Perceptions and Experiences of Two Survivors of Stroke Who Participated in Constraint-Induced Movement Therapy Home Programs

Amanda J. Gillot, Anna Holder-Walls, Jennifer R. Kurtz, Nolina C. Varley

The purpose of this study was to explore and describe the perceptions and experiences of two survivors of stroke who participated in constraint-induced movement therapy (CIMT) home programs. Data sources were analyzed with a phenomenological approach, and common themes were identified. Themes were translated using the Occupational Adaptation frame of reference as a template.

Three themes were generated from the data: (a) motivational factors and expectations represented personal desires to increase functional ability and environmental demands that created a press to participate in CIMT; (b) neurorehabilitation as an ongoing process suggested that rehabilitation should continue as long as functional deficits exist; and (c) perceived changes in function represented perceived changes in efficiency, effectiveness, and satisfaction after CIMT. CIMT was found to help the participants in this study become more satisfied with performance and to increase efficiency and effectiveness of function in daily activities.


Cerebrovascular accident (CVA) is the leading cause of disability in the United States” (Kunkel et al., 1999). Of the persons who sustain CVAs, more than half experience an impairment of motor function, most commonly hemiparesis (Leibovitch, 2000; Taub, Uswatte, & Pidikiti, 1999). Furthermore, researchers have found that 5 years after the onset of CVA, approximately 56% of patients continue to complain of pronounced hemiparesis (Duncan, Goldstein, Matchar, Divine, & Feussner, 1992). Recent studies support the idea that cortical map reorganization, a form of brain plasticity, plays a major role in regaining functional use of the upper extremity most affected by hemiparesis after stroke (Cao, D’Olhaberriague, Vikingstad, Levine, & Welch, 1998; Cramer et al., 1997; Cramer, Moore, Finklestein, & Rosen, 2000; Johansson, 2000; Liepert, Bauder, Miltner, Taub, & Weiller, 2000; Liepert et al., 1998; Robertson & Murre, 1999; Traversa, Cicinelli, Bassi, Rossini, & Bernardi, 1997). Occupational and rehabilitative demands requiring functional use of the affected upper extremity have been found to increase the reorganization of cortical motor areas in patients who participate in rehabilitation programs (Cicinelli, Traversa, & Rossini, 1997). Thus, cortical map reorganization may be a fundamental component of the rehabilitative process.

Constraint-induced movement, or forced use, of the upper extremity affected by hemiparesis has been credited with hastening the cortical map reorganization process in nonhuman primates (Taub et al., 1994) and in humans (Kunkel et al., 1999). In other methods of stroke treatment, patients learn to use the unaffected extremity for activities of daily living (ADL). Such treatment approaches may foster “learned nonuse” of the affected extremity. Learned nonuse is proposed to be a
phenomenon in which the individual effectively “forgets” to use the affected extremity because of the extreme difficulty of movement experienced immediately after the onset of CVA (Kunkel et al., 1999; Ostendorf & Wolf, 1981; Wolf, Lecraw, Barton, & Jann, 1989). Constraint-induced movement therapy (CIMT) is thought to offset learned nonuse, as it was developed to improve purposeful movement of the affected extremity by restricting use of the unaffected upper extremity after CVA (Ostendorf & Wolf, 1981). In fact, the main therapeutic factor in CIMT is the intensive use of the paretic limb (Taub et al., 1999).

Studies have shown significant results in favor of the effectiveness of CIMT compared with traditional therapy approaches (Van der Lee et al., 1999). Functional carryover of CIMT has been demonstrated from the clinic to the patient’s natural environment. Patients have shown significant increases in the daily use of their impaired limbs and an increase in the speed at which they carry out activities after participating in CIMT. Patients have reported increased satisfaction levels secondary to increased ability to use their affected extremity (Ostendorf & Wolf, 1981; Wolf et al., 1989). Furthermore, they have a greater rate of retaining recovered function, with evidence of sustained improvement as long as 2 years poststroke (Taub et al., 1999). However, research is lacking that addresses the experience of participating in a CIMT program.

We, the researchers, believe that understanding the experiences and perceptions of patients as they undergo treatment is an integral component of practicing effective occupational therapy. Such an understanding can arm the therapist with increased insight into the patient’s needs, which in turn can help the therapist to meet those needs. The purpose of this study, therefore, was to explore the perceptions and describe the experiences of survivors of stroke who participated in CIMT home programs.

Before the data collection, we chose the Occupational Adaptation frame of reference as a theoretical framework for exploring two participants’ experiences with CIMT because the nature of the treatment requires participants to adapt continually to the demands of everyday life. According to the Occupational Adaptation frame of reference, occupation is conceptualized as an avenue by which adaptation evolves internally (Schkade & Schultz, 1998). Adaptation is defined as a change the person makes in his or her response approach when he or she encounters an occupational challenge. This change occurs when a person’s existing adaptive response is inadequate for producing mastery over the challenge (Schkade & Schultz, 1997). The Occupational Adaptation frame of reference focuses on the adaptation process when a person is meeting new challenges. The interaction of the person (sensorimotor, cognitive, and psychosocial systems) with the occupational environment (work, play and leisure, and self-maintenance function) is inherent in occupational challenges and yields adaptation (Schultz, 1996).

Method

Design

This study involved a multimethod approach to data collection and analysis. A primarily phenomenological design that included in-depth case studies was used to investigate qualitative themes that arose from the experiences of two survivors of stroke who participated in CIMT. The phenomenological qualitative research tradition was chosen because of our interest in the meaning of the participants’ experience of CIMT. A portion of the study included a within-subject design to provide additional descriptors to the qualitative data. We used this aspect of the design to obtain quantitative information regarding the participants’ functional performance before and after a 2-week experience with the independent variable of CIMT. These data enriched our understanding of the experience of participating in a CIMT program.

Participants

The participants were drawn from a convenience sample of persons identified through community referrals. The researchers complied with Institutional Review Board guidelines regarding informed consent. Inclusion criteria required that all participants (a) have sustained a stroke resulting in hemiparesis and (b) agreed to participate in a 2-week, independent CIMT program between December 1, 2000, and February 1, 2001. Exclusion criteria were (a) the presence of uncontrolled severe medical conditions or severe shoulder injuries and (b) the existence of expressive or receptive aphasia. Two participants were included in this study. For the purpose of this article, the participants will be referred to as Janice and Chris, and each participant’s history will be discussed separately.

Janice was a 42-year-old woman who was married and lived with her husband. She spent 25 years working as a waitress. At the time of the study, she attended a community college where she studied computer information systems. She enjoyed going to movies, surfing the Internet, and socializing with friends and family.

Janice sustained a CVA on August 15, 1997, secondary to hypertension. Hospital records confirmed left ventricular hypertrophy and a 16-cm hemorrhage centered in the left putamen. According to her medical records, the CVA resulted in hemiparesis of her right side, dysarthria, dysphasia, right central seventh facial paresis, right hypoglossal...
nerve paresis, and impaired ambulation and self-care. Subsequently, Janice spent 3 weeks in the hospital.

When Janice began inpatient rehabilitation, she exhibited trace movement in the right upper extremity for shoulder flexion only. She also exhibited a flexor and extensor synergy in the right lower extremity. She received occupational therapy, physical therapy, speech therapy, and cognitive therapy while in the hospital and at two facilities after discharge. She spent approximately 8 weeks in outpatient therapy. Janice described her previous occupational therapy “as being a lot of hand work, working with the hands, peg boards, and hand–eye coordination.” She also described being taught adaptive strategies for self-care during this therapy.

Janice became aware of CIMT after a presentation on the topic in her stroke survivors group. She began to research CIMT through the Internet, and found articles that she believed promised that CIMT could produce “remarkable results.” Janice became interested in attending a CIMT program at a major medical center; however, she had to forgo this desire because she could not afford the fees involved, and her insurance would not cover the cost of the program. Because of the inconveniences, Janice decided to continue researching the therapy and to develop her own program.

Janice began her first trial with CIMT during July 2000 and her second trial during September 2000. We became involved with Janice just before her second trial. As she began her third trial of CIMT during December 2000, we interviewed Janice and measured her function with occupational therapy assessments. The third trial of CIMT is described in this study.

Janice designed and guided all trials of her own program; no assistance was provided from therapists. Janice discussed her plans to participate in her own CIMT program with her physician. She chose to participate in the program for 6 hr per day for 2 weeks. A nursing home near her residence agreed to let Janice sit in the employee breakroom during the day so that she could participate in her therapy. This arrangement reduced distractions that Janice experienced in previous trials at home.

During the trial described in this study, Janice would apply a sling to her unaffected (left) arm after waking and finishing her bathroom tasks. The sling facilitated functional use of her affected upper extremity by restricting use of her unaffected extremity during her daily activities. Janice arrived at the nursing home around 8:30 a.m. to begin the fine motor tasks associated with her program. She purchased games at thrift stores that addressed fine motor skills, including lighted peg boards, puzzles, eye–hand coordination challenges, and stacking blocks. Janice also participated in such activities as dealing cards, sorting beans and buttons, picking up toothpicks and straight pins, writing (Christmas cards), and sorting coins and identifying them through stereognosis. When she returned home, she would work on her computer using the mouse with her right (hemiparetic) hand. Janice wore her sling for the duration of the daily routines and activities described here, usually 8 hr per day.

Janice noted functional improvements after each trial with CIMT. These functional improvements motivated her to participate in the third trial. The complete results of Janice’s third CIMT trial are listed and explained in the Results section.

Chris was a 65-year-old retired man who was married and lived with his wife. At the time of the study, Chris spent his days volunteering at a child-care center in the morning and participating in activities with his church or friends and family in the afternoons. He also enjoyed going to movies, reading, and socializing with friends and family. Chris had a supportive family, which he believed was instrumental in his recovery.

Chris sustained a CVA on May 17, 2000, secondary to a 99% blockage of his left carotid artery, resulting in hemiparesis of his right side. Initially, he spent 5 days in the hospital before being discharged and transferred to an outpatient facility. On arrival at the outpatient facility, Chris was able to perform gross motor movements with resistance but unable to perform fine motor movements secondary to distal hypotonicity in his right upper extremity. Chris was unable to grasp or pinch with his right hand and required some assistance for ADL, including use of eating utensils and home management. Chris attended outpatient therapy 5 days per week for 4 weeks for a total of 20 visits. His goal was independence with all ADL and increased fine motor coordination and dexterity of his right hand.

The outpatient therapy Chris received consisted of exercises, strength and endurance training, handwriting, fine motor games and activities, dressing skills, and home management skills. By the time Chris left the outpatient facility, he was independent with all dressing and home management skills. He had functional dexterity in his right hand and fingers and was able to write his name legibly.

After formal therapy at the outpatient facility, Chris tried other therapeutic activities at home. Although he had never participated in any form of formal CIMT, Chris noted that he often performed similar therapy by forcing himself to use his right hand to complete functional activities and occupations. Chris had not seen any significant improvements since he left the outpatient facility. When the opportunity surfaced for this study, he decided to participate to see whether improvements could still occur.
Chris’s CIMT program was guided by a local licensed occupational therapist. Chris and the therapist set up meetings to discuss the parameters of the program. Chris participated in the program for 3 hr per day for 2 weeks. He incorporated the activities of his program into his daily routines both at home and while volunteering. The therapist had contact with Chris at the beginning, middle, and end of the program. The therapist provided Chris with activity ideas but predominantly left the activity choices up to him. Chris performed a variety of activities to increase his fine motor coordination and dexterity in his right hand, wearing a glove on his left hand occasionally to remind him to use his affected hand. The activities he performed included typing, shuffling cards, dealing cards, playing solitaire, sorting screws and bolts, screwing screws into wood, writing, sharpening pencils manually, and spraying a spray bottle. Chris often performed some of the finger exercises (curling fingers around pencil, knuckle push-ups, twirling a pencil between fingers) while sitting in meetings and volunteering at the child-care center.

Data Collection

Sources of data were obtained during five meetings between researchers and the individual participants. During the first meeting with each participant, the researchers explained the study and answered questions pertaining to the study. In the second meeting, the researchers gathered demographic information through assessments and quantitative data through assessments and interviews. In the next section, and we conducted an audiotaped, semistructured interview. We used an interview guide that contained broad questions, for example: “What are your expectations of constraint-induced movement therapy?” “What is motivating you to take part in constraint-induced movement therapy?” The third meeting took place within the participant’s natural environment to observe the participant’s performance and perceptions during the time that he or she engaged in CIMT. The fourth meeting took place immediately after participation in a 2-week CIMT trial. During this meeting, postintervention measurements were taken through assessments (described in the next section), and we conducted an audiotaped, semistructured interview. We used an interview guide that contained broad questions, for example: “Describe the program you participated in by describing a typical day during constraint-induced movement therapy treatment.” “How did you feel while participating in this therapy program?” “How was this therapy different from previous therapies you undertook?” The fifth meeting took place approximately 2 weeks after completion of the CIMT treatment. At this time, the Canadian Occupational Performance Measure (COPM) was readministered. Approximately 2 weeks was allowed to lapse after completion of treatment to afford the participant time to note changes that might have occurred in perceived performance and satisfaction with occupations. All meetings were attended by at least two researchers, and all four researchers attended most meetings.

The assessments used to obtain quantitative data included the Minnesota Rate of Manipulation Test (MRMT), the Arm Motor Ability Test (AMAT), and the COPM. The MRMT was intended to measure change in dexterity and endurance. The researchers used only the Turning and Placing subtest to decrease the possible effects of fatigue on the participants. Test–retest reliability is high for the MRMT. In a two-trial test, the test–retest reliability (r) ranged from .87 to .95 (American Guidance Service, 1969).

The AMAT was used to quantify upper-extremity function in ADL. Each activity in the AMAT involved one to three task components rated according to quality of movement, ability to perform each component part in a compound task, and time required to complete the activity (Taub, Crago, & McCulloch, n.d.). The AMAT has demonstrated high reliability, including intrarater reliability, with Kappa ranging from .68 to .77 and Spearman rank order correlations ranging from .97 to .99. Intercoder reliability was .99, and Cronbach’s alpha and split-half reliability were .93 to .99. The test–retest reliability was established at .93 to .99. The test also has satisfactory concurrent validity. Correlations of the AMAT scores to the Motricity-Index-Arm Score were .45 to .61 (Kopp et al., 1997).

Finally, the COPM is an interview instrument that measures a person's perception of his or her own occupational performance and satisfaction with that performance over time. Test–retest reliability of the COPM for performance and satisfaction scores have been rated as high as .80 and .89, respectively (Bosch, 1995). Content, criterion, and construct validity of the measure have been established according to the test manual (Law et al., 1998).

Data Analysis

The data collected from field notes and transcripts of audi-taped interviews were analyzed through open coding, axial coding, and selective coding. Each researcher open coded all the interviews individually. According to Creswell (1998), during open coding the “researcher forms initial categories of information about the phenomenon being studied” (p. 57). Embedded in each category, we discovered subcategories. Within the subcategories we expected to find data that exemplified participant experiences and perceptions of participation in CIMT. Axial coding and selective coding involved all four researchers meeting to regroup the data and identify themes that emerged. Emergent themes were identified and described, and differences and commonal-
ties among the themes were explored. Themes were then translated into the language of the Occupational Adaptation frame of reference.

The assessments were administered during the second and fourth meetings under the direct supervision of a registered, licensed occupational therapist. The data gathered from the quantitative assessments were analyzed and expressed as percent change between preparticipation and postparticipation scores. These assessments were not intended to measure the outcome of a CIMT program. Instead, the data collected from the assessments were used as descriptors to further explore the participant’s experiences and perspectives with a CIMT program.

Rigor was achieved through various methods, including triangulation of data. Transcripts of interviews, and our interpretations of them, were presented to participants for member checking. Each researcher coded transcripts of the interviews and identified general themes independently before axial coding, which was performed by the four researchers as a group.

Results
Themes were identified after the data (field notes collected during interviews and observations, qualitative interview responses collected from the two participants) had been coded to a point of saturation. The original themes were (a) motivational factors and expectations, (b) neurorehabilitation as an ongoing process of rehabilitation, and (c) perceived changes in function. The COPM, MRMT, and AMAT results were analyzed and expressed as percent change between preparticipation and postparticipation scores. Each participant’s data will be discussed within each theme.

Theme 1: Motivational Factors and Expectations
Janice was dissatisfied with the length of her formal rehabilitation and believed that medical professionals treat diagnoses rather than individuals. Janice even referred to her experience with formal rehabilitation as “McDonald’s Rehab,” inferring depersonalization and haste. “People don’t care…caseloads are too big…three patients in 45 minutes!” She stated, “I haven’t seen one-on-one attention [in therapy] since I had my stroke.” She also stated, “I can’t help but feel it is about money instead of people. You almost feel bad for taking up their time.” The combination of Janice’s experience in rehabilitation and perceived negative statements regarding her prognosis from professionals motivated Janice to pursue home-based CIMT independently. She stated, “I want people to say, ‘Wow!’ I want the recovery to be substantial; I want to see big changes.” One of the big changes Janice anticipated with CIMT was a decrease in the length of time it took her to complete daily tasks involved in the roles of wife, student, and future professional. According to Janice, “Everything takes me twice as long; my whole world is slow.”

Before participating in the program, Chris felt a desire to increase his accuracy with his affected hand to be more efficient in some ADL that were difficult for him, including writing, handling money, and sorting papers. Chris and his wife are active in their community, and Chris seemed to find it important that he be able to maintain his busy schedule. During involvement in the program, Chris’s motivation to carry out his CIMT appeared to increase as he made functional gains. “I’m getting more out of [the program] than I thought I would.” Finally, Chris spoke to his thoughts about his personal desire to master the occupation of CIMT: “I’ve always been competitive, and being competitive, you want to get better….It’s not what happens to you, it’s how you handle it in your mind.”

Theme 2: Neurorehabilitation as an Ongoing Process
Through her experience with CIMT, Janice found it necessary to alter her expectations of the program. “I think I’m disappointed in the fact that I read all of the articles that said people have remarkable results.” Although Janice did not believe that she had “remarkable results,” she was pleased with the results she achieved because she was recognizing functional improvements in her daily occupations. She noted that she used her right hand (hemiparetic side) without consciously thinking about it in her daily routines. “I definitely do more things with the right hand, and it’s just automatically grabbing glasses, a dish rag, a broom with the right hand….I’m going to keep [CIMT] up; I think it’s going to be evolving instead of ending.”

Simply finding time to complete the minimum of 3 hr of CIMT was a challenge for Chris. He adapted his routine by finding time to do some of the exercises that were part of his program during meetings and while watching television. Chris stated, “I don’t think I will ever go in a meeting that I won’t be doing this [hand exercises].”

Participation in the CIMT program helped Chris to revise his ideas about therapy. Chris had been generally satisfied with his functional gains after rehabilitation based on his health care providers’ expectations. “I had 8 weeks of therapy, and then I basically quit doing therapy because I could do everything that I had to do….They give you diplomas. I thought that was it.” However, when given the option to continue therapy, he eagerly assumed the challenge. After his participation in CIMT, he stated:

I think they should have had a continuing program….I mean, heck, you go to the doctor and get blood work, and

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6 months later you get blood work again. You find out where you are….One of the things [rehabilitation professionals] could do is follow up.

**Theme 3: Perceived Changes in Function**

Janice noted improvements in her daily routine in activities that require fine motor coordination of her right (hemiparetic) hand. She stated, “Now I can open a can of tuna fish in 3 seconds.” Other improvements in her daily routine involve school-related activities. For example, Janice is now able to take notes and fill out forms legibly and in a timely manner. She added, “I work on the computer with the right hand, and I never did that before.” Janice discussed her satisfaction regarding others’ perceptions of her increases in function: “Positive feedback from another source other than yourself is very helpful.” Her functional gains have led to a more active lifestyle after this CIMT program: “I’m definitely moving around more because of the therapy. I’m doing more task-oriented home life instead of sitting, potato-couching home life.” Janice also had a very positive view of her program. She stated, “I think the home program[s] I did [were] great for me. I’m really, really happy.”

Janice’s satisfaction with specific occupations was found to increase, as demonstrated by her scores on the COPM (see Table 1). Findings from the MRMT illustrated an increase in Janice’s efficiency after participation in her program (see Figure 1). The AMAT was used in this study to quantify change in effectiveness in performing functional activities. Janice’s performance on the AMAT included a mean decrease of 24.6% in the time it took to complete the tasks after her participation in CIMT. She exhibited a mean increase of 12.4% in scores rating functional ability and a mean increase of 6.4% in quality of movement (see Table 2).

Chris also noted improvements in the activities and occupations that required fine motor coordination of his right (hemiparetic) hand:

Well, I can do a lot more things a lot better than I could do them before. Just many things, such as toileting, and pick-

**Table 1. COPM Scores Before and After Constraint-Induced Movement Therapy Participation: Janice**

<table>
<thead>
<tr>
<th>Occupational Performance</th>
<th>Performance Rating Before</th>
<th>Performance Rating After</th>
<th>Satisfaction Rating Before</th>
<th>Satisfaction Rating After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taking notes in class</td>
<td>7</td>
<td>10</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Using mouse with computer</td>
<td>5</td>
<td>9</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Using punch wire tools</td>
<td>1</td>
<td>10</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Cleaning; standing up on stools to get cobwebs</td>
<td>4</td>
<td>10</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Getting to seat at the movies</td>
<td>4</td>
<td>9</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

*Note.* COPM = Canadian Occupational Performance Measure. Numbers represent Likert scale of 1 to 10, with 1 = low performance and satisfaction and 10 = extremely high performance and satisfaction as reported by the participant in relation to the activity listed.

**Table 2. AMAT Scores Before and After Constraint-Induced Movement Therapy Participation: Janice**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Preparticipation</th>
<th>Postparticipation</th>
<th>% Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean function rating</td>
<td>3.62</td>
<td>4.14</td>
<td>12</td>
</tr>
<tr>
<td>Mean quality rating</td>
<td>3.60</td>
<td>3.82</td>
<td>6</td>
</tr>
<tr>
<td>Time to complete tasks (sec)</td>
<td>191.35</td>
<td>144.31</td>
<td>25</td>
</tr>
</tbody>
</table>

*Note.* AMAT = Arm Motor Ability Test. Numbers corresponding to function and quality represent the average of the scores given independently by the researchers on the tasks assessed. Scores spanned a scale of 0 to 5, with the following definitions: for functional ability, 0 = no use of paretic limb, 1 = very slight use, 2 = slight use, 3 = moderate use, 4 = almost normal use, 5 = normal use; for quality of movement, 0 = no use of paretic limb, 1 = very poor quality of movement of paretic limb, 2 = poor, 3 = fair, 4 = almost normal, 5 = normal. Units of time represent the total time required to complete the tasks assessed.

Interestingly, Chris’s satisfaction with his performance decreased on three of the five occupations listed on the COPM (see Table 3). We believe that Chris’s decrease in satisfaction with his performance may reflect an increased expectation of his own functional ability. Before participation in CIMT, Chris reported that he did not realize that further functional gains could be made after formal rehabilitation. After participation in CIMT, Chris reported that he believed that further gains could be made. He reported decreased satisfaction with his performance, and increased motivation to work toward improvements in functional use of his affected upper extremity. Figure 2 illustrates Chris’s performance on the MRMT before and after CIMT treatment.

Chris’s performance on the AMAT included a mean decrease of 7.5% in the time it took to complete the tasks after his participation in CIMT. He exhibited a mean increase of 8.8% in scores rating functional ability to com-
complete the tasks and a mean increase of 5.6% in scores rating his quality of movement when performing the tasks (see Table 4).

Discussion

Survivors of a stroke who participate in CIMT programs experience continual adaptation due to the occupational challenges the therapy introduces. We found that the Occupational Adaptation construct provided a useful framework for analyzing the adaptive processes illustrated in the stories discussed within the study because the frame of reference focuses on adaptation to occupational demands. The in-depth descriptions of the participants' experiences with CIMT generated data that we believe further the understanding of the perceptions that survivors of stroke have of the time following formal rehabilitation.

Analysis uncovered three thematic categories: (a) motivational factors and expectations, (b) neurorehabilitation as an ongoing process of adaptation, and (c) perceived changes in function. Further, the original themes reflect Occupational Adaptation language, forming a direct link between these categories and theoretical constructs of the frame of reference, which matched respectively: (a) press for mastery, (b) adaptation as an ongoing process, and (c) relative mastery.

When challenges arise, a person's abilities and desires interact with the demands of the environment. This interaction results in a press for mastery (Schkade & Schultz, 1992). Demonstrated in the first theme, the participants expressed personal desires and described environmental demands that influenced their press for function after stroke. According to Janice and Chris, the environment also produced a press that influenced their desire for mastery of their occupational roles.

In the second theme, adaptive response modes were found to shift continuously as new challenges were met and existing demands were successfully adapted to. Adaptation, as defined in the Occupational Adaptation frame of reference, is a process and a product. To achieve adaptation as a product, one experiences press for mastery, creates an adaptive response, evaluates that response, and incorporates that response into his or her daily routine. The new routines Janice and Chris adopted after participation in CIMT represent adaptation as a product. When these new routines do not meet the demand and desire for mastery, Janice and Chris will have to change their adaptive responses, thereby reinstating adaptation as a process, to create adaptation as a new product. Both participants expressed an intention to continue to make the adaptations necessary to keep CIMT in their everyday routines.

The third theme, relative mastery, encompasses the successful completion of efficient and effective adaptation that includes the person's satisfaction in relation to society's expectations (Schkade & Schultz, 1992). Both participants perceived and exhibited an increase in efficiency and effectiveness in daily activities. Both were satisfied enough with increases in functional gains to continue pursuing CIMT. Janice, who exhibited greater gains in quantitative scores on the assessments, including scores of satisfaction, verbally reported less overall satisfaction with results than Chris. We believe that this discrepancy related to Janice's belief that CIMT would result in marked results, whereas Chris, who was less familiar with CIMT, had few, if any, expectations. We believe that Chris's decreased scores in satisfaction

Table 3. COPM Scores Before and After Constraint-Induced Movement Therapy Participation: Chris

<table>
<thead>
<tr>
<th>Occupational Performance Problem</th>
<th>Performance Rating</th>
<th>Satisfaction Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before</td>
<td>After</td>
</tr>
<tr>
<td>Handwriting</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Retrieving items from right pants pocket</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Physically handling money</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Sorting, shuffling papers</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Handling toothpaste cap</td>
<td>7</td>
<td>9</td>
</tr>
</tbody>
</table>

Note. COPM = Canadian Occupational Performance Measure. Numbers represent Likert scale of 1 to 10, with 1 = low performance and satisfaction and 10 = extremely high performance and satisfaction as reported by the participant in relation to the activity listed.

Table 4. AMAT Scores Before and After Constraint-Induced Movement Therapy Participation: Chris

<table>
<thead>
<tr>
<th>Measure</th>
<th>Preparticipation</th>
<th>Postparticipation</th>
<th>% Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean function rating</td>
<td>4.37</td>
<td>4.77</td>
<td>9</td>
</tr>
<tr>
<td>Mean quality rating</td>
<td>4.25</td>
<td>4.50</td>
<td>6</td>
</tr>
<tr>
<td>Time to complete tasks (sec)</td>
<td>151.67</td>
<td>140.59</td>
<td>7</td>
</tr>
</tbody>
</table>

Note. AMAT = Arm Motor Ability Test. Numbers corresponding to function and quality represent the average of the scores given independently by the researchers on the tasks assessed. Scores spanned a scale of 0 to 5, with the following definitions: for functional ability, 0 = no use of paretic limb, 1 = very slight use, 2 = slight use, 3 = moderate use, 4 = almost normal use, 5 = normal use; for quality of movement, 0 = no use of paretic limb, 1 = very poor quality of movement of paretic limb, 2 = poor, 3 = fair, 4 = almost normal, 5 = normal. Units of time represent the total time required to complete the tasks assessed.

Figure 2. Minnesota Rate of Manipulation Test: Chris's one-hand turning and placing of 28 discs. Note. 1 = average left upper-extremity time; 2 = right upper-extremity time; 3 = right upper-extremity time after participation.
reflect his realization that improvements in the functioning of his hemiparetic limb were possible after formal rehabilitation. Chris's decreased satisfaction with his performance was accompanied by reports of an increased motivation to continue to work toward improved functioning of his affected upper extremity.

**Strengths and Limitations**

We believe that the use of both qualitative and quantitative methods is a strength of this study because they provide a means of triangulating data. Examining the data of only two participants limited the breadth of our insights into the CIMT experience. However, this factor also allowed us to attain in-depth data on each participant and explore the data thoroughly. The participants exhibited variability in the time from onset of stroke; type of stroke; extent of severity; previous experience with CIMT; and demographic factors, such as age and gender. However, these differences were not considered a weakness because the study was intended to be descriptive, not comparative.

The participants were aware of the purpose of the quantitative measurements, which may have influenced their performance on the pre- and post-CIMT assessments if they subconsciously skewed the results. We acknowledged this possibility and used the quantitative data only as a descriptor of the experience. Other limitations of this study involve the AMAT. This test offered limited fine motor test descriptors of the experience. Other limitations of this study include the possibility and used the quantitative data only as a descriptor of the experience. Other limitations of this study involve the AMAT. This test offered limited fine motor test descriptors of the experience. Other limitations of this study involved a perception of receiving negative feedback from health care professionals regarding their prognosis. More in-depth studies need to be completed to determine the causes of the negative feedback of which the participants spoke.

In a study that did not involve CIMT, Andres et al. (1999) found that during early learning phases involving bimanual tasks, interhemispheric communication is most important. Janice noted the value of mirroring the movements of her affected hand after the movements of her unaffected hand. In this way, Janice attempted to approximate the quality of movement of the affected hand with that exhibited by the unaffected hand. In addition, Chris discussed the fact that many of the activities that facilitated his functional gains required the use of both hands. Implications of these findings include a need for research addressing the effectiveness of using bilateral therapeutic activities in conjunction with CIMT compared with the effectiveness of CIMT alone.

**Conclusion**

We, the authors, pose the following questions for further research: (a) What are the functional performance outcomes of CIMT home programs that incorporate the individual's ADL compared with the functional performance outcomes of therapeutic home programs that focus on rote exercises? (b) What is the incidence of perceptions of negative feedback from professionals regarding prognoses among survivors of stroke, and do these perceptions affect the patients' long-term functional outcomes? (c) Are there benefits to be gained from CIMT home programs as long-term therapeutic interventions after completion of formal rehabilitation?

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