TELEMEDICINE AND e-HEALTH
Volume 13, Number 3, 2007

DOI: 10.1089/tmj.2006.0041

Original Research

The Receptiveness Toward Remotely Supported Myofeedback Treatment

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ABSTRACT

Remotely supported myofeedback treatment (RSMT) is considered to be a potentially valuable alternative to the conventional myofeedback treatment, as it might increase efficiency of care. This study was aimed at examining the receptiveness of potential end users (patients and professionals) with respect to RSMT. By doing so, protocols of RSMT can be developed which fit to the needs of end users and enhance treatment adherence. For both end-user groups, questionnaires were developed focusing on two components of the attitude–social support–self-efficacy (ASE) model. Fifteen patients with neck–shoulder complaints previously treated with conventional myofeedback and 17 professionals participated in the study. Results showed positive attitudes toward RSMT in 53% of the patients, and 67% of them were willing to participate in RSMT. Of the 17 professionals included in the present study 43% reported a positive attitude. In addition, 40% of the patients and 100% of the professionals believed their self-efficacy level to be sufficient for RSMT. In addition to e-consultations, 40% percent of the patients suggested that the optimal frequency of structural *in vivo* contact with their therapist would be once per 2 weeks, which is less frequent compared to the weekly *in vivo* contacts in the conventional myofeedback treatment. Professionals emphasized the importance of nonverbal communication and physical interaction (as in *in vivo* contact) in remote treatment concepts.

INTRODUCTION

As NECK–SHOULDER COMPLAINTS are related to high costs for health care and society costs, there is an urgent need for well-developed and efficient treatment programs to address these complaints.

A relatively new treatment is the myofeedback treatment based on the Cinderella hypothesis of Hägg (1991).[1] This hypothesis states that insufficient relaxation of the neck–shoulder muscles contributes to the chronification of neck–shoulder pain. As the muscle contraction levels are quite low, subjects are not very aware of a lack of relaxation. The ambulatory training based on this principle consists of continuous measurement of surface electromyograpgy (sEMG) of the trapezius muscle, and providing feedback when insufficient muscle relaxation occurs in a certain time frame. A harness is

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equipped with dry sEMG electrodes connected to a storage and processing unit as illustrated in Figure 1. Within this unit, raw sEMG data are processed into percentage of relaxation time and the unit provides auditory and vibratory feedback when relaxation time is not sufficient.[2]

Effect studies in work-related musculoskeletal disorders (WMSD) and whiplash (WAD) patients showed clinically relevant decreases in pain intensity and disability in the neck and shoulder regions after 4 weeks of myofeedback treatment.[2,3]

In the conventional protocol for myofeedback treatment, subjects wear the system for 4 weeks during daily activities, and they continuously receive feedback from the system when their muscle relaxation is insufficient. This system permits patients to receive intense treatment in their own environment. These are considered major advantages compared to the intramural therapy. Each week when the subject is visited by the therapist, the system is connected with the computer to download the sEMG data. This data is then discussed, guided by an activity diary which the subject fills out manually every day the system is worn. This is experienced as a disadvantage of the conventional myofeedback system. The visits are relatively short—about 30 minutes. However, travel time from the patient's home to the clinic is time-consuming. This time consumption is costly, and limits the geographical area in which patients can be treated. Moreover, the professionals have no time to prepare the data interpretation of the sEMG in combination with the activity diary, which could affect the effectiveness of treatment. Therefore, the myofeedback system was recently designed to automatically download the sEMG data on a secured sever, which is remotely accessible for the myofeedback therapist (Fig. 2).

FIG. 1. The myofeedback harness with dry sEMG electrodes.

This creates the possibility to replace the weekly visits between professionals and patients by an e-consult, called remotely supported myofeedback training (RSMT). It is likely that this will increase the efficiency of care. It is hypothesized that remote monitoring is technically possible, but the main question is whether or not patients and professionals are receptive to it.

In the literature, different models exist that postulate determinants of an individual's receptiveness toward new treatments. One of these models is the social–psychological oriented attitude–social support–self-efficacy model (ASE)[4] that originated from Fishbein and Azjen's (1975)[5] theory of reasoned action and Bandura's (1986)[6] social cognitive theory. According to this theory, the best predictor of human behavior is the intention to do so. Likewise, in the ASE model "intention to treatment receptiveness" is considered to be a mediator of "actual treatment receptiveness." The intention for future treatment adherence is seen as being directly affected by three main determinants: attitude, social support, and self-efficacy. Subjects with a positive attitude toward the new treatment, high levels of self-efficacy of succeeding in the new treatment, and high social support are likely to adhere to the new treatment.

Insight in the determinants of the ASE model would provide valuable information on how people can be stimulated to perform desired behavior, for instance, with regard to RSMT. As stated by Berg, involvement of the end-users in the early stages of developing treatment it is recommend, as their interesting and useful views are believed to be important for successful implementation.[7]

Within this framework, the objective of the current study was to explore the attitude and self-efficacy of both patients as well as professionals with regard to the remote myofeedback treatment. Social support is kept outside the scope of the present study, as it was hypothesized that it would be hard for subjects to estimate the perceived support from significant others on a treatment that has not fully been developed yet. Moreover, according to the Diffusion of Innovations Theory, positive, social support will be experienced when the innovative treatment is described by the patient to be positive and effective.[8]

MATERIALS AND METHODS

Subjects

Patient population. Twenty-two subjects with musculoskeletal disorders in the neck–shoulder region of varying origin (WMSD, $n = 18$ and WAD, $n = 4$) were approached for participation in this study. Subjects were recruited from an existing database of patients who recently participated in the conventional myofeedback treatment (between 6 and 12 months posttreatment). It was assumed that selecting subjects who actually underwent conventional myofeedback treatment had quite good understandings of the procedures when providing the myofeedback remotely.

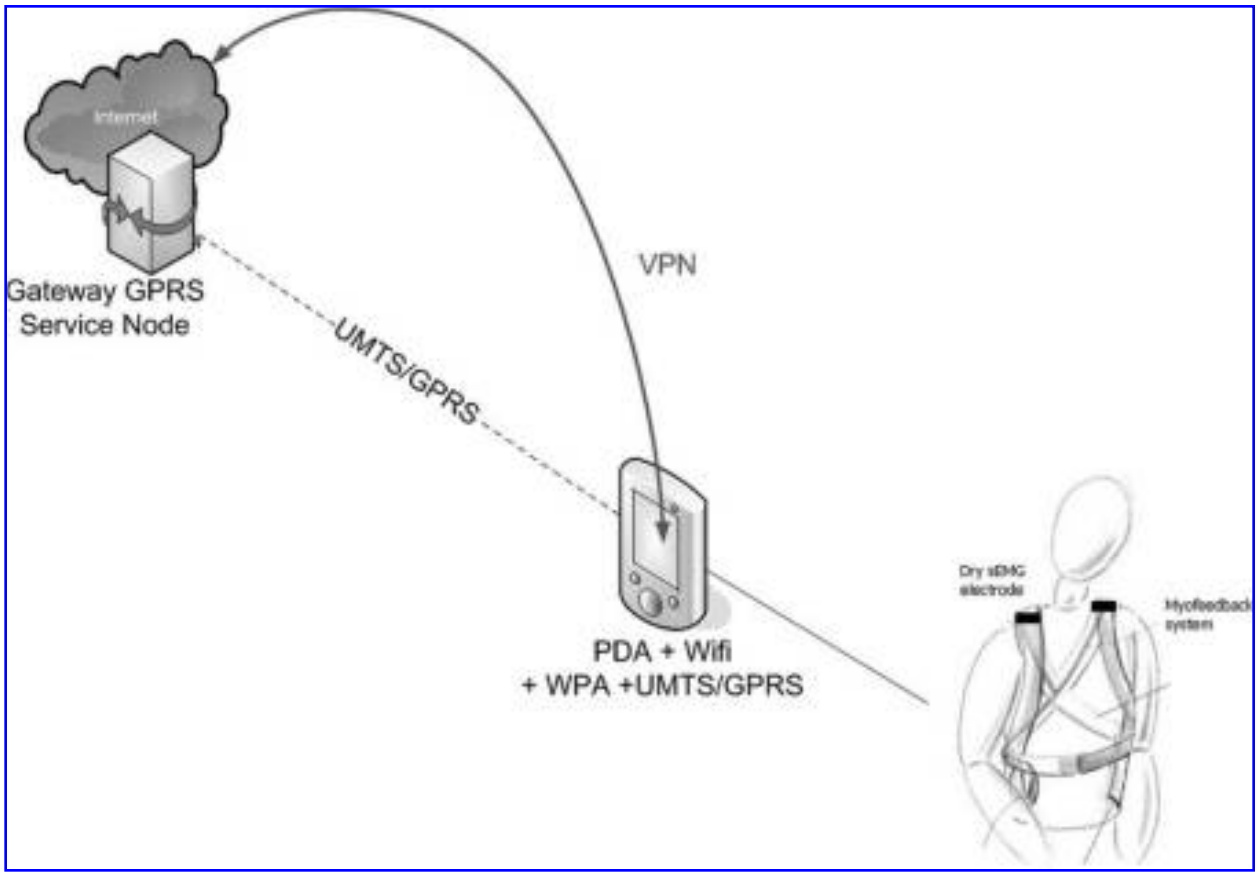

FIG. 2. Remotely supported myofeedback training (RSMT).

Subjects were eligible for participation if they were females between 18 and 65 years of age, with chronic neck–shoulder complaints (>6 months), and a stable medical condition reflected in an absence of large fluctuations in pain and/or disability. Subjects were excluded when they had insufficient understanding of the Dutch language.

Population of professionals. Professionals were recruited from the pain division of a local rehabilitation center. Among these professionals, both direct providers of the conventional myofeedback treatment ($n = 4$) as well as professionals with the authorization to refer patients to the myofeedback treatment ($n = 17$) were approached. All professionals were acquainted with the principles and protocol of the conventional myofeedback treatment.

Measurements

Two questionnaires were developed: one for the patients, and one for the professionals. The questions were similar in origin, but they were specified to the target group, that is, patients and professionals (respectively, Appendix 1 and 2). The ASE model formed the theoretical background of the questionnaire. In the ASE model, three determinants for intention of treatment adherence are postulated. The questionnaire developed focused on two of the three determinants of the ASE model, namely attitude and self-efficacy.

Self-efficacy can be defined as one's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances.[6] Within this context, patient's self-efficacy is the degree to which patients expect themselves to be capable of applying the relaxation skills and/or exercises provided by their myofeedback therapist during future e-consultation(s). A professional's self-efficacy is the degree to which they consider themselves capable of communicating the relaxation skills and/or exercises to their patients via ICT. The self-efficacy questions are aimed at providing insight in the optimum frequency of communication and preferred mode for remote consultation. For the professionals, the attitude questions were asked to all professionals, both the therapists providing the conventional myofeedback ($n = 4$) and the direct referring professionals ($n = 17$). The self-efficacy questions were asked solely to the myofeedback therapists ($n = 4$), as those are the ones who need to provide the RSMT. The questions including (abbreviated) answering methodology are presented in Appendix 1 and 2.

Analysis

Results of open questions were analyzed and presented in a mainly qualitative way. Questions measured at an ordinal scale were described using frequency distributions.

RESULTS

Twenty-two questionnaires were sent to 18 WMSD and four WAD patients. Fifteen questionnaires were filled out and returned (response rate 68%). The mean age of the patients was 53.8 years (range 43–58). In addition, 21 questionnaires were sent to professionals working within the field of pain rehabilitation. Of these 21 questionnaires, 17 were returned (response rate 81%). Responding professionals were physiotherapists (36%), social workers (37%), psychologists (37%), occupational therapist (12%), rehabilitation doctors (12%), and vocational investigators (6%). The mean age of the professionals was 39.6 years (range 25–54). Fifty-three percent of respondents were male.

Patient population

Attitude. In total, 53% of the patients with neck–shoulder pain were "positive" (40%) to "very positive" (13%) about the myofeedback treatment following the conventional approach (see Table 1). Twenty-seven percent of the patients had a "negative" to "very negative" attitude toward the conventional myofeedback treatment. This "negative" attitude was largely related to experienced technical failures and low usability of the system during the conventional myofeedback treatment.

As illustrated in Table 1, an equal amount of patients with a positive attitude toward the conventional myofeedback treatment also reported a positive attitude toward the RSMT. So,

53% of the patients had a "positive" attitude toward remote treatment of their neck–shoulder complaints. Similar to the conventional myofeedback, 27% of the patients reported a "negative" to "very negative" attitude toward the RSMT. Twenty percent of the patients had a "neutral" attitude toward it, indicating that they did not prefer this type of treatment but also did not have an aversion toward it.

As presented in Figure 3, 67% of all patients were willing to participate in RSMT.

Interestingly, more patients were willing to undergo the RSMT (67%) than the ones who reported a "positive" to "very positive" attitude toward it (53%; see Table 1). This difference was hypothesized to be related to the geographical distance between patient and therapist. Subjects who lived a longer distance from their therapist are probably more favorable to report willingness to undergo RSMT. Data inspection revealed no difference in the distance from the therapist and the time needed to commute to receive care between these additional patients (range 15–134 km, range 18–100 minutes) (14% increase) and the other 53% of the patients (range 0–115 km, range 5–78 minutes) who reported a positive attitude toward the conventional myofeedback. Twenty percent of the patients reported that they did not have a clear opinion about participating in a RSMT, whereas 13% were not willing to participate. No specific arguments were mentioned.

Patients reported that a reduced travel time, for either the patient herself or the therapist, was one of the major advantages of the RSMT compared to the conventional treatment. In addition, some patients assumed the remote treatment to be more effective because of its potentially high treatment intensity as muscle relaxation patterns can be viewed by their therapists continuously.

Self-efficacy. Despite the limitation concerning the lack of *in vivo* contact in RSMT, 40% of the patients believed they could still learn the required skills of the myofeedback principles remotely, and 20% reported doubt. Thirty-three percent of the subjects reported that they would not be capable of learning the instructions provided in the RSMT. In addition, 7% did not have any opinion with regard to their self-efficacy levels, which might indicate that they have difficulty in imagining the concept of remote myofeedback. Lack of *in vivo* contact was believed to make the contact less personal, resulting in lower treatment compliance.

With regard to the frequency of contact with the professional, a minority (13%) of the patients believed structural *in vivo* contact would not be necessary with the RSMT. Forty percent of the patients suggested that the optimal frequency of structural *in vivo* contact with their professional would be once per 2 weeks (Fig. 4), which is less frequent compared to the conventional myofeedback treatment during which the therapists and patients meet each week.

Patients were also asked for the frequency of other forms of contact. Patients reported that this could be of valuable, in particular when their myofeedback therapist thought it to be necessary and in the early stages of the treatment.

The preferred communication mode of learning the myofeedback skills in RSMT is e-mail and/or telephone (80%) above other types of communication modes, chat and short message services (SMS), which made up the other 20%.

Professional population

Attitude. Forty-three percent of all professionals familiar with myofeedback treatment reported a positive attitude toward the RSMT (Fig. 5).

Table 1. Patients' Attitude Toward Conventional and Remote Myofeedback (n = 15)

Attitude of patients	*Very positive*	*Positive*	*Neutral*	*Negative*	*Very negative*
Conv. Mfb	13%	40%	20%	20%	7%
Rem. Mfb	0%	53%	20%	20%	7%

Conv. Mfb, conventional myofeedback/in vitro consultations; Rem. Mfb, remote myofeedback.

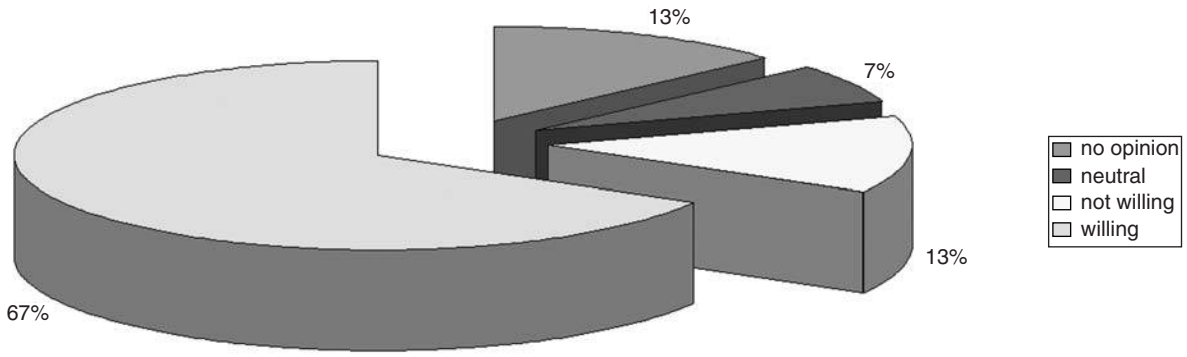

FIG. 3. The intention of patients with respect to participation in remotely supported myofeedback treatment (RSMT) ($n = 15$).

According to the professionals, the major advantages of the RSMT were the reduced travel times and ability to treat several patients simultaneously. Healthcare was considered to become more accessible for patients, because professionals believed the threshold for consulting the therapist to be lower when communication media other than *in vivo* contact (e.g., e-mail) could be applied.

Self-efficacy. The expectations toward self-efficacy of providing the RSMT was assumed to be mainly dependent on the mode and frequency of communication. All four myofeedback therapists felt they would be able to provide the RSMT on the condition that the technical feasibility of the system has been proven to be reliable. Similar to patients, professionals reported the possible lack of *in vivo* contact to be a major disadvantage of the RSMT. *In vivo* contact is considered to be stimulating for patients, and enhances treatment compliance. Inherently, professionals assume that there is an increased risk of dropouts, and they stated that nonverbal communication, which occurs during *in vivo* consultations, provides important clinical input for the myofeedback therapist.

Similar to patients, the majority (three out of four) myofeedback therapists preferred telephone, and too a lesser extent, e-mail contact above SMS and chat. One therapist believed that chat could be valuable in remote consultations.

Second to communication, the frequency of contacts between patient and professional is considered to be very important. Professionals believed that in RSMT the frequency and the intensity of the communication could easily be adapted to individual needs; two out of the

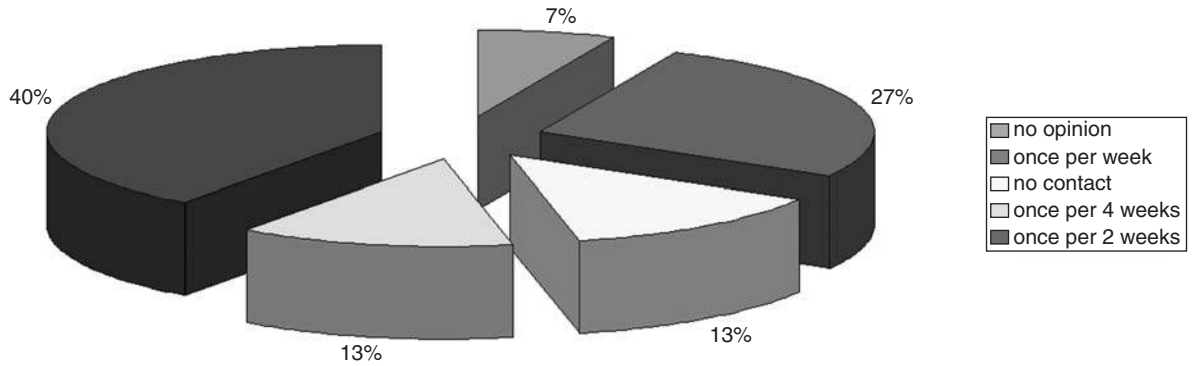

FIG. 4. The percentage of preferred frequency of structural *in vivo* contact with the myofeedback therapist in remotely supported myofeedback treatment (RSMT) of patients ($n = 15$).

four myofeedback therapists preferred to have *in vivo* contact at least once per 2 weeks; two preferred to have *in vivo* contact with the patient at the start and end of the treatment. The number of *in vivo* contacts could be reduced by alternating it with remote consultations. However, the total number of contacts are preferred to be comparable to the frequency of contact in the weekly conventional myofeedback treatment. All four myofeedback therapist preferred phone and/or e-mail contact and according to one therapists chat and other types of communications could also be applied in RSMT. Finally, the lack of current computer skills and facilities at the professional's workplace was considered to be problematic.

DISCUSSION

RSMT is suggested to be a valuable alternative of the conventional myofeedback treatment because it has the potential to increase the efficiency and effectiveness of care. In the present explorative study, the ASE model served as a framework to investigate the receptiveness of both patients and professionals towards RSMT.[4] The study sample consisted of 15 neck–shoulder pain patients previously treated with conventional myofeedback, 17 therapists familiar with this therapy, of which 4 therapists actually providing conventional myofeedback. This sample was chosen because it had actually experienced the myofeedback treatment and is expected to understand the (future) procedures of providing RSMT.

Results showed positive attitudes toward RSMT in 53% of the patients, and 67% of them were willing to participate in future RSMT. Of the 17 professionals included in the present study, 43% reported a positive attitude. In addition, 40% of the patients and 100% of the professionals believed their self-efficacy level to be sufficient for RSMT.

Counter to our expectations, several patients reported intent to participate in remote myofeedback, although they did not report a positive attitude toward the conventional myofeedback. A possible explanation for this finding is that these patients assume an improvement of technical reliability of the remote myofeedback system compared to the conventional myofeedback system. Another explanation might be the fact that they prefer remote consultations above the *in vivo* contacts because of its time-saving character, which is the major difference between the conventional myofeedback and RSMT.

Professionals emphasized the importance of nonverbal communication and physical interaction (*in vivo* contact) in remote treatment concepts. In the literature, nonverbal communication was found to be important in shaping and defining relationships between patients and professionals.[9] In turn, affective behavior was positively associated with patients' satisfaction.[10,11] It is yet to be determined, whether the content of communication patterns in a remote communication mode allowing nonverbal communication differs from *in vivo* consultation, and how these affect the therapeutic rela-

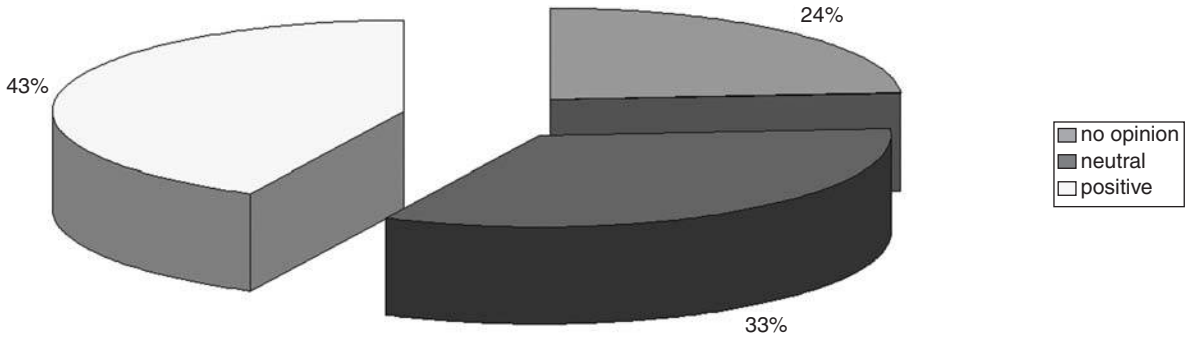

FIG. 5. The attitude of conventional myofeedback therapists toward remote supported myofeedback treatment (RSMT) ($n = 17$).

tionship. The therapeutic relationship which a professional builds with the patient is considered to be a cornerstone of treatment compliance.[12] Therefore, besides a communication mode, allowing nonverbal communication, other factors might need to be applied to RSMT to increase patients' compliance. It is suggested that patient's decisions to modify or discontinue therapy can be reduced by committing themselves to attain specific treatment goals.[13] By formulating goal intentions people translate their noncommittal desires into binding goals. This so-called "theory of Implementation Intention" principles to bridge the gap between treatment intentions ("I intend to achieve x") and actual adherence to the treatment (actual behavior).

In order to add nonverbal communication in remote consultations, videoconferencing is recommended. However, further research should be aimed at getting insight in the optimal communication mode for myofeedback teleconsultations by taking into account the clinical communication context. This context will differ across specialty settings in terms of the scope of issues and the duration of relationships between patients and providers.[14] Communication differs in "richness" with face-to-face communication being richest, while other communication tools capable of sending fewer cues (voice, gestures, chat) or providing feedback slower (voice-mail, e-mail) are "leaner."[14] Therefore, the appropriate mode is dependent on the task that needs to be performed.[14] In the course of 4 weeks of RSMT, there is a high chance that the task, that is, the function, of the tele-consultation changes. For example, the amount of instructions of the myofeedback therapist is expected to be larger in the initial phase of the RSMT.

Despite the fact that only two of the three determinants of the ASE-model, attitude and expectations toward self-efficacy, were addressed in the present study, the results revealed some interesting "end-user views."

A limitation of the present study was the relatively small sample size. Therefore, the results need to be interpreted with caution. Despite this limitation, the present study revealed some important recommendations which are likely to contribute to increased adherence of future remote myofeedback treatment. First, as the negative attitudes about the conventional myofeedback treatment were primarily due to technical failures of the myofeedback system, instruction sessions and well-organized technical support should be part of the RSMT. Second, nonverbal communication and physical interaction are considered to be essential, and should be part of the RSMT.

ACKNOWLEDGMENTS

This study was supported by a grant from the SenterNovem provided to the Exozorg project. SenterNovem is an agency of the Dutch Ministry of Economic Affairs.

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Appendix 1. Questionnaire for the Patients

Patients ($n = 15$)

Attitude

1. What is your attitude toward remote myofeedback treatment? ○ Very positive ○ Positive ○ Neutral ○ Negative ○ Very negative
2. What are the potential advantages and disadvantages of remote myofeedback treatment? _____
3. What are possible solutions to solve these problems? _____
4. Would you be interested in participation? ○ Yes ○ No ○ Not sure

Self-efficacy ($n = 15$)

5. Do you think that you can learn the required skills during remote myofeedback treatment? ○ Yes ○ No ○ Not sure
6. Frequency of personal contact between expert professional and patient _____
7. Incidence of other forms of contact between professional and patient _____
8. Which forms of contact between professional and patient are preferred? ○ Chat ○ Email ○ Telephone ○ SMS ○ Other

Appendix 2. Questionnaire for Professionals

Professionals (therapists familiar with conventional myofeedback: $n = 13$; therapists providing conventional myofeedback: $n = 4$)

Attitude

1. What is your attitude toward remote myofeedback treatment? ○ Very positive ○ Positive ○ Neutral ○ Negative ○ Very negative
2. What are the potential advantages and disadvantages of remote myofeedback treatment? _____
3. What are possible solutions to solve these problems? _____

Self-efficacy (conventional myofeedback therapists: $n = 4$)

4. Do you think that you will be able to provide remote monitoring of myofeedback treatment? _____
5. Frequency of personal (in vivo) contact between expert professional and patient _____
6. Incidence of other forms of contact between professional and patient _____
7. Which forms of contact between professional and patient are preferred? _____
8. Requirements for optimal compliance _____