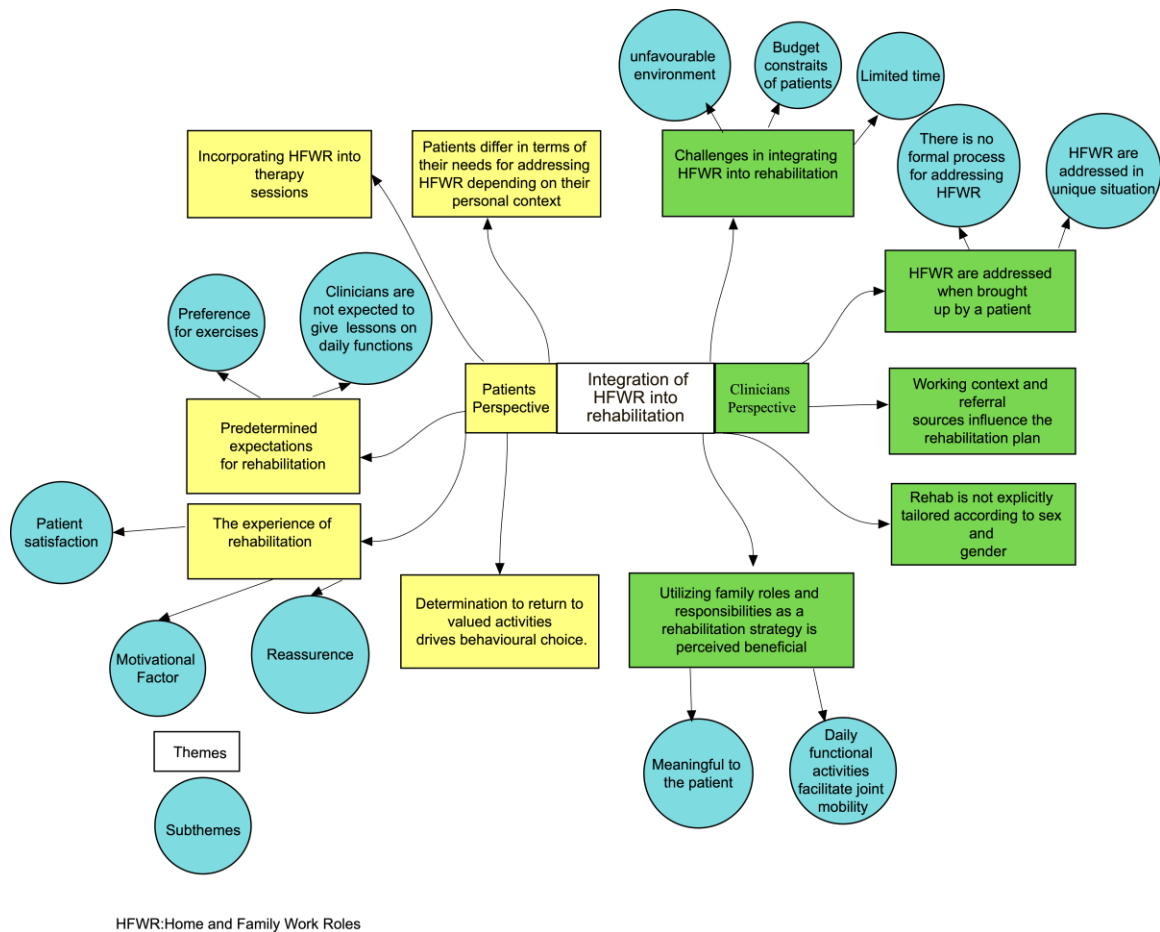


Figure 9. Schematic Representation of Patients and Clinicians Perspectives on Integrating HFWR into Rehabilitation.

4.5 Discussion

The therapy expectations of the DRF participants in this study were mobility and strengthening exercises. Previous rehabilitation experience, healthcare system policies, and discussions with family and friends (Barron, Klaber Moffett & Potter, 2007) influence patient therapy expectations. An observational study that explored the physiotherapy intervention after DRF showed that the most common intervention was exercise, advice, passive joint mobilization, and patient factors had little impact on the type of interventions (Bruder, Taylor, Dodd & Shields, 2013).

The narratives of DRF participants reflect that therapy provided motivation, reassurance, and satisfaction. Previous studies that explored the therapy experience of the working population after a dominant side wrist fracture (Bamford & Walker, 2010) and after orthopedic trauma support the study findings that therapy can improve motivation, provide reassurance and encouragement through expert knowledge and interventions, and contribute to better emotional state and motivation (Claydon, Robinson, & Aldridge, 2017). Patients lack knowledge and experience with wrist injuries and trust specialists in decision-making (Huetteman, Shauver, Nasser, & Chung, 2018).

Some interviews with DRF participants highlighted that incorporating HFWRs into therapy sessions is beneficial. Including daily activities as a rehabilitation strategy facilitates habituation and mental well-being (Collis, Mayland, Wright-St Clair & Signal, 2021). Incorporating HFWRs is beneficial in habituating patients with their pre - fracture functional roles or modifying activities to attain functional independence. Furthermore, patients differ in terms of their need to address HFWRs depending on their personal context. Waljee et al. (2016) report that the mediating factors of DRF outcomes are sociodemographic, physiologic, psychological, treatment, and injury. The treatment plan should include and consider mediating factors when rehabilitating patients with DRF. The goal of many patients in this study was to return to the activities they enjoyed and was determined to resume those activities regardless of the advice of the clinicians indicating that patient behaviour patterns and characteristics can influence rehabilitation (Usui & Nishida, 2015). The study by Usui and Nishida (2015) concluded that the type A behaviour pattern reduced hospital stays. This behaviour pattern is characterized by impatience, urgency, and a strong drive to achieve. Individuals with type A personalities are often highly motivated and driven to achieve their goals, such as returning to occupational and

leisure activities after an injury.

The clinicians acknowledge the benefits of incorporating HFWRs into a therapy session but only address them when brought up by a patient. This might be due to the challenges in integrating HFWRs into therapy sessions. Treatment plans are influenced by institutional policies and budgets (Fitzpatrick & Presnell, 2004). The medical model of care predominates in the health system (Colaianni & Provident, 2010). Rehabilitation centers in the hospital and clinic are set for a biomechanical approach (Engel 1980) focusing on the diagnosis and not the patient as a whole; consequently, clinicians use primarily physical impairment outcome measures rather than functional outcomes (Michlovitz, LaStayo, Alzner, & Watson.,2001; Norton, Bugden, & Liu, 2022).

Moreover, the clinicians have limited time due to a high caseload demand (Dale et al., 2002). A systematic review that explored the attitudes and beliefs of physiotherapists about the use of psychosocial intervention in practice showed that time is one barrier (Driver, Kean, Oprescu & Lovell, 2017). On the other hand, a systematic review of the perception of physical therapists of addressing psychosocial and cognitive factors in low back pain showed that physical therapists only partially recognized psychosocial factors, and they considered them poorly motivated (Synnott et al., 2015). However, physiotherapists expressed their skills and confidence in the biopsychosocial approach to low back pain after cognitive functional training (Synnott et al., 2015). These findings show that psychosocial factors may not be the primary focus of physiotherapists. Furthermore, the treatment approach of the physiotherapist is highly influenced by the scope of practice and the beliefs of the lay health of the patients. The narratives of the clinicians indicate that the clinicians acknowledge the benefits of utilizing HFWRs as a rehabilitation strategy. However, clinicians must consider the work environment, reference

sources, and patients' expectations in tailoring treatment plans.

The clinician's narratives show that the assessment and treatment plans are not explicitly tailored based on sex and gender, although the clinicians recognize gender differences in the functional perspectives of the patients. There is a complex relationship between sex, gender, social construct, health, and the gendered nature of family roles and responsibilities (Horne, Johnson, Galambos, & Krahn, 2017). The biomedical model of care that is commonly adopted in patient care does not differentiate physical health problems in men and women (Ruiz & Verbrugge, 1997), creating gender bias and assuming equality when there is a difference. The social construct of gender defines masculine and feminine gendered tasks, which differ in each group depending on ethnicity and social norms. This gender role affects health and rehabilitation (Stenberg et al., 2022) and must be explicitly considered when developing a rehabilitation plan. Implicit inclusion may lead to making assumptions or overlooking significant factors related to gendered family role functions.

Comparison of clinicians' and patients' perspectives identified converging, complimenting, and diverging perspectives of patient and clinician groups. Both patients and clinicians agree that exercise is the primary focus. Patients consider HFWR as a private matter, and clinicians address HFWRs when brought up by the patient. Both parties also acknowledge that HFWR is beneficial. This finding indicates the importance of accommodating the individual preferences and needs of the patients while maintaining a patient-centered, evidence-based rehabilitation approach. However, it might be worth investigating the outcome of incorporating HFWR into routine therapy sessions to provide a more complete understanding of their roles in rehabilitation.

4.5.1 Strengths and limitations

This study had several strengths. There was diverse group of clinicians working in hospitals,

clinics, and home care from three provinces in Canada. There were novice and experienced clinicians and a physiotherapist with 50 years of experience, which allowed us to understand the generational effect in physiotherapy practice. There was frequent author collaboration, peer group comments, and recommendations on the theme. Although the telephone interview has missed some visual cues, it allows patients to relax and communicate from their comfort zone, facilitating honest discussion. There were sufficient patient participants to reach saturation. Clinicians specifically worked in different rehabilitation settings mainly, hospital, clinic, and home care. However, some limitations of this study need to be acknowledged, including the fact that the patient participants were only from a rehabilitation setting. Interviewing patients while in the cast can provide a different patient perspective on integrating HFWRs into rehabilitation and challenges encountered with HFWRs.

4.6 Conclusions

The study explored patients' and clinicians' perceptions of integrating HFWRs in rehabilitation. Patients have predetermined rehabilitation expectations, mainly focused on mobility and strengthening exercises. Clinicians and patients agree that adapting HFWRs is necessary during recovery and varies in whether or how they expect this to be considered during therapy sessions. Addressing HFWRs was not a major focus for either clinicians or patients during therapy. Home and family work are important for quality of life and should be explored during the assessment. The degree to which these roles affect rehabilitation vary by individual patient. Integration of family roles in rehabilitation can be challenging due to an unfavourable environment, patient budget constraints and limited time.

4.7 References

- Aas, M. H., & Bonsaksen, T. (2022). Exploring occupation-based practice among occupational therapists in hospitals and rehabilitation institutions. *Scandinavian Journal of Occupational Therapy*, 1–11. doi:[10.1080/11038128.2022.2059564](https://doi.org/10.1080/11038128.2022.2059564)
- Aburto, J. M., Villavicencio, F., Basellini, U., Kjærgaard, S., & Vaupel, J. W. (2020). Dynamics of life expectancy and life span equality. *Proceedings of the National Academy of Sciences of the United States of America*, 117(10), 5250–5259. doi:[10.1073/pnas.1915884117](https://doi.org/10.1073/pnas.1915884117)
- Azad, A., Kang, H. P., Alluri, R. K., Vakhshori, V., Kay, H. F., & Ghiassi, A. (2019). Epidemiological and treatment trends of distal radius fractures across multiple age groups. *Journal of Wrist Surgery*, 8(4), 305–311. doi:[10.1055/s-0039-1685205](https://doi.org/10.1055/s-0039-1685205)
- Bamford, R., & Walker, D.-M. (2010). A qualitative investigation into the rehabilitation experience of patients following wrist fracture. *Hand Therapy*, 15(3), 54–61. doi:[10.1258/ht.2010.010013](https://doi.org/10.1258/ht.2010.010013)
- Barron, C. J., Moffett, J. A., & Potter, M. (2007). Patient expectations of physiotherapy: Definitions, concepts, and theories. *Physiotherapy Theory and Practice*, 23(1), 37–46. doi:[10.1080/09593980601147843](https://doi.org/10.1080/09593980601147843)
- Braun, V., & Clarke, V. (2012). Thematic analysis. In *APA handbooks in Psychology®. APA handbook of research methods in psychology, 2: Research designs: Quantitative, qualitative, neuropsychological, and biological* (pp. 57–71). Washington, DC: American Psychological Association. doi:[10.1037/13620-004](https://doi.org/10.1037/13620-004)
- Bruder, A. M., Taylor, N. F., Dodd, K. J., & Shields, N. (2013). Physiotherapy intervention practice patterns used in rehabilitation after distal radial fracture. *Physiotherapy*, 99(3), 233–240. doi:[10.1016/j.physio.2012.09.003](https://doi.org/10.1016/j.physio.2012.09.003)

- Bruder, A. M., Shields, N., Dodd, K. J., & Taylor, N. F. (2017). Prescribed exercise programs may not be effective in reducing impairments and improving activity during upper limb fracture rehabilitation: A systematic review. *Journal of Physiotherapy*, 63(4), 205–220. doi:[10.1016/j.jphys.2017.08.009](https://doi.org/10.1016/j.jphys.2017.08.009)
- Chung, K. C., Sasor, S. E., Speth, K. A., Wang, L., & Shauver, M. J., & for the WRIST Group. (2020). Patient satisfaction after treatment of distal radial fractures in older adults. *Journal of Hand Surgery (European Volume)*, 45(1), 77–84. doi:[10.1177/1753193419878981](https://doi.org/10.1177/1753193419878981)
- Claydon, J. H., Robinson, L., & Aldridge, S. E. (2017). Patients’ perceptions of repair, rehabilitation and recovery after major orthopaedic trauma: A qualitative study. *Physiotherapy*, 103(3), 322–329. doi:[10.1016/j.physio.2015.11.002](https://doi.org/10.1016/j.physio.2015.11.002)
- Colaianne, D., & Provident, I. (2010) The benefits of and challenges to the use of occupation in hand therapy. *Occupational Therapy in Health Care*, 24(2), 130–146. doi:[10.3109/07380570903349378](https://doi.org/10.3109/07380570903349378)
- Collis, J. M., Mayland, E. C., Wright-St Clair, V., & Signal, N. (2022). ‘The more I do, the more I can do’: Perspectives on how performing daily activities and occupations influences recovery after surgical repair of a distal radius fracture. *Disability and Rehabilitation*, 44(19), 5440–5449. doi:[10.1080/09638288.2021.1936219](https://doi.org/10.1080/09638288.2021.1936219)
- Collis, J., Signal, N., Mayland, E., & Clair, V. W.-S. (2020). A systematic review of how daily activities and exercises are recommended following volar plating of distal radius fractures and the efficacy and safety of early versus late mobilisation. *Hand Therapy*, 25(4), 139–151. doi:[10.1177/1758998320967032](https://doi.org/10.1177/1758998320967032)
- Crockett, K., Farthing, J. P., Basran, J., Dal Bello-Haas, V., Johnston, G., Haver, C. R. A., & Arnold, C. M. (2019). Changes in fall risk and functional status in women aged 50 years

- and older after distal radius fracture: A prospective 1-year follow-up study. *Journal of Hand Therapy*, 32(1), 17–24. doi:[10.1016/j.jht.2017.09.009](https://doi.org/10.1016/j.jht.2017.09.009)
- Crotty, M. (1998). *The foundation of social research: Meaning and perspective in the research process*. Thousand Oaks, CA: SAGE.
- Dale, L. M., Fabrizio, A. J., Adhlakha, P., Mahon, M. K., McGraw, E. E., Neyenhaus, R. D., Zaber, J. M. (2002). Occupational therapists working in hand therapy: The practice of holism in a cost containment environment. *Work (Reading, Mass.)*, 19(1), 35–45.
- Dekkers, M. K., & Nielsen, T. L. (2011). Occupational performance, pain, and global quality of life in women with upper extremity fractures. *Scandinavian Journal of Occupational Therapy*, 18(3), 198–209. doi:[10.3109/11038128.2010.510205](https://doi.org/10.3109/11038128.2010.510205)
- Driver, C., Kean, B., Oprescu, F., & Lovell, G. P. (2017). Knowledge, behaviors, attitudes and beliefs of physiotherapists towards the use of psychological interventions in physiotherapy practice: A systematic review. *Disability and Rehabilitation*, 39(22), 2237–2249. doi:[10.1080/09638288.2016.1223176](https://doi.org/10.1080/09638288.2016.1223176)
- Edwards, B. J., Song, J., Dunlop, D. D., Fink, H. A., & Cauley, J. A. (2010). Functional decline after incident wrist fractures—Study of Osteoporotic Fractures: Prospective cohort study. *BMJ*, 341(jul08 1), c3324–c3324. doi:[10.1136/bmj.c3324](https://doi.org/10.1136/bmj.c3324)
- Engel, G. L. (1980). The clinical application of the biopsychosocial model. *American Journal of Psychiatry*, 137(5), 535–544. doi:[10.1176/ajp.137.5.535](https://doi.org/10.1176/ajp.137.5.535)
- Ferguson-Pell, M., & Armstrong, E. (2021). Patient and clinician reported outcomes and experiences following advanced tele-rehabilitation assessments conducted in rural Alberta. *Archives of Physical Medicine and Rehabilitation*, 102(10). doi:[10.1016/j.apmr.2021.07.419](https://doi.org/10.1016/j.apmr.2021.07.419)

- Fitzpatrick, N., & Presnell, S. (2004). Can occupational therapists be hand therapists? *British Journal of Occupational Therapy*, 67(11), 508–510. doi:[10.1177/030802260406701107](https://doi.org/10.1177/030802260406701107)
- Furtado, R., Seens, H., Ziebart, C., Fraser, J., & MacDermid, J. C. (2022). Understanding the unpaid work roles amongst households, during Covid-19. *Aging and Health Research*, 2(2), 100071. doi:[10.1016/j.ahr.2022.100071](https://doi.org/10.1016/j.ahr.2022.100071)
- Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In *Handbook of qualitative research* (pp. 105–117). Thousand Oaks, CA: SAGE, Inc.
- Horne, R. M., Johnson, M. D., Galambos, N. L., & Krahn, H. J. (2018). Time, money, or gender? predictors of the division of household labour across life stages. *Sex Roles*, 78(11–12), 731–743. doi:[10.1007/s11199-017-0832-1](https://doi.org/10.1007/s11199-017-0832-1)
- Huetteman, H. E., Shauver, M. J., Nasser, J. S., & Chung, K. C. (2018). The desired role of health care providers in guiding older patients with distal radius fractures: A Qualitative Analysis. *Journal of Hand Surgery*, 43(4), 312–320.e4. doi:[10.1016/j.jhsa.2017.11.005](https://doi.org/10.1016/j.jhsa.2017.11.005)
- Ikpeze, T. C., Smith, H. C., Lee, D. J., & Elfar, J. C. (2016). Distal radius fracture outcomes and rehabilitation. *Geriatric Orthopaedic Surgery and Rehabilitation*, 7(4), 202–205. doi:[10.1177/2151458516669202](https://doi.org/10.1177/2151458516669202)
- Karagiannopoulos, C., Sitler, M., Michlovitz, S., & Tierney, R. (2013). A descriptive study on wrist and hand sensori-motor impairment and function following distal radius fracture intervention. *Journal of Hand Therapy*, 26(3), 204–14; quiz 215. doi:[10.1016/j.jht.2013.03.004](https://doi.org/10.1016/j.jht.2013.03.004)
- MacDermid, J. C., Roth, J. H., & Richards, R. S. (2003). Pain and disability reported in the year following a distal radius fracture: A cohort study. *BMC Musculoskeletal Disorders*, 4(1), 24. doi:[10.1186/1471-2474-4-24](https://doi.org/10.1186/1471-2474-4-24)

- Maguire, M. (2017, January 01). Doing a thematic analysis: A practical, step-by-step guide for learning and teaching scholars. Retrieved from https://www.academia.edu/68415334/Doing_a_thematic_analysis_A_practical_step_by_step_guide_for_learning_and_teaching_scholars
- Mestdag, I., & Vandeweyer, J. (2005). Where has family time gone? in search of joint family activities and the role of the family meal in 1966 and 1999. *Journal of Family History*, 30(3), 304–323. doi:[10.1177/0363199005275794](https://doi.org/10.1177/0363199005275794)
- Michlovitz, S. L., LaStayo, P. C., Alzner, S., & Watson, E. (2001). Distal radius fractures: Therapy practice patterns. *Journal of Hand Therapy*, 14(4), 249–257. doi:[10.1016/S0894-1130\(01\)80002-8](https://doi.org/10.1016/S0894-1130(01)80002-8)
- Morse, J. M. (2000). Determining sample size. *Qualitative Health Research*, 10(1), 3–5. doi:[10.1177/104973200129118183](https://doi.org/10.1177/104973200129118183)
- Nellans, K. W., Kowalski, E., & Chung, K. C. (2012). The epidemiology of distal radius fractures. *Hand Clinics*, 28(2), 113–125. doi:[10.1016/j.hcl.2012.02.001](https://doi.org/10.1016/j.hcl.2012.02.001)
- Norton, B., Bugden, B., & Liu, K. P. (2022). Functional outcome measures for distal radius fractures: A systematic review. *Hong Kong Journal of Occupational Therapy*, 35(2), 115–124. doi:[10.1177/15691861221114264](https://doi.org/10.1177/15691861221114264)
- Peterson, R., & Green, S. (2014, February 24). Families first-keys to successful family functioning. family roles. Retrieved from <https://vtechworks.lib.vt.edu/handle/10919/4830>
- Philip, S. S., Macdermid, J. C., Nair, S., Walton, D., & Grewal, R. (2019). What factors contribute to falls-related distal radius fracture? *Journal of Aging and Physical Activity*, 27(3), 392–397. doi:[10.1123/japa.2017-0428](https://doi.org/10.1123/japa.2017-0428)

- Ponterotto, J. G. (2005). Qualitative research in counseling psychology: A primer on research paradigms and philosophy of science. *Journal of Counseling Psychology*, 52(2), 126–136. doi:[10.1037/0022-0167.52.2.126](https://doi.org/10.1037/0022-0167.52.2.126)
- Ruiz, M. T., & Verbrugge, L. M. (1997). A two way view of gender bias in medicine. *Journal of Epidemiology and Community Health*, 51(2), 106–109. doi:[10.1136/jech.51.2.106](https://doi.org/10.1136/jech.51.2.106)
- Stenberg, G., Fjellman-Wiklund, A., Strömbäck, M., Eskilsson, T., From, C., Enberg, B., & Wiklund, M. (2022). Gender matters in physiotherapy. *Physiotherapy Theory and Practice*, 38(13), 2316–2329. doi:[10.1080/09593985.2021.1970867](https://doi.org/10.1080/09593985.2021.1970867)
- Synnott, A., O’Keeffe, M., Bunzli, S., Dankaerts, W., O’Sullivan, P., & O’Sullivan, K. (2015). Physiotherapists may stigmatise or feel unprepared to treat people with low back pain and psychosocial factors that influence recovery: A systematic review. *Journal of Physiotherapy*, 61(2), 68–76. doi:[10.1016/j.jphys.2015.02.016](https://doi.org/10.1016/j.jphys.2015.02.016)
- Thaler, A. (2013). Pain comorbidities: Understanding and treating the complex patient. *Pain Medicine*, 14(5), 763–764. doi:[10.1111/pme.12111](https://doi.org/10.1111/pme.12111)
- Thompson Burdine, J., Thorne, S., & Sandhu, G. (2021). Interpretive description: A flexible qualitative methodology for medical education research. *Medical Education*, 55(3), 336–343. doi:[10.1111/medu.14380](https://doi.org/10.1111/medu.14380)
- Thorne, S. (2016). *Interpretive description: Qualitative research for applied practice* (2nd ed). New York: Routledge. doi:[10.4324/9781315545196](https://doi.org/10.4324/9781315545196)
- Tracy, S. J. (2010). Qualitative quality: Eight “big-tent” criteria for excellent qualitative research. *Qualitative Inquiry*, 16(10), 837–851. doi:[10.1177/1077800410383121](https://doi.org/10.1177/1077800410383121)

Harunobu, U., & Yusuke, N. (2015). Type A behavior pattern shortens length of stay in comprehensive rehabilitation units. *Journal of Physical Therapy Science*, 27(1), 183–185. doi:[10.1589/jpts.27.183](https://doi.org/10.1589/jpts.27.183)

Vergara, I., Vrotsou, K., Orive, M., Garcia-Gutierrez, S., Gonzalez, N., Las Hayas, C., & Quintana, J. M. (2016). Wrist fractures and their impact in daily living functionality on elderly people: A prospective cohort study. *BMC Geriatrics*, 16(1), 11. doi:[10.1186/s12877-015-0176-z](https://doi.org/10.1186/s12877-015-0176-z)

Waljee, J. F., Ladd, A., MacDermid, J. C., Rozental, T. D., Wolfe, S. W., & Distal Radius Outcomes Consortium. (2016). A unified approach to outcomes assessment for distal radius fractures. *Journal of Hand Surgery*, 41(4), 565–573. doi:[10.1016/j.jhsa.2016.02.001](https://doi.org/10.1016/j.jhsa.2016.02.001)

Watson, N. J., Martin, S. A., & Keating, J. L. (2018). The impact of wrist fracture, surgical repair and immobilization on patients: A qualitative study. *Clinical Rehabilitation*, 32(6), 841–851. doi:[10.1177/0269215518754614](https://doi.org/10.1177/0269215518754614)

Chapter 5

5 Discussion and Conclusion

In this thesis, three studies have been analyzed that examined patient and rehabilitation factors in the recovery of home and family work roles (HFWRs). The interrelated studies collectively advance the understanding of how distal radius fracture (DRF) influences HFWRs and the implication for rehabilitation practices.

The initial study established a foundational framework by conducting an exploratory factor analysis on the HFWR questionnaire. Exploratory factor analyses of 115 DRF participants between the ages of 18 to 89 years yielded three-factor solutions: traditionally masculine, traditionally feminine, and caregiving roles within the DRF patient population, paralleling previous findings in general populations (Dabbagh, Seens, Fraser, & MacDermid, 2023) and fit the theoretical conceptualizations. Men performed a significant amount of outdoor cleaning, home repairs, yard work, driving the family to activities or appointments, and maintaining vehicles. Women completed a significant amount of laundry compared to men. This study's conceptualization of HFWRs informs the subsequent studies, enabling a nuanced assessment of the gender-specific impact of DRFs on HFWRs. It also emphasizes the necessity for individualized rehabilitation strategies, thereby facilitating patient-centered care and improving alignment between patient experiences and rehabilitation objectives.

Advancing from this foundation, the second study explored HFWRs performed by 115 DRF participants (30 men and 85 women, 18 to 89 years) before the fracture and recovery of those roles after the fracture. The findings showed a significant decrease in HFWRs at 1-week post-

fracture compared to pre-fracture level. A follow-up survey of 50 DRF participants (14 men and 36 women; 18 to 89 years; 21 single/divorced/widowed, 29 married/common-law partners; 18 employed, and 32 unemployed/retired) showed that the HFWRs recovered to the prefracture level at three months. Marital and employment status have a significant influence on the proportion of HFWRs. DRF has a significant short-term impact on HFWRs, with a resumption of roles in three months. The longitudinal analysis provided empirical support for the structural dimensions identified in the first study. Marital and employment status significantly modulate the trajectory of HFWR recovery. These insights underscore the need for additional patient support or alternative strategies to manage HFWRs during the acute rehabilitation phase.

The third study complements quantitative data with qualitative insights, exploring patient and clinician perceptions and experiences regarding the integration of HFWRs into rehabilitation plans. Patients with DRF were asked about the experience of fracture, rehabilitation, and perception of addressing family roles by the treating clinicians in a therapy session. The clinicians were asked about their current rehabilitation strategies, their perception of assessing and utilizing HFWRs as a rehabilitation strategy, and their opinions on the benefits, facilitators, and barriers to incorporating HFWRs in the rehabilitation plan. Eighteen patients with DRF and 11 clinicians were interviewed. The study revealed that while the integration of HFWRs is valued there exist challenges and barriers in practice, including environmental constraints, time limitations, and resource allocation. Additionally, this study elucidates that current rehabilitation plans may not sufficiently differentiate according to sex and gender, suggesting a potential oversight in addressing the full spectrum of patient needs.

5.1 Implications

Clinical: The HFWR Questionnaire used in our study is a valid tool for measuring HFWRs in the DRF population. The finding that DRF has a significant short-term impact on HFWRs suggests that clinicians need to consider strategies to adapt or delay home responsibilities during the acute rehabilitation phase. For instance, clinicians can utilize HFWR questionnaire along with routine subjective assessment to gauge the proportion of work done at home and educate patients on performing HFWRs without compromising their recovery, such as performing tasks with the unaffected hand, modifying HFWRs, seeking help from family members or care workers.

Current DRF rehabilitation practice focuses on exercises and pain management performed under the clinician's supervision or as an independent home exercise program. Evidence is lacking to support the best rehabilitation intervention (Quadlbauer et al., 2020). A study that explored how engaging in daily activities and occupation influenced DRF recovery in the first eight weeks after surgery showed that daily life engagement facilitated the recovery of movement and function.

Incorporating HFWRs as a rehabilitation strategy might habituates movement and enables well-being (Collis, Mayland, Wright-St Clair, & Signal, 2022). HFWRs and exercises can be

advocated as a rehabilitation strategy that can foster holistic care, independence, and well-being.

Rather than perceiving a functional role as an end goal, purposeful activities should be used as a rehabilitation tool. Clinicians (Hand therapists/physiotherapists/occupational therapists) with knowledge of fracture healing and rehabilitation can guide patients with graded activities of daily living that promote healing and movements.

In academia, a more significant, fully powered randomized control trial that compares rehabilitation strategies that address HFWRs with conventional hand rehabilitation programs will provide robust evidence on the benefits and limitations of incorporating HFWRs into

rehabilitation plans. Further surveys incorporating diverse ethnic groups and paying particular attention to indigenous communities and people of different economic and cultural statuses will further expand the understanding of the impact and recovery of HFWRs following DRF.

Hospitals and rehabilitation centers are more inclined to the medical model of care (based on impairment) than the holistic participation or activity-based intervention (Aas & Bonsaksen, 2022). The study by Aas & Bonsaksen (2022) shows that only 26% of the assessments and 38% of the interventions were classified as occupation-based practice. This thesis and the literature show that lack of time is a significant barrier (Aas & Bonsaksen, 2022; Colaianni & Provident, 2010) to assessing and using HFWRs during therapy sessions. The hospital and rehabilitation practice guidelines must prioritize activities meaningful to the patient as rehabilitation strategies. This requires reexamining the working context and making a needed change to incorporate HFWRs as appropriate.

There needs to be more credibility in functional role-based care among hand therapists, other professionals, and patients (Colaianni & Provident, 2010). Stakeholders are not aware of the body of knowledge that supports functional role-based intervention (Colaianni & Provident, 2010). Similarly, in this study, participants reported that they do not expect clinicians to address HFWRs, indicating a knowledge-to-action gap. This gap can be narrowed by disseminating research information to policymakers, practitioners, and the public through workshops, conferences, and infographics.

5.2 Limitations

The structure validity of the home and family work role questionnaire warrants further approval of a three-factor solution in a larger sample by confirmatory factor analysis. There was a large

dropout in follow-up evaluation at three months, decreasing statistical power. The result that the patient resumed HFWR at three months needs to be interpreted with caution. Patients with DRF who participated in the interview were recruited from a hospital. The working context, policies, and procedures differ depending on the hospital setup and the clinic working environment. Future studies must recruit patients from multiple centers, as therapy practice can vary in different settings, influencing patient experience.

In conclusion, there is a short-term impact on HFWRs following DRF, and the patient resumes these roles in three months. Patients had a positive rehabilitation experience, and therapy provided reassurance, motivation, and satisfaction. Patients prefer exercise mainly as a rehabilitation strategy; however, incorporating HFWRs is beneficial for different patient needs. Some patients were determined to return to activities they enjoyed and chose to do functional activities, irrespective of clinicians' guidelines. The clinician's interview revealed challenges in integrating HFWRs into rehabilitation, which are environmental factors, time and budget. Additionally, the working environment and referral sources influence the rehabilitation plan. Both patients and clinicians acknowledge that addressing HFWRs is beneficial. Engagement in HFWRs post-DRF is not only pivotal to personal identity and social roles but also critical to comprehensive rehabilitation outcomes, thereby advocating for the patient's return to role function (participation domain of ICF) as a key indicator of recovery. Future larger studies are further required to confirm these findings.

5.3 References

- Aas, M. H., & Bonsaksen, T. (2022). Exploring occupation-based practice among occupational therapists in hospitals and rehabilitation institutions. *Scandinavian Journal of Occupational Therapy*, 1–11. doi:[10.1080/11038128.2022.2059564](https://doi.org/10.1080/11038128.2022.2059564)
- Colaianni, D., & Provident, I. (2010) The benefits of and challenges to using occupation in hand therapy. *Occupational Therapy in Health Care*, 24(2), 130–146. doi:[10.3109/07380570903349378](https://doi.org/10.3109/07380570903349378)
- Collis, J. M., Mayland, E. C., Wright-St Clair, V., & Signal, N. (2022). ‘The more I do, the more I can do’: Perspectives on how performing daily activities and occupations influences recovery after surgical repair of a distal radius fracture. *Disability and Rehabilitation*, 44(19), 5440–5449. doi:[10.1080/09638288.2021.1936219](https://doi.org/10.1080/09638288.2021.1936219)
- Dabbagh, A., Seens, H., Fraser, J., & MacDermid, J. C. (2023). Construct validity and internal consistency of the HFWRs questionnaires: A cross-sectional study with exploratory factor analysis. *BMC Women’s Health*, 23(1), 56. doi:[10.1186/s12905-023-02199-1](https://doi.org/10.1186/s12905-023-02199-1)
- Quadlbauer, S., Pezzei, Ch., Jurkowitsch, J., Rosenauer, R., Kolmayr, B., Keuchel, T., . . . Leixnering, M. (2020). Rehabilitation after distal radius fractures: Is there a need for immobilization and physiotherapy? *Archives of Orthopaedic and Trauma Surgery*, 140(5), 651–663. doi:[10.1007/s00402-020-03367-w](https://doi.org/10.1007/s00402-020-03367-w)

6 Appendices

6.1 Appendix 1: Study Questionnaire

Think about the work to care for your home and family. Please answer the following questions by putting an **X** in the box for **how much of this work you usually do**. Do not count the work done by friends, family, paid staff, spouse, or others. If the item does not apply to you, for example, you have no children or no vehicle, then choose “*does not apply to me.*”

	None	A Little	Some	About half	Quite a bit	Most	All	Does not apply to me.
What part of the work done in your family/home do you do?	0%	1-20%	21-40%	41-60%	61-80%	81-99%	100%	
	0	1	3	5	7	9	10	0

House cleaning (floors, dishes, bathrooms, etc.)

Outdoor cleaning (garage, garbage, windows, etc.)

Laundry

Home decorating (painting, wallpapering, etc.)

Home repairs (install doors or lights, fix bathroom, etc.)

Yard work

Garden (plant, weed,
etc.)

Prepare meals

Shop for groceries and
supplies

Drive family to activities
or appointments

Arrange family
appointments and
activities

Maintain vehicles
(repair, change oil, clean,
etc.)

Help children with
homework

Supervise children in the
home

Care for children when
sick

Care for other family
members (parent, spouse,
or others)

Earn family income

Manage family
finances/bills

6.2 Appendix 2: Interview Guide – Patient and Clinician Perceptions of How Daily Life Activities Integrate into Rehabilitation and Recovery Following Distal Radius Fracture (DRF)

Primary Goal: To understand how clinicians evaluate family role functioning and what action is initiated to support patients in maintaining family role responsibilities including how family role functioning is integrated into the rehabilitation plan.

Secondary Goal: To understand patient perceptions of the extent to which clinicians evaluate and address family role functioning.

Format: Semi-structured interview questions (marked with numeric numbers) with probing questions (in alphabetical listing) to elicit responses that are most relevant to the participant.

Introduction: Explain to the participant that the questions may be skipped/not answered. Also explain that the interview will be recorded so that it can later be transcribed.

Patient Question Guide

This semi structured interview guide is designed to know whether your clinician addressed your activities of daily living, family role responsibilities and work responsibilities during your rehabilitation session.

- 1) Fracture Experience
- 2) Can you tell me about your fracture?
 - a. How did it occur?
 - b. When/where did it occur?
 - c. Were you alone or with someone at that time?
- 3) Household Chores
- 4) What activities of daily living (toileting, shower, dressing, meal preparation) do you find challenging to do since your injury?
 - a. How do you feel about this difficulty?
 - b. What strategies have you tried to cope with this?
 - c. Has anyone helped you since your injury?
 - d. How did your clinician address activities of daily living (toileting, shower, dressing, meal preparation) in the rehabilitation session?
 - e. What strategies did your clinician provide to manage activities of daily living?
- 5) Family Roles
- 6) What family role (For example, laundry, supervising children) do you find challenging to participate in since your injury?
 - a. How do you feel about this difficulty?
 - b. What strategies have you tried to cope with this?
 - c. Has anyone helped you since your injury?

- d. How did your clinician address family roles in the rehabilitation session?
- e. What strategies did your clinician provide to manage family roles?

7) Work

- a. How do you feel about this difficulty?
- b. What strategies have you tried to cope with this?
- c. How did your clinician address work responsibilities in rehabilitation session?
- d. What strategies did your clinician provide to manage work responsibilities?

8) Support

9) What support have you received with household chores or family roles since your injury?

- a. How has the clinician helped you?
- b. From whom would you like more support/help with household chores? With family roles?

10) Opinions/Perceptions

How do you think your home and work responsibilities are affecting your ability to cope with your injury?

- a. Is any activity making it difficult to cope with your injury?
- b. Is any activity helping you cope with your injury?
- c. Has the therapeutic intervention enabled you to cope and gradually resume home responsibilities?
- d. Has the therapeutic intervention enabled you to cope and gradually resume work responsibilities?
- e. Do you think the rehabilitation sessions have helped you to return to your functional activities?

Clinician Question Guide

The questionnaire is designed to know how you, as a clinician, consider your patient's activities of daily living, family role and responsibilities as part of the assessment and treatment plan.

- 1) Clinician
 - a. Could you please tell me about yourself?
 - b. How many years of experience do you have?
 - c. What kind of patients do you treat primarily?
 - d. Do you get many patients with DRF?
- 2) What factors do you consider while rehabilitating patients following DRF?
 - a. What type of education do you give your patients?
 - b. What type of exercise do you prescribe?
 - c. How do you incorporate functional activities into your rehabilitation plan?
 - d. What are patients' primary concerns?
 - e. Does your treatment plan vary by sex and gender?
- 3) Does your assessment and treatment plan include strategies to manage ADL?
 - a. What strategies do you teach your patient to take a shower?
 - b. How does your patient manage toileting and dressing?
 - c. How does your patient manage meal preparation?
- 4) Indoor household chores
 - a. How does your patients manage laundry while recovering?
 - b. How do your patients manage cleaning the house and utensils during recovery?

c. How do your patients manage the caregiver role (spouse, children, grandchildren)

d. How do your patients take care of pet animals?

5) Outdoor chores

a. How do your patients commute for appointments and other personal needs during recovery?

b. How do your patients manage grocery shopping?

c. Who helps patients with yard work or snow removal during recovery?

6) Work Responsibilities

a. How do your patients manage using a computer or phone for work?

b. How does your patients manage using tools at work?

c. How do you guide patients to return to work?

6.3 Appendix 3: Demographic Questionnaire

1. What is your marital status?
- Single
 - Common-law married
 - Married
 - Divorced
 - Widowed
 - Other _____
-

2. How many children *who are dependent on you* currently live in your home? _____
-

3. Do you currently care for a sick or disabled adult in your home (spouse
- Yes, my spouse
 - Yes, other adult person
 - No
-

4. How many people *in total* currently live in your home, including yourself? _____
-

5. Indicate all of the people who perform some part of caring for your home and family (check all that apply)
- Myself
 - My spouse / partner
 - My children
 - Friends
-

Other family members who also live in my home

Other family members who live outside of my home

Paid staff (like babysitters or cleaners)

Support workers (like healthcare workers)

Other _____

6. Do you work outside the home?

Yes, full-time paid work

Part-time paid work

Yes, Volunteer work

No

7. What is your age (in years)?

8. What sex were you assigned at birth?

Male

Female

Other _____

9. With which gender do you identify?

Man

Woman

Other _____

10. If you are currently in a relationship, what is the gender of your partner?

Man

Woman

Other _____

6.4 Appendix 4: Ethics Approval



Western Research

Date: 26 October 2022

To: Dr. Joy MacDermid

Project ID: 114561

Review Reference: 2022-114561-72425

Study Title: The role of sex and gender in recovery from distal radius fractures: Unpaid work roles and compensatory strategies

Application Type: Continuing Ethics Review (CER) Form

Review Type: Delegated

REB Meeting Date: 08/Nov/2022

Date Approval Issued: 26/Oct/2022 10:39

REB Approval Expiry Date: 01/Nov/2023

Dear Dr. Joy MacDermid,

The Western University Research Ethics Board has reviewed the application. This study, including all currently approved documents, has been re- approved until the expiry date noted above.

REB members involved in the research project do not participate in the review, discussion or decision.

Western University REB operates in compliance with, and is constituted in accordance with, the requirements of the Tri- Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS 2); the International Conference on Harmonisation Good Clinical Practice Consolidated Guideline (ICH GCP); Part C, Division 5 of the Food and Drug Regulations; Part 4 of the Natural Health Products Regulations; Part 3 of the Medical Devices Regulations and the provisions of the Ontario Personal Health Information Protection Act (PHIPA 2004) and its

applicable regulations. The REB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000940.

Please do not hesitate to contact us if you have any questions.

Electronically signed by:

Ms. Nicola Geoghegan-Morphet, Ethics Officer on behalf of Dr. P. Jones, HSREB Chair 26/Oct/2022 10:39

Reason: I am approving this document

6.5 Appendix 5: Curriculum Vitae

Name	Sheena Philip
Post-secondary Education and Degrees	Dr. M.G.R Medical University Tamil Nadu, India 1994-1998: Bachelor of Physiotherapy Western University, London, Ontario 2014-2016: Master of Health and Rehabilitation Sciences.
Related Work Experience	Physiotherapist London, Ontario: 2018 -Present Sultanate of Oman: 2002 to 2014 India:1999 to 2001 Graduate Teaching Assistant (Western University, London, Ontario) PT 9121 Acute Care I IPE 9803 Applying Research to Practice PT Profession Consolidation PT 9539 Therapeutic Modalities PT 9690 Clinical Consolidation – Wound Healing

	<p>PT 9539 Therapeutic Modalities</p> <p>Physical Therapy in Rehabilitation Settings II</p> <p>PT Integrated Assessment</p> <p>Research Assistant</p> <p>The Leprosy Mission Hospital, Allahabad, India</p> <p>2000-2001</p>
Certification and License	<p>Advanced Vestibular Rehabilitation</p> <p>Acupuncture and Dry needling</p> <p>Soft Tissue Release</p> <p>Concussion Management</p> <p>Canadian Fall Prevention Curriculum</p> <p>Outcome measurement and patient engagement</p>
Physiotherapist	<p>College of Physiotherapist of Ontario</p>
	<p>Teaching Assistant Training Program (TATP) Western University October 2014</p>

<p>Conference and Poster Presentations</p>	<p><i>London Health Research Day 2023</i> (Poster):</p> <p><i>Topic: Impact of Distal Radius Fracture on Home and Family Work Roles</i></p> <p><i>Interdisciplinary Social Accountability Research2023 (McMaster University, Hamilton, Ontario) (Poster)</i></p> <p>Topic: Age, Gender and Ethnicity as Predictors of Family Role Responsibilities</p> <p><i>London Health Research Day 2022</i> (Poster):</p> <p>Age, Gender and Ethnicity as Predictors of Family Role Responsibilities.</p> <p><i>Canadian Bone and Joint Conference</i></p> <p><i>April 2016</i></p> <p>Topic: Do People with Distal Radius Fracture Differ from Normal in Terms of Postural Stability and Fall Risk.</p> <p><i>HRS Graduate Research Conference</i> <i>February 2016</i></p> <p>Topic: Do People with Distal Radius Fracture Differ from Normal in Terms of Postural Stability and Fall Risk.</p> <p><i>National Conference on Musculoskeletal</i></p>
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	<p><i>Rehabilitation, Sultanate of Oman 2013</i></p> <p>Topic: Relaxation Technique</p> <p><i>International Conference on Mental Health Rehabilitation Sultanate of Oman 2012 (organizer)</i></p> <p>Topic: Role of Physiotherapist in Mental Health Rehabilitation.</p>
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Publications:

Philip, S. S., Macdermid, J. C., Nair, S., Walton, D., & Grewal, R. (2019). What factors contribute to falls-related distal radius fracture? *Journal of Aging and Physical Activity*, 27(3), 392-397. doi:10.1123/japa.2017-0428

Manuscripts Under Review:

Philip, S., MacDermid, J., Rushton, A., Parikh, P., & Seens, H. (2023). patients' and clinicians' perception of integrating home and family work roles into rehabilitation following a distal radius fracture. *Disability and Rehabilitation*.

Philip, S., MacDermid, J., Rushton, A., Parikh, P., & Seens, H. (2023). Philip, S., MacDermid, J., Rushton, A., Parikh, P., & Seens, H. (2023). Exploratory factor analysis of home and family work role questionnaire in distal radius fracture patients. *Journal of hand therapy*

Philip, S., MacDermid, J., Rushton, A., Parikh, P., & Seens, H. (2023). Philip, S., MacDermid, J., Rushton, A., Parikh, P., & Seens, H. (2023) The impact of distal radius fracture on home and family work role. *Journal of hand therapy*