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An Occupation-Based Approach to Management of Concussion: Guidelines for Practice

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Abstract

Concussion and the cumulative effects of repetitive head trauma have become a growing health concern both in the mainstream media and in the health care community. Although symptoms of concussion are not always outwardly visible, evidence suggests that post-concussion symptoms may interfere with an individual's ability to work, play, and participate in school. In the past, the recommendations following concussion emphasized a complete rest approach, whereas current approaches focus on a gradual engagement in functional activities shortly after the injury. Since current recommendations are focused on a gradual engagement in occupation and activity, occupational therapy may be a valuable service for individuals who have sustained concussions. However, despite the valuable role that occupational therapy may offer, there is limited literature supporting the role of occupational therapy in the management of concussion, and there are currently no clear guidelines for clinical practice. This paper will provide an overview of an occupation-based, client-centered framework for the management of concussion and specific guidelines for occupation-based assessments and interventions.

Comments

The author reports that they have nothing to disclose.

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Keywords

concussion, client-centered, occupation

Cover Page Footnote

I would like to acknowledge all my colleagues for their support and encouragement throughout this process.

Credentials Display

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In 2013 in the United States, there were approximately 2.8 million traumatic brain injury-related emergency department (ED) visits, including mild traumatic brain injury (mTBI) or concussion (Taylor, Bell, Breiding, & Xu, 2017). The actual number of head injuries may be higher, as this number only encompasses ED visits (Coronado et al., 2015). Because of the increased number of incidences and reports of head injury, there has been a heightened awareness of the topic of concussion in the media and the health care field (Ahmed & Hall, 2016). Although most concussions are thought to resolve in about 10 to 14 days for adults, and in about 4 weeks for children (McCrorry et al., 2017), some individuals experience prolonged symptoms beyond this time frame. The constellation of symptoms, which may include visual, vestibular, cognitive, emotional, and sleep disturbances, has been characterized as post-concussion syndrome (World Health Organization, 2007). Although these symptoms may not be outwardly visible, there is evidence that post-concussion symptoms may interfere with an individual's ability to work, play, and participate in school (Master, Gioia, Leddy, & Grady, 2012; McCrorry et al., 2017; Vikane et al., 2016). Moreover, studies that have found that individuals with post-concussion symptoms also reported decreased perceived quality of life (Heitger et al., 2009).

In the past, theories about and approaches to the management of concussion have emphasized a complete rest approach, while newer, more current theories are focused on gradual engagement in functional activities shortly after the injury (DeMatteo et al., 2015; McGrath, 2010; Popoli, Burns, Meehan, & Reisner, 2014). This new trend of a gradual return to activity is consistent with the most recently published guidelines following the 2017 Concussion in Sport Group consensus statement (McCrorry et al., 2017). Both expert opinions and the summative findings of multiple research studies inform the consensus guidelines. Current guidelines for rest and gradual return to activity are as follows:

There is currently insufficient evidence that prescribing complete rest achieves these objectives. After a brief period of rest during the acute phase (24-48 hours) after injury, patients can be encouraged to become gradually and progressively more active while staying below their cognitive and physical symptom-exacerbation thresholds (i.e., activity level should not bring on or worsen their symptoms). (McCrorry et al., 2017, p. 5)

Thus, it is apparent that the most current recommendations for the management of concussion emphasize the importance of a graded return to activity. Furthermore, recent literature has emphasized the importance of a graded return to activity, as well as increasing evidence of the adverse effects of prolonged rest, such as increased susceptibility to depression and anxiety (Silverberg & Iverson, 2013; Thomas, Apps, Hoffmann, McCrea, & Hammeke, 2015). In addition to the focus on return to activity, current guidelines highlight the importance of a graded return to activity that does not significantly provoke or exacerbate symptoms. The current guidelines call for a symptom-limited approach for return to activity where the activity is terminated if symptoms are worsened significantly. As a consequence, it is apparent that the client plays an active role in determining barriers to participation in meaningful occupation by developing an awareness of the interaction of symptoms, activity, and environment. Currently, many occupational therapists work with clients who have sustained concussion and/or mTBI and emphasize improving visual and cognitive skills (Finn & Waskiewicz, 2015). The proposed theoretical framework considers the visual, vestibular, cognitive, and other physical sequelae associated with concussion, but in the context of engagement in meaningful occupation, particularly for clients with persistent symptoms.

Challenges in Current Practice

Knowledge of Concussion and Best Practices

Concussion is a complex diagnosis with a heterogeneous presentation and subsequent varying clinical symptoms (McCrory et al., 2017). Furthermore, individuals who have persistent symptoms may have an even more complex presentation, as there are several factors found to contribute to persistent symptoms that may include pre-existing neurological or psychiatric conditions (Bonfield, Lam, Lin, & Greene, 2013; Corwin et al., 2014). Because of the complexity of the diagnosis and varying clinical presentations (McCrory et al., 2017), as well as the evolving literature related to concussion, health care professionals working with this population should have a comprehensive understanding of this complex diagnosis, and they should also be up-to-date on the most recent literature. However, recent literature reports varying knowledge levels among currently practicing health care professionals (Lebrun et al., 2013; Mitchell, Hildenbrand, & Pietz, 2016; Salisbury, Kolessar, Callender, & Bennett, 2017). Occupational therapists, in particular, scored lower on a concussion knowledge assessment as compared to their peers in other professions (physical therapist, speech and language pathologist, physician, athletic trainer), as found in a recent study (Salisbury et al., 2017). Recent literature suggests that specific concussion educating/training may be associated with greater knowledge levels (Salisbury et al., 2017), thus suggesting the need for further training and education in the area of concussion for all health care professionals. Occupational therapists may benefit from specialized training, given the unique contribution they may offer to this population. However, occupational therapists may not have received explicit education on concussion with occupational therapy programs or may not have had the opportunity to receive additional training.

Lack of Unified Best Practice Guidelines for Occupational Therapy

As stated above, concussion is a complex condition with varying clinical presentations (McCrory et al., 2017). Symptoms of concussion can be diverse and affect different domains that may include cognitive changes, such as difficulty concentrating; emotional symptoms, such as irritability; physical symptoms, such as headache or dizziness; and sleep disturbances (McCrory et al., 2017). Since concussion may result in a variety of different symptoms affecting multiple different domains, individuals who have sustained concussion will likely experience disruptions not only in their ability to participate in occupations but also in their ability to engage in occupations. Symptoms, such as visual disturbances or dizziness, are not often outwardly visible; nonetheless, they have been found to compromise perceived health status and quality of life (Heitger et al., 2009). Despite the impact on perceived quality of life and health status, selecting outcome measures that clearly illustrate these impairments and their impact on function can be challenging, particularly in a traditional physical rehabilitation setting, where outcome measures frequently focus on external or performance measures. Although there is literature related to the role of occupational therapy and moderate to severe brain injury, there is less focus on the approach to mild traumatic brain injury, which has a unique clinical presentation.

Theoretical Framework for Occupational Therapy and Concussion

The primary foundations of the profession of occupational therapy are rooted in participation and engagement in meaningful occupations and, as a result, these foundations align with the most recent literature on guidelines for management of concussion that emphasize participation in activity shortly after injury (McCrory et al., 2017). The role of occupational therapy in facilitating engagement in meaningful occupations, while carefully monitoring client responses, further illustrates the relevance of

occupational therapy in the management of concussion and post-concussion syndrome. Recent literature has emphasized the unique role of occupational therapy in facilitating a return to occupations, specifically a return to work. Acord-Vira, Davis, Wheeler, and Canoy (2018) emphasize the significant role of occupational therapists in facilitating a return to work following concussion because of their “extensive knowledge and skills in client-centered assessment, environmental modification, activity analysis, and activity grading” (p. 32). However, despite the valuable role of occupational therapy in the management of concussion, no clear framework guides occupational therapy practice for the management of concussion. Furthermore, there are no clear guidelines to determine the just right challenge that balances activity with rest while also considering how the client’s choice of activities, his or her ability to monitor symptoms, and the environmental factors may ultimately impact recovery. The purpose of this paper is to: (a) provide a theoretical framework to guide clinical practice in the management of concussion using an occupation-based model to promote engagement and participation in meaningful occupations following a concussive injury and to (b) provide guidelines for occupation-based assessment and intervention in the area of concussion rehabilitation.

This framework will integrate the conceptual foundations of the Canadian Model of Occupational Performance-E (CMOP-E) (Polatajko, Townsend, & Craik, 2007) with the current international consensus statement guidelines on the management of concussion. The CMOP-E and the International Consensus statement on the Management of Sport Related Concussion (McCrory et al., 2017) have parallel concepts in that they both emphasize the importance of engagement in occupations and daily activities. The unique clinical presentation of concussion and associated symptoms, such as dizziness, light sensitivity, and headaches, can often interfere with satisfaction and optimal engagement in occupational performance but may not necessarily prohibit participation (Heitger et al., 2009). The International Consensus Statement recommends a graduated return to activity following a concussive injury at a sub-symptom threshold level, emphasizing the importance of a return to daily activity while also considering both internal and external factors that may influence engagement (McCrory et al., 2017). This is congruent with the CMOP-E, which considers not only participation but also factors that influence an individual’s ability to engage in meaningful occupations. The proposed framework integrates conceptual foundations of the CMOP-E and expert recommendations for the management of concussion based on published research. The core constructs of the framework that guide clinical practice for occupational therapy management of concussion are as follows:

1. Client-centered: The client identifies barriers and symptoms that limit engagement in self-identified meaningful occupations. The client and therapist work collaboratively to identify and implement strategies to manage symptoms and a return to meaningful activity.
2. Occupation based: Intervention focuses on the use of meaningful occupations as a therapeutic tool to facilitate recovery and the reduction of symptoms.
3. Engagement focused: Occupational therapy intervention focuses on facilitating optimal engagement rather than participation only. Engagement may impact perceptions of quality of life positively.

Client-Centered Practice

Client-centered practice is considered an integral component of occupational therapy practice and is embedded in the Occupational Therapy Practice Framework (American Occupational Therapy Association [AOTA], 2014). Although various definitions have been proposed throughout the literature, one of the core definitions of client-centered practice as proposed by Law et al. (1995) is

an approach to providing occupational therapy, which embraces a philosophy of respect for, and partnership with, people receiving services. Client-centered practice recognizes the autonomy of individuals, the need for client choice in making decisions about occupational needs, the strengths clients bring to a therapy encounter, the benefits of client-therapist partnership and the need to ensure that services are accessible and fit the context in which a client lives. (p. 253)

The collaborative element of client-centered practice is also highlighted by the Canadian Association of Occupational Therapists (CAOT, 1997), who emphasize the importance of partnership and overall respect for clients. Specifically, the CAOT emphasizes the client-centered approach to occupational therapy as one that should “demonstrate respect for clients, involve clients in decision making, advocate with and for clients’ needs and otherwise recognize clients’ experience and knowledge” (1997, p. 180). Hammell (2013) highlights the core values in both the definitions of client-centered practice as proposed by Law (1995) and the CAOT (1997). According to Hammell, both definitions “explicitly value respect for clients, both prioritize collaborative relationships and/or partnerships between therapists and clients, both identify the need for client choice and involvement in decision making, and both explicitly respect clients’ strengths (experience and knowledge)” (p. 143).

Bright, Boland, Rutherford, Kayes, and McPherson (2012) further propose the importance of an active listening approach to determine what the client’s needs are and how the client and therapist can work collaboratively to address these needs. Bright et al. suggests that by using a client-centered approach, one that shifts “the focus from ‘what can I do for this person’ to ‘who is this person and what do they need,’” (p. 1002) allows the clinician to move “from being an expert clinician to more of a coach, handing back power to the client” (Bright et al., 2012, p. 1001). Thus, the key components of client-centered practice include a partnership between client and therapist, explicit regard for client strengths and occupational needs, and an active listening approach to develop an understanding of these needs (Bright et al., 2012; CAOT, 1997; Hammell, 2013; Law, 1995).

Client-Centered Practice and Management of Concussion

Individuals with post-concussion syndrome often experience a persistent constellation of symptoms that precludes optimal engagement in daily occupations, which may potentially compromise overall perceived quality of life (Heitger et al., 2009). These symptoms are often not readily visible to the outside observer, and thus the clinician is required to rely on client report to develop an understanding of the client experience. To develop a comprehensive understanding of the client experience, the therapist should be familiar with the type and intensity level of symptoms in association with activity level and environmental factors. In addition, the application of a client-centered approach to management of concussion and associated symptoms allows the therapist and client to develop a collaborative approach to treatment as emphasized by Law (1995) and the CAOT (1997). Once the client and therapist identify symptoms and resultant barriers to optimal occupational engagement, the therapist and client can identify strategies that allow the client to participate in meaningful occupations with fewer symptoms and greater perceived quality of life.

As proposed by Bright et al. (2012), a client-centered approach requires the therapist to determine who the person is and the client’s specific needs. Thus, in the context of rehabilitation following a concussion, the therapist and client should first work together to “**R**ecognize and Identify Symptoms and Impact on Occupational Performance,” and “**R**ecognize Internal and External Factors that Contribute to Symptoms” (see Figure 1). In this framework, the therapist and client work collaboratively to develop comprehensive insights into the unique challenges of each client. Since

clients are not always aware of the exact factors that precipitated the onset of the symptoms, occupational therapists can help to establish an understanding of how activity demands or environmental factors may have contributed to symptoms. In addition, the therapist and client can work together to determine how symptoms or environmental factors may have impacted engagement in occupations. At the next level, the therapist and client collaboratively work together to “**R**esume Activity with **R**ecommendations.” This stage includes “**R**eturn to Activity with Graduated Approach” and “**R**ecommendations for sub-symptom threshold activity.” At this stage, the client returns to activity in a graduated manner, and the therapist and client work together to establish parameters to ensure activity challenges are below or at the sub symptom threshold. The last stage in the framework calls for the therapist and client to “**R**eflect on activity level and associated symptoms” and “**R**e-evaluate occupational performance.” This component of the framework emphasizes the importance of reflecting on the activity and developing awareness of how strategies or other factors may have influenced participation, engagement, and overall satisfaction with occupational performance. In a client-centered approach to occupational therapy, the client is provided with the opportunity to develop autonomy and the ability to direct one’s treatments (Bright et al., 2012). In the proposed framework, as the therapist facilitates the client’s ability to self-recognize symptoms and factors that contributed to difficulties engaging in occupations, the client develops the ability to apply these strategies to future activities and subsequently better control symptoms, which is consistent with the client-centered approach that is hinged on a collaborative partnership (Law, 1995).

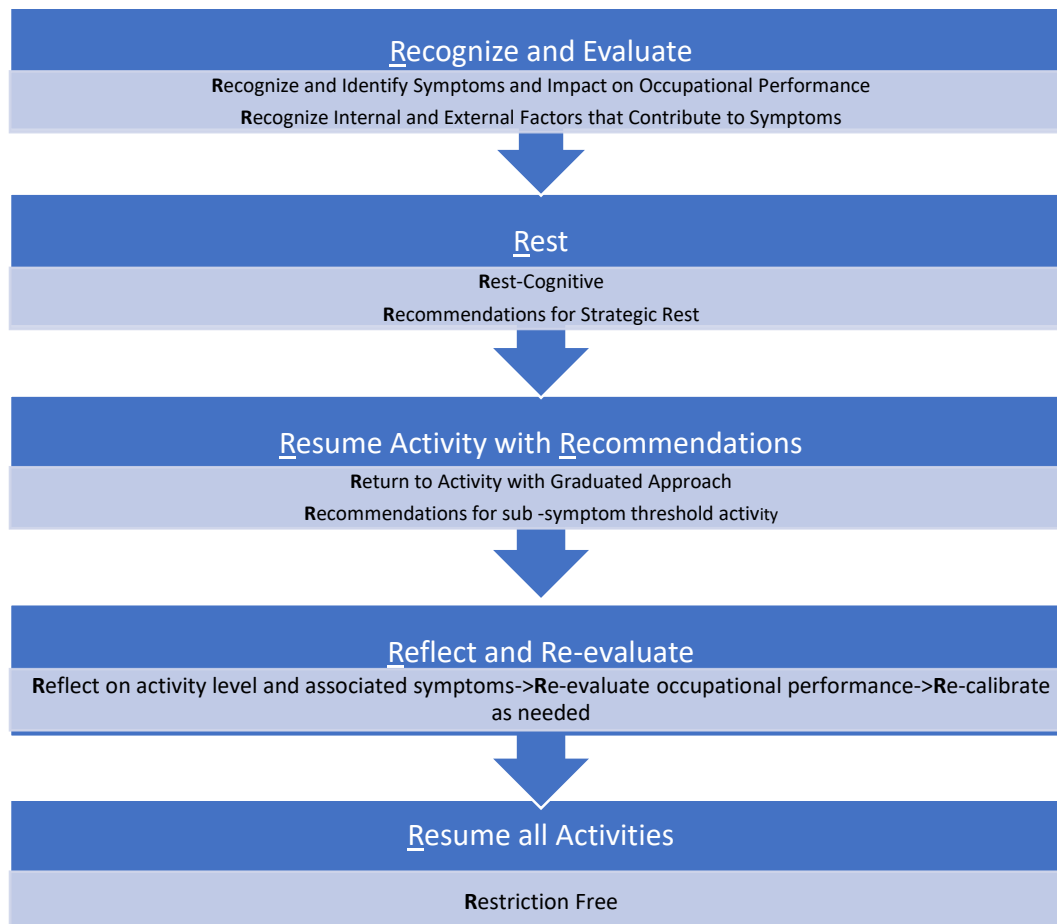


Figure 1. A Client-Centered, Occupation-Based Model for Return to Activity Following Concussion

Occupation and Engagement

According to the Occupational Therapy Practice Framework (AOTA, 2014), occupation has many different working definitions, but it essentially refers to the daily activities in which people engage. The Occupational Therapy Practice Framework states that “occupations occur over time; have purpose, meaning, and perceived utility to the client; and can be observed by others (e.g., preparing a meal) or be known only to the person involved (e.g., learning through reading a textbook)” (p. S6).

Polatajko, Townsend, and Craik (2007) refer to human occupation as not a specific phenomenon but rather as a “broad class of tasks and activities in which a person engages in everyday life that are both culturally and personally meaningful” (Polatajko et al., 2007). In the CMOP-E, it is proposed that occupational performance and engagement is the result of a dynamic relationship between persons, environment, and occupation. In addition, the CMOP-E suggests that physical, cognitive, and affective components of the person have the potential to contribute to the successful engagement in occupation. According to this model, occupational engagement is more encompassing than participation only, and thus it is not adequate for an occupational therapist to observe performance alone; he or she should gather information on the client’s perceived sense or self-efficacy and satisfaction with engagement in occupation. The profession of occupational therapy views engagement in occupation as an instrumental component of health and well-being (Wilcock, 1998). Doble and Santha (2008) further proposed a concept of “occupational well-being” (p. 184) that expands the concept of occupational participation to acknowledge subjective occupational experiences. The concept of occupational well-being suggests that occupational performance alone does not result in well-being, but rather, certain factors need to be considered in order for occupation to be associated with well-being. Thus, the therapist should not only assess the client’s ability to perform an activity but should also consider how well a client can perform an activity, to what extent the symptoms are experienced, and the client’s perception of his or her ability to engage in occupation.

Occupational Engagement and Management of Concussion

Clients who have sustained concussion will often report either a reluctance to engage in occupation or a decreased overall perceived satisfaction with occupational performance due to various post concussive symptoms, such as headaches, dizziness, light sensitivity, and other symptoms (Heitger et al., 2009). For those clients who may experience more prolonged symptoms during occupation, this may result in avoidance of participation in meaningful activity. Avoidance of activity can then, in turn, impact psychological health in the individual who has sustained concussion (DiFazio, Silverberg, Kirkwood, Bernier, & Iverson, 2016). DeFazio et al. (2016) propose that “withdrawal from daily validating activities has an adverse effect on the ability to cope with illness generally, and activity withdrawal is associated with psychological complications” (2016, p. 446). Additional literature that has examined the effects of rest following other illnesses has also affirmed the effects of withdrawal from meaningful activity as deleterious to overall psychological well-being (Chao, 2014; Walters & Williamson, 1999). In contrast, the importance of participation in routine activity following an injury appears to be related to psychological well-being (DiFazio et al., 2016). Thus, the importance of engagement in meaningful activity as a tool to facilitate recovery is apparent. However, clients often struggle in their ability not only to participate but to engage fully in occupations. Occupational therapists can facilitate engagement in meaningful occupations by implementing a client-centered, occupation-based approach as described above. Facilitating engagement in meaningful occupations can help avoid susceptibility to depression and anxiety associated with prolonged concussive symptoms (DiFazio et al.,

2016; Silverberg & Iverson, 2013) and can help the client feel a greater sense of occupational well-being. By addressing barriers to optimal occupational engagement in the individual who has sustained concussion, the therapist is better able to help the client return to full engagement, rather than participation alone.

There is literature to support occupational therapy practice for concussion with a focus on screening eye movements, including smooth pursuits, saccades, and visual fixation through observation as well as standardized assessments, such as the Developmental Eye Movement Test and assessing sensory processing (Finn and Waskiewicz, 2015). Visual, cognitive, and sensory impairments as highlighted by Finn and Waskiewicz (2015) may limit engagement in occupation, but further research is needed to establish the extent to which these impairments may limit engagement in occupation. Furthermore, participation in carefully graded meaningful occupation may improve visual, cognitive, and sensory processing abilities.

Guidelines for Practice

Assessment

Comprehensive occupational therapy assessment following a concussion should include a thorough client interview to ascertain the symptoms, areas of occupation affected by the symptoms, current daily routine, and routine prior to the onset of concussive injury, as well as current factors that may be associated with the onset of symptoms. This process will allow the client and therapist to recognize, or develop, a comprehensive understanding of how both internal and external factors may contribute to the onset of symptoms and to difficulty engaging in desired occupations. Assessment may include evaluation of client factors, such as visual skills, balance, coordination, and sensory processing. However, the focus of the assessment should be to develop an understanding of how these difficulties relate to the symptoms and/or engagement in meaningful occupations.

Perceived Occupational Performance Assessments

Since the value and meaning of tasks may differ for each individual (Schultz-Krohn, 2014), therapists should first strive to identify and prioritize the client's desired outcomes in specific areas of occupation. For example, one individual who has sustained a concussion may be a collegiate athlete focused on returning to school and play, whereas another individual may be a young mother who works full-time in a job requiring extensive reading and computer use. An occupational performance assessment that gathers information on a client's perceived performance and limitation can serve as a foundation for the development of a treatment plan that is client-centered and occupation-based. The Canadian Occupational Performance Measure (COPM) is a client-centered outcome measure developed to detect changes in a client's perception of occupational performance (Law et al., 2005) and is an example of an appropriate occupational performance assessment. This tool can gather information about the client's occupational profile and personal values, roles, and interests and how intervention has affected engagement in desired occupations. Another useful tool is the National Institutes of Health Activity Record (ACTRE), which provides information about how the client structures his or her time and the impact of symptoms on perceived occupational performance. This tool can aid in determining specific activities that may contribute to a worsening of concussion-related symptoms (Gerber & Furst, 1992).

Symptom Assessments

Several symptom management tools are used to gather information about symptoms and symptom severity, including the Rivermead Post Concussion Symptoms Questionnaire (RPQ) (King,

Crawford, Wenden, Moss, & Wade, 1995), which was developed specifically for tracking symptoms for those with persistent symptoms (Eyres, Carey, Gilworth, Neumann, & Tennant, 2005), and the Concussion Symptom Inventory, which is an empirically based tool developed for monitoring subjective symptoms following a concussion (Randolph et al., 2009). Such tools can be helpful in determining the severity of symptoms and allow the therapist to track the progression of symptoms following occupational therapy interventions.

Quality of Life Assessments

In the Occupational Therapy Practice Framework, quality of life is identified as a targeted outcome of occupational therapy interventions (AOTA, 2014). In the context of rehabilitation following a concussion, quality of life assessments can help gather information on an individual's perceived overall quality of life, which may be affected by symptoms of a concussion. Furthermore, quality of life assessments can be used to monitor changes following occupational therapy interventions, particularly for individuals with complicated and prolonged recovery times, and may be a useful tool for individuals who seem to demonstrate little change with more traditional physical assessments. Many quality of life assessments have been developed specifically for certain populations, such as older adults or school-age children. The Centers for Disease Control Health Related Quality of Life -14 (CDC HRQOL-12) (1993) is a 14-question measure that includes questions related to general health, healthy days/physical, health days/mental, and days when activities were limited by poor health to get a summative score of perceived healthy days. This tool can help gather additional information on the individual's perceived sense of health as related to concussion symptoms and the impact on engagement in occupations (Centers for Disease Control and Prevention, 2000). The 36-Item Short Form Survey Instrument (SF-36) is also a helpful tool for general quality of life in the following domains: physical functioning, role limitations because of physical health problems, bodily pain, general health perceptions, vitality, social functioning, role limitations because of emotional problems, and mental health (RAND Health, n.d.). Use of this tool can help guide the intervention process by identifying specific factors that may contribute to decreased overall perceived quality of life following a concussion. The specific domains included in the assessment may be particularly helpful with the client with persistent symptoms, as concussion may result in various clinical symptoms, which may include physical, cognitive, emotional, and sleep disturbances (McCrorry et al., 2017).

Occupational Performance Assessments

Although individuals who have sustained concussion may not necessarily experience an inability to participate in occupations, they may be limited in their ability to engage fully in activities due to their symptoms, which could interfere more with the quality of their performances. As a result, occupation-based assessments that measure quality rather than just one's ability to perform an activity may yield more relevant clinical findings. The Assessment of Motor and Process Skills, 7th edition (AMPS), not only measures independence but also examines the efforts, efficiency, and safety of 16 motor items and 20 process items and how well the client performs the tasks (Fisher, 2012). Although there are several other assessments that directly measure occupational performance, many of these tools are designed for individuals with more significant physical or external impairments, and thus may not necessarily be relevant for individuals who have sustained concussions.

Sleep Assessments

Sleep disturbances are common following concussion, with individuals reporting difficulty falling asleep or staying asleep (Mathias & Alvaro, 2012). Lack of sleep may contribute to the

worsening of clinical symptoms with the potential for sleep disturbance to impact engagement in occupations. Sleep assessments can be used to gather information about the quality of sleep and sleep routines to address the effects of sleep disturbances on occupational performance and participation (AOTA, 2017). If the individual has significant difficulties with sleep, the therapist may consider using a sleep assessment to gather information on sleep hygiene, as sleep disturbances may need to be addressed first before addressing other areas of occupational performance. The Pittsburgh Sleep Quality Index is a self-rated questionnaire to assess sleep quality and sleep disturbances over 1 month, with 19 individual items (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). This assessment tool may help determine the severity of the sleep disturbance so that clinicians can help to identify strategies to improve the overall quality of sleep. The Functional Outcomes of Sleep Questionnaire evaluates the effects of sleepiness on the performance of daily tasks and roles (Weaver et al., 1997) and may be helpful to determine how sleep disturbances may limit overall engagement in occupations.

In summary, there are a variety of different assessments that can be used to gather a comprehensive profile of the individual's valued roles and occupations (see Table 1). Therapists can use information obtained from occupational performance assessments to gather information about current perceived occupational performance and factors that may contribute to a worsening of symptoms. Symptom report questionnaires can be effective tools in gathering information about the level and types of symptoms, while quality of life measures can be helpful at gathering information about the impact of symptoms on overall perceived quality of life. By completing a comprehensive evaluation, occupational therapists can develop an individualized intervention plan that is occupation-based and client-centered and that focuses not only on participation but also on optimal engagement in occupations.

Table 1

Assessments (Identify and Recognize)

<i>Perceived Occupational Performance Assessments</i>	Canadian Occupational Performance Measure National Institutes of Healthy Activity Record
<i>Symptom Report</i>	Rivermead Post Concussion Symptoms Questionnaire Concussion Symptom Inventory
<i>Quality of Life Assessments</i>	Center for Disease Control Health Related Quality of Life -14 36-Item Short Form Survey Instrument
<i>Assessments of Occupations</i>	Assessment of Motor and Process Skills
<i>Sleep Assessments</i>	Fatigue Severity Scale Pittsburgh Sleep Quality Index

Intervention

Once desired areas of occupation have been identified and the factors contributing to decreased engagement have been established, the therapist can work collaboratively with the client to recognize symptoms and the subsequent impact of activity and environment on the identified symptoms. Although in the past best practices for concussion management suggested that complete rest following the initial injury was recommended, best practices now recommend a balanced return to activity. It appears that strict rest may be associated with increased post-concussive symptoms (Thomas et al., 2015), while

higher levels of cognitive exertion may also be associated with increased post-concussive symptoms (Brown et al., 2014).

Thus, for cases where symptoms are prolonged, the therapist should carefully examine the types of activities in which the individual should be engaged. Furthermore, the intervention should focus on a balanced, gradual return to activity that can be facilitated through environmental modifications, assistive technology, activity modifications, and strategies for pacing and energy conservation (see Table 2). In addition, interventions should also focus on building self-awareness of which activities exacerbate symptoms and knowing when and how to implement rest breaks or modifications to avoid the worsening of symptoms.

Table 2

Interventions (Rest, Resume, Recalibrate)

<i>Relative Rest</i>	Symptom Limited Rest and Monitor Symptoms
<i>Resume Activity</i>	Gradual Resumption of Activities Individualized plan of a return to learn, work, play, social engagement Implement accommodations and environmental modifications
<i>Reevaluate and Recalibrate</i>	Identify factors that contributed to worsening of symptoms Continued modifications as necessary Rest breaks and pacing
<i>Resume without Restrictions</i>	If symptom free, return to desired occupation without restrictions Education on re-injury prevention

Specific guidelines have been published for facilitating a gradual return to learn and return to play following a concussion (McCrorry et al., 2017) (see Tables 3 and 4). Guidelines are provided in a stepwise manner to gradually increase the amount of cognitive and physical activity that the individual can tolerate. Occupational therapists can use these guidelines to develop individualized treatment plans that fit the unique needs of each client while considering the complex interactions between person, task, and environment. Furthermore, although these guidelines are specific to a return to learning or school and a return to play, the therapist can also apply the principles of graduated return to activity to other areas of occupation, such as leisure and work.

Table 3

Return to Learn Protocol

Stage	Aim	Activity	Goal
1	Daily activities at home that do not give the child symptoms	Typical activities of the child during the day as long as they do not increase symptoms (e.g. reading, texting, screen time). Start with 5 to 15 min at a time and gradually build up	Gradual return to typical activities
2	School activities	Homework, reading, or other cognitive activities outside of the classroom	Increase tolerance of cognitive work
3	Return to school part-time	Gradual introduction of schoolwork. May need to start with a partial school day or with increased breaks during the day	Increase academic activities
4	Return to school full-time	Gradually progress school activities until a full day can be tolerated	Return to full academic activities and catch up on missed work

Note. “Consensus Statement on Concussion in Sport—the 5th International Conference on Concussion in Sport held in Berlin,” by McCrorry et al., 2017. *British Journal of Sports Medicine*, 51(11), 838.

Table 4
Return to Play Protocol

Stage	Aim	Activity	Goal
1	Symptom-free activity	Activity of daily living not causing symptoms	Returning to work and school activities as tolerated
2	Light aerobic exercise	Stationary bicycle or walking	Raise heart rate
3	Sport-specific activities	Running, swimming, etc.	Incorporating movement
4	Non-contact practice	Resistance training, sports simulation without potential for head injury	Exercise with coordination and thinking
5	Full contact practice	Simulation of sport activities, normal training activities	Build confidence, allow for assessment by athletics staff
6	Return to sport	Game play	

Note. “Consensus Statement on Concussion in Sport—the 5th International Conference on Concussion in Sport held in Berlin,” by McCrory et al., 2017. *British Journal of Sports Medicine*, 51(11), 838.

Clinical Application

The following is a case example of the application of an occupation-based approach to the management of concussion in occupational therapy practice. Specific examples of both evaluation and intervention are provided to illustrate the unique role of occupational therapy in facilitating engagement in meaningful occupations for an individual with persistent post-concussive symptoms. The case begins with a discussion of the client’s symptoms and the impact on occupational engagement and then highlights the approach used by the therapist to facilitate a gradual resumption of meaningful activities.

The patient was a 17-year-old female who sustained her third concussion while playing hockey. She lost consciousness after she was pushed up against the boards and fell to the ice. With her prior concussions, she was able to return to activity with relatively few symptoms. However, following this concussion, she presented with persistent headaches, dizziness, lightheadedness, eyestrain, and light sensitivity. She was unable to participate in schoolwork due to her symptoms. Because of her increase in reported symptoms, she was not going to school, and she received tutoring at home. She was out of school for over 1 year. She was no longer playing hockey or other team sports due to the risk of reinjury, and her social engagement was also very restricted. When she arrived at the clinic, she appeared withdrawn and depressed. She was independent with self-care and functional mobility, although she occasionally displayed a loss of balance. She tended to avoid activities that provoked her symptoms in any way and was primarily resting most days. When she would attempt to engage in activity and experienced symptoms, she would withdraw from the activity. She was not taught how to compensate, how to modify activity, or how to implement rest. She identified sports, socialization, school, and community management as her main priorities for improving occupational performance. Using the Canadian Occupational Performance Measure (COMP) (Law et al., 2005), she scored her performance as 5 out of 10 for all activities except for sports, which she scored as 1 out of 10, and she scored her satisfaction with her performance for all activities as 5 out of 10 and 1 out of 10 for sports. Her Rivermead Post-Concussion Symptoms Questionnaire (King et al., 1995) score indicated that she was experiencing dizziness, headaches, light sensitivity, and difficulty concentrating. Although her quality of life was not formally assessed at the time, the patient reported feeling frustrated and isolated with her symptoms and had difficulty engaging in routine, age-appropriate activities.

Resume Activity

The occupational therapist worked with the client using blue tint and line guide, reading shorter items initially, such as emails, letters, and short homework assignments over about 8 to 10 sessions. The therapist then worked with the client to progress gradually to larger amounts of reading, beginning with computer reading programs and progressing to school-related assignments over the course of another 6 to 8 sessions. The client became more comfortable with reading and no longer avoided the task and began to perform activities that were meaningful to her, such as reading a book or corresponding with friends via email. During the course of her treatment, she was beginning her senior year of high school and had been out of school for over 1 year. At this time, she expressed interest in going to college, which is an age and culturally appropriate occupation. Her mother expressed reluctance and was afraid she would fail. The patient, although eager to enroll in college, also expressed reservations about her symptoms and whether she would be successful. The occupational therapist, family, and neuropsychologist worked with the patient to increase tolerance for reading and school-related tasks and begin the college application process. With the goal of attending college in mind, the patient's affect began to change. She was eventually accepted into a small local college with small classes. The team worked to have accommodations put in place, including small class sizes and extended time for exams.

Reevaluate and Recalibrate

She was successful as a commuter the first year and went back for another semester and lived in the dorms. At this time, near the end of her sessions, her affect was brighter, her mood had improved, and her symptoms continued to dissipate. Her perceived quality of life was much improved, as per her report, and she rated her performance and satisfaction as 8 out of 10 with her identified areas of occupation on the COPM. She still had some restrictions in activity, required rest breaks while reading, and sometimes had difficulty in settings with more noise. She continued to work with the therapist to identify triggers and modify activities. With continued guidance to recalibrate based on her symptoms, she was able to increase her engagement in school-related activities gradually.

Conclusion and Future Steps

Concussion is a complex diagnosis with varying clinical presentations that can impact an individual's ability to engage in occupations on multiple levels. Identifying barriers to occupational engagement and developing interventions to optimize engagement is a holistic process that requires a comprehensive understanding of the complex interplay between person, task, and environment. By implementing comprehensive assessments, occupational therapists can identify strategies to work collaboratively with clients to maximize engagement in occupations and optimize perceived quality of life.

Further research is needed to develop best practice guidelines for occupational therapy and concussion, including for assessments and interventions. Current trends in the management of concussion recommend a graduated return to activity rather than prolonged rest (McCrory et al., 2017). A graduated approach to return to activity hinges on the foundation that symptoms can be exacerbated if the individual engages in stimulating activity without allowing adequate rest. However, it can often be challenging for individuals to determine what precipitates symptoms and how to optimize participation in occupations. Occupational therapy can help facilitate the process of reengaging in activity while also considering how the individual, the activity, and the environment interact. The client and the therapist can work together to maximize participation in meaningful occupations through symptom recognition, the implementation of strategies to adapt activities, and by monitoring internal responses to activities.

The importance of a client-centered and occupation-based approach is apparent in the management of concussion, and as a result, occupational therapists have the potential to offer a unique contribution to concussion rehabilitation.

As professionals, occupational therapists should continually strive to provide client-centered and occupation-based treatment, as is consistent with the philosophy and foundation of the profession. A client-centered, occupation-based approach to management of concussion is particularly important because of the unique challenges of each client. However, it can be difficult to apply this approach to clients without practical guidelines. As the field of concussion management continues to evolve, it should be recognized that occupational therapists have the potential to provide a unique contribution to the multidisciplinary team involved in concussion care. This proposed clinical framework is a foundation for the treatment and management of concussion and may be a helpful tool for currently practicing occupational therapists.

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