Tijou, I., Yardley, L., Sedikides, C., & Bizo, L. (2010). Understanding adherence to physiotherapy: Findings from an experimental simulation and an observational clinical study. *Psychology and Health, 25*, 231-247.

Understanding Adherence to Physiotherapy:

Findings from an Experimental Simulation and an Observational Clinical Study

Imogen Tijou

Department of Psychology, Southampton Solent University, Above Bar Street, Southampton, SO14 0RF, UK

Lucy Yardley and Constantine Sedikides

School of Psychology, University of Southampton, Highfield Campus, Southampton, SO16 1BJ, UK

Lewis A. Bizo

Department of Psychology, Southern Cross University, Hogbin Drive, Coffs Harbour, NSW, 2457, Australia

Both the simulation and observation study were carried out in accordance with University of Southampton ethical procedures. The observational study also obtained and was conducted in accordance with National Health Services Local Research Ethics Committee procedures.

Key words: Adherence; physiotherapy; simulation; observation

Acknowledgements: These studies were supported by a PhD studentship from the Economic and Social Research Council, UK, to the first author. The authors would like to thank Martin Hall and Jin Zhang for their assistance in programming the simulation.

Understanding Adherence to Physiotherapy:
Findings from an Experimental Simulation and an Observational Clinical Study

ABSTRACT

This article reports two studies assessing the influence of self-efficacy, outcome expectancies, and aversive feedback on different aspects of adherence. Study 1 employed a computer simulation of physiotherapy to test experimentally the effects of aversive feedback (i.e., loud noise) experienced during simulated therapy on adherence behavior in a student population. Study 2 examined whether similar effects of aversive feedback (i.e., pain) experienced during physiotherapy in a clinical setting would be observed in a longitudinal questionnaire study of predictors of adherence. In both studies, self-efficacy and outcome expectancies were assessed at baseline and after experience of the task (performing simulated or actual physiotherapy). Study 1 found that self-efficacy and outcome expectancies predicted persistence with simulated physiotherapy (i.e., completing the experimental session), whereas aversive feedback influenced adherence during sessions (i.e., correct response rate). Study 2 found that self-efficacy and outcome expectancies predicted persistence with actual physiotherapy (i.e., completing the prescribed number of sessions). Aversive feedback and outcome expectancies influenced adherence during sessions. We conclude that different factors predict different aspects of adherence behavior. It is therefore important to measure both persistence over time and adherence during sessions, and to investigate the predictors of each dimension of adherence.

INTRODUCTION

It is important to identify and address the factors influencing adherence to therapy, given that non-adherence has been identified as a substantial problem that limits the effectiveness and cost-effectiveness of treatment (WHO, 2003). Between 60% and 80% of patients admit to partial or complete non-adherence to home-based physiotherapy exercises (Engström, & Öberg, 2005; Sluijs, Kerssens, van der Zee, & Myers, 1998). Home-based physiotherapy has several features that can reduce adherence (Carter, Taylor, & Levenson, 2003), as it typically requires long-term self-management of a new behavior that may initially provoke rather than relieve physical symptoms, such as pain.

Adherence to treatment (Griva, Myers, & Newman, 2000; Maddux, Brawley, & Boykin, 1995; WHO, 2003), exercise (Fleury & Sedikides, 2007; Rodgers, Hall, Blanchard, McAuley, & Munroe, 2002; Ryan, 2005; Sniehotta, Scholz, & Schwarzer, 2005), and physiotherapy exercises (Engström & Öberg, 2005; Sluijs et al., 1998; Brewer, Cornelius, van Raalte, Petitpas, Sklar, Pohlman, et al., 2003; Jensen & Lorish, 1994; Luszczynska & Sutton, 2006; Rejeski, Ettinger, Martin, & Morgan, 1998) is associated with more positive social cognitions (Bandura, 1997). These include higher self-efficacy (confidence in the ability to carry out exercise or treatment) and more positive outcome expectancies (perceiving greater benefits than costs of exercise or treatment). There is evidence that adherence to physiotherapy affected by symptoms (particularly pain) experienced during treatment (Dobkin, Abrahamowicz, Fitzcharles, Drista, & da Costa, 2005; Iverson, Fossel, & Katz, 2003; Yardley & Donovan-Hall, 2007). The relationship among experiences of symptoms during treatment, self-efficacy, and outcome expectancies has not been established.

Social cognitive theory (Bandura, 1997) proposes that self-efficacy and outcome expectancies directly influence behavioral performance, whereas physiological and emotional states can affect behavior indirectly through their influence on self-efficacy. Symptoms that people experience when exercising may therefore reduce confidence in their ability to persist with exercising (Courneya, Friedenreich, Arthur, & Bobick, 1999), which in turn could result in non-adherence. The experience of symptoms may also lead people to have more negative outcome expectancies (Maddux et al., 1995) and conclude that the treatment is too aversive to complete, or will not be successful. An additional possibility is that the experience of symptoms may interfere with self-regulation of adherence, by redirecting attention from the long-term goal of successful treatment to the short-term goal of avoiding the aversive consequences of exercising (Baumeister & Heatherton, 1996; Tice, Bratslavsky, & Baumeister, 2001). Although avoidance of the aversive consequences of exercising may involve a conscious decision, there is evidence that aversive (painful) consequences can directly shape avoidance behavior without conscious awareness (Hölzl, Kleinböhl, & Huse, 2005). Operant conditioning effects are obtained when there is consistent and repeated pairing of the operant response (behavior) with an outcome (Skinner, 1938). Whether conditioning increases or decreases the occurrence of the behavior depends on whether the outcome positively or negatively reinforces versus punishes the operant response. In the case of physiotherapy, pain is often concurrent with its performance. Carrying out physiotherapy can be seen as the operant response which results in the occurrence of pain. Carrying out physiotherapy may be punished by pain, whereas terminating physiotherapy may be negatively reinforced by the avoidance of the pain provoked by physiotherapy. Therefore, it is expected that performance of physiotherapy will be reduced when pain is felt.

It is difficult to elucidate the unique and combined effects of cognitions and aversive symptom experiences in clinical research on adherence to physiotherapy. Given that the level of aversive symptoms experienced during therapy cannot be controlled or directly measured, symptoms must be assessed by self-report, which is inevitably influenced by cognitions. To examine the effects of experiences of therapy on long-term adherence, it is also desirable to obtain repeated measurements of cognitions (Rothman, 2000) as well as a detailed objective longitudinal measurement of adherence behavior, because self-report can be imprecise or unreliable (Johnston, Bonetti, & Pollard, 2002; Levine et al., 2006). However, objective longitudinal measurement of performance of home-based exercises is intrusive and costly, and could itself change behavior.

In order to overcome some of these obstacles, a computer-based simulation was constructed that would permit systematic and controlled investigation of the effects of cognitions and aversive feedback on adherence. The primary advantage of employing a simulation was that this practice allowed the use of an experimental design to test the effects of aversive feedback on behavior and cognitions, rather than attempting to infer causal relations from correlations between observed variables (Michie, Rothman, & Sheeran, 2007; Weinstein, 2007; Yardley & Moss-Morris, 2007). The simulation also allowed these variables to be studied in isolation, whereas in clinical research their effects are partly obscured by the influence of such variables as physiological and lifestyle factors as well as social support. A limitation of any simulation, however, is that it is difficult to tell whether responses to the simulation reflect behavior in the real-life context. Consequently, a complementary observational study was carried out in a clinical (and thus an uncontrolled) setting in order to assess the generality of the experimental findings.

In Study 1, two key characteristics of physiotherapy were simulated. First, for a participant to achieve a successful outcome, it was necessary for them to 'exercise' at the correct rate for a prolonged period with success being uncertain. Consequently, it was expected that cognitions concerning the likely success and relative costs and benefits of 'exercising' would influence participants' decisions to persist with 'exercising' or drop out. Second, in the simulation, as in physiotherapy, the immediate effects of 'exercising' could be aversive and/or informative (e.g., noticeable progress towards recovery). In physiotherapy the level of symptoms experienced when exercising may be intrinsically aversive, as engaging in the therapy could provoke pain, whereas a reduction in symptoms when carrying out exercises may convey information about whether therapy is likely to be successful, thus influencing cognitions. In the simulation, ‘exercising’ could provoke immediate aversive feedback (i.e., a loud sound), whereas progress towards a successful outcome was signaled by a reduction in this aversive feedback. The effects of aversive feedback were compared with the effects of purely informational feedback (i.e., a visual display of progress). A combined condition that provided both aversive and informational feedback in order to control for the possibility that better adherence in the informational condition was simply due to receiving more accurate information about progress (given that the visual display provided more precise information about progress than reduction in aversive feedback). The first study tested the hypotheses that: a) aversive feedback would exert immediate negative effects on responding (even if visual informational feedback was provided), thus interfering with adherence (i.e., rate of simulated exercising) during sessions; b) persisting with or dropping out of simulated therapy would be predicted by self-efficacy and outcome expectancies, and therefore c) recovery in the simulation would be affected by both self-efficacy and outcome expectancies as well as aversive feedback.

STUDY 1
Method

Design

A between-groups design was used to investigate the effect of three feedback conditions on adherence during sessions (i.e., whether participants performed ‘exercises’ within sessions as prescribed, measured here by response rate), persistence (i.e., whether participants persisted with or dropped out of the simulation) and recovery (a function of both persisting at the simulation and performing exercises as prescribed within sessions). Repeated measures were also used to examine changes in self-efficacy and outcome expectancies from baseline to follow-up.

Apparatus

The simulation was presented on a personal computer, which displayed a gender neutral figure. Participants were instructed to imagine that this figure represented them, that they had a painful and disabling shoulder injury, and that to 'recover' they must carry out rehabilitation exercises by clicking on an 'exercise shoulder' button at a steady rate. Each time the 'exercise shoulder' button was pressed, the figure performed an arm movement. In the aversive feedback condition, an unpleasant 'scream of pain' was simultaneously delivered to participants via headphones, starting at a very loud level (90dB). Participants were informed that the correct response rate would be in the region of once every 2 to 4 seconds and that exercising at that rate would result in recovery, whereas responding that was too fast or too slow would not result in recovery (this instruction pertained to adherence during sessions). In the *aversive feedback* condition, each step of recovery resulted in a reduction of 1.5dB in the loudness of the scream of pain. In the *informational feedback* condition, level of recovery was displayed on a 32 step scale on the left of the screen. In the *combined feedback* condition, both the auditory scream and the visual scale were given as feedback.

Exercising was negatively reinforced according to a variable interval schedule (45 seconds) with a 1.5 dB reduction in the loudness of the auditory feedback when participants were responding at the correct rate (between 0.43 and 0.24 'exercises' per second; an 'exercise' every 2.34 to 4.20 seconds), calculated from a moving average of the past 3 responses. This meant that a step of recovery would occur on average every 45 s, if the rate of exercising matched the target rate. Complete recovery was achieved after 32 steps. The simulation was divided into 3-minute periods that represented virtual 'days' of treatment. On completion of the 4th virtual day and every subsequent virtual day (up to a maximum of 20 virtual days), participants could choose to end or continue participation by pressing a button. Pilot work established the tolerance boundaries and instructions that would result in suitably gradual and variable recovery, as well as the incentives that would lead to appropriate levels of dropout at varying time-points (Tijou, 2007).

Measures

Successful completion of physiotherapy simulation. Completion of simulated physiotherapy was assessed by three adherence measures. Adherence during sessions was measured by *response rate*, computed as mean responses/second, calculated from the total responses made during the total virtual days completed. Persistence with simulated therapy was measured by d*rop out,* a dichotomous variable distinguishing those who dropped out before completing the task from those who persisted until they recovered or for the maximum 20 virtual days. *Recovery* was the total number of steps of recovery achieved, which was a function of responding at the correct response rate (adherence during sessions) over a sufficient number of virtual days (*persistence*).

Questionnaire measures. Self-efficacy and outcome expectancies for completing the simulation were assessed by scales developed specifically for use with this simulation, given that no suitable existing measures could be located. For *self-efficacy,* five items, scored from 0 (*definitely will be able to complete it*) to 6 (*definitely will not be able to complete it*), assessed participants' degree of confidence that they could complete the task even if they found it difficult or unpleasant (example item: "How strongly do you believe you will be able to complete the simulation even if it was harder than you thought it would be?"). Cronbach's α for the total scale was .79. Three items, scored from 0 to 6 (0 = *strongly disagree*; 6 = *strongly agree*), were used to assess each of the three key dimensions of outcome expectancies (Bandura, 1997). In particular, three items pertained to *social expectancies* (i.e., pleasing the experimenter; example item: "I expect the experimenter will be pleased with me if I complete the simulation"), three items pertained to *self-evaluative expectancies* (i.e., sense of accomplishment; example item: "I expect I will be impressed with myself if I complete the simulation"), and three items pertained to *task expectancies*, (i.e., the perceived pleasantness/aversiveness of the task; example item: "I expect the simulation will be pleasurable to complete"). Cronbach's α for the total scale was .79 and for the three sub-scales was .73, .80, and .88, respectively.

Participants and Procedure

Participants were 84 student volunteers (females = 44, males = 40; mean age = 23.20; SD = 6.25), who received £3 (or one research participation credit for psychology students) for completing the first 4 virtual days of the simulation. They were told that, if they chose to continue with the simulation beyond 4 virtual days and achieved full recovery, they would be entered into a prize draw, with a .25 probability of winning a £20 prize. Participants were allocated to condition sequentially based on order of presentation to complete the study, and completed the simulation in an isolated booth, with visual observation by the researcher to ensure that they followed instructions and did not remove the headphones. They completed baseline questionnaires after reading the instructions and carrying out one practice 'exercise', and completed follow-up questionnaires after carrying out two virtual days of simulated physiotherapy. Reassessment of self-efficacy and outcome expectancies at this point was considered appropriate, given that during these first 6 minutes participants would have had around 60 instances of 'exercising' and could have made 8/32 steps towards recovery if they had followed the instructions. As such, the participants would have had sufficient experience of the simulation for their self-efficacy and outcome expectancies to be potentially influenced.

Statistical Analyses

Chi-square analyses were used to examine between-condition differences in *drop out*. Analysis of Variance (ANOVA) was used to compare *response rates* and *recovery* in the three conditions. Bonferroni tests were implemented for between-group comparisons.

To reduce the risk of Type I error, analyses of questionnaire responses were initially performed on the total score for self-efficacy and total score for outcome expectancies. Follow-up tests examining outcome expectancies sub-scale scores were conducted only if a significant effect on total outcome expectancies score emerged. A mixed-design ANOVA was used to determine the effects of drop out (the between-subjects factor) and time (baseline or virtual day 2; a repeated measures factor) on self-efficacy and outcome expectancies, and to analyze the effects of drop out and time on social, evaluative and task expectancies.

Correlations were used to examine the relationships between a) baseline and virtual day 2 self-efficacy and outcome expectancies and b) response rate and recovery. Finally, partial correlations were used to examine the relationships between a) response rate and recovery to virtual day 2 self-efficacy and b) outcome expectancies, controlling for baseline levels.

Results

Response Rate (Adherence during Sessions)

Figure 1 displays the pattern of responding over time in the three conditions. Most participants in the informational condition responded at the correct rate from the start, as indicated by the majority of response rates falling within the upper and lower tolerance boundaries. When negative reinforcement became available, those who were responding within the tolerance boundaries would make a step towards recovery. In contrast, those in the aversive feedback condition responded too slowly, as indicated by the majority of response rates falling beneath the target response rate and often below the lower tolerance boundary. When negative reinforcement became available, those who were responding outside the tolerance boundaries would not make a step towards recovery. An ANOVA confirmed a difference between conditions ($F_{(2,81)} = 7.89$, $p < .001$, $\eta_p^2 = .16$). Post hoc testing indicated that the aversive feedback condition (*M* = .22, *SD*. = .17) and combined condition (*M* = .23, *SD* = .15) did not differ significantly, but both resulted in significantly slower responding than the informational feedback condition (*M* = .36, *SD* = .12). Self-efficacy and outcome expectancies at baseline and virtual day 2 were unrelated to response rate (*r*s ranged from -.13 to -.05).

Drop out (Persistence with Simulated Therapy)

The number of participants who dropped out of each condition was similar (aversive feedback *N* = 16, 55.2%; combined feedback *N* = *17*, 63%; informational feedback *N* = 15, 53.6%) and did not differ significantly (χ^2 = 0.57, *df* = 2, *ns*).

Table 1 shows the mean baseline and virtual day 2 self-efficacy and outcome expectancies of participants who did and did not drop out before completion. Self-efficacy was initially similar in both groups but was lower by virtual day 2 in those who dropped out. Outcome expectancies were lower at baseline and on virtual day 2 in those who dropped out. An ANOVA confirmed that there was a significant effect of drop out ($F_{(2,79)}$ = 7.98, p < .001, η_p^2 = .36), time of measurement of self efficacy and outcome expectancies ($F_{(2,79)}$ = 22.61, p < .001, η_p^2 = .36), and an interaction ($F_{(2,79)}$ = 5.8, p = .004, η_p^2 = .13). Univariate analyses confirmed that the effects of time and drop out were significant for both self-efficacy (time $F_{(1,80)}$ = 4.91, p = .03, η_p^2 = .06; drop out $F_{(1,80)}$ = 6.33, p = .02, η_p^2 = .07) and outcome expectancies (time $F_{(1,80)}$ = 45.79, p < .001, η_p^2 = .36; drop out $F_{(1,80)}$ = 11.80, p = .001, η_p^2 = .13), but that the interaction was significant only for self-efficacy ($F_{(1,80)}$ = 11.76, p = .001, η_p^2 = .13).

From the outcome expectancy sub-scales shown in Table 1, it appears that drop-out was associated with lower self-evaluative expectancies and task expectancies at baseline and virtual day 2, and with a decline in social expectancies between baseline and virtual day 2. Follow-up analyses of the outcome expectancies confirmed a main effect of drop out on self-evaluative ($F_{(1,82)}$ = 4.23, p = .043, η_p^2 = .05) and task expectancies ($F_{(1,82)}$ = 19.30, p < .001, η_p^2 = .19), a significant effect of time on social expectancies ($F_{(1,82)}$ = 22.09, p < .001, η_p^2 = .21) and task expectancies ($F_{(1,82)}$ = 66.75, p < .001, η_p^2 = .45), and a significant interaction for social expectancies ($F_{(1,82)}$ = 4.10, p = .046, η_p^2 = .05).

Recovery

From Figure 1, it appears that recovery was most rapid in the informational feedback and slowest in the aversive feedback condition, as indicated by the different slopes of recovery plotted in panel A and panel C. An ANOVA confirmed a difference between conditions ($F_{(2,81)} = 3.10$, $p = .050$, $\eta_p^2 = .07$), and post hoc tests indicated that recovery was significantly slower in the aversive feedback condition than in the informational condition ($p < .05$). Mean recovery in the combined condition (*M* = 11.59, *SD* = 13.57) fell between that achieved in the aversive (*M* = 8.24, *SD* = 11.28) and informational conditions (*M* = 16.43, *SD* = 12.51), but did not differ significantly from the aversive or informational conditions.

Recovery was unrelated to baseline and virtual day 2 outcome expectancies ($r = .12$ and $r = .17$ respectively). Recovery was also unrelated to baseline self-efficacy ($r = .06$), but was correlated with virtual day 2 self-efficacy ($r = .29$, $p < .01$) and with change in self-efficacy from baseline ($r_p = .34$, $p < .01$).

Given that feedback and virtual day 2 self-efficacy both predicted recovery, analyses were conducted to determine whether self-efficacy mediated the effects of aversive feedback on recovery. First, a dichotomous variable was created which compared purely informational feedback with the aversive and combined feedback (grouped together, given that both included aversive feedback). Linear regression confirmed that aversive feedback was associated with lower virtual day 2 self-efficacy (β= .23). The dichotomised feedback variable explained 5% of the variance in self-efficacy at virtual day 2 ($F_{(1,82)} = 4.53$, $p < .05$). A hierarchical regression was then carried out with recovery as the dependent variable. The dichotomous feedback variable was entered on the first step and explained 6% of the variance ($F_{(1,82)} = 5.19$, $p = .025$). Virtual day 2 self-efficacy was entered on the second step and explained a further 6% of the variance ($F_{(1,81)} = 5.44$, $p = .022$). When virtual day 2 self-efficacy was entered into the equation, the standardized beta coefficient for feedback fell from .24 ($p = .025$) to .19 ($p = .085$). Sobel's test for mediation (Preacher & Hayes, 2004) was significant, z = 3.58, *p* < .01, indicating that virtual day 2 self-efficacy partially mediated the effect of aversive feedback on recovery.

Discussion

As predicted, dropout (i.e., whether the participant persisted with simulated therapy) was predicted by self-efficacy and outcome expectancies, whereas aversive feedback resulted in slower responding (i.e. less good adherence during sessions). Given that the reduction in response rate occurred in both the aversive and the combined feedback conditions, it can be attributed to the aversive rather than the imprecise nature of the feedback. Response rate was unrelated to self-efficacy and outcome expectancies, whereas aversive feedback had no effect on drop out. Participants' persistence at the task before dropping out was predicted by task and self-evaluative outcome expectancies at baseline and virtual day 2 – that is, by how enjoyable or unpleasant participants perceived the task and how much they valued completing it. Dropping out was also predicted by a reduction in self-efficacy by virtual day 2. Achieving 'recovery' was a function of the number of virtual days completed while responding at the correct rate, and was predicted by both feedback and self-efficacy. The effect of feedback condition on recovery was partly mediated by a reduction in self-efficacy by virtual day 2: Receiving aversive feedback reduced self-efficacy from baseline to virtual day 2, and this reduction in self-efficacy predicted less recovery.

These findings show that there is a complex combination of direct and indirect effects of aversive feedback on the different dimensions of adherence. The decision to persist with the task was predicted by cognitions, but there was an effect of aversive feedback on adherence during sessions that was not mediated by self-efficacy or outcome expectancies. Aversive feedback also had an indirect effect on recovery, given that it resulted in lower self-efficacy, which directly influenced persistence with the task.

Although this pattern of combined effects of aversive feedback and cognitions on adherence is theoretically plausible, it is difficult to tell how closely adherence to the simulation corresponds to adherence to physiotherapy itself. An observational study of adherence to physiotherapy was therefore undertaken in order to examine whether a similar pattern of findings would emerge.

STUDY 2

The aim of this study was to determine whether, as in the simulation, self-efficacy and outcome expectancies would predict persisting with physiotherapy, whereas aversive feedback would predict adherence during physiotherapy sessions and therefore also predict subjective recovery. Experiences and expectations of aversive symptoms were assessed by measuring levels of pain and expectations that physiotherapy would provoke pain, at baseline and after experiencing therapy.

Given that the appropriate rate of exercising during physiotherapy sessions was likely to differ according to injury and physical status, we assessed adherence during sessions with the amount of time spent on each exercise session relative to that prescribed. Similarly, given that the number of sessions required for recovery would vary, persistence with physiotherapy was assessed by estimating the proportion of prescribed sessions that were completed (‘sessions completed’). Whereas in the simulation ‘recovery’ could be directly measured, in the clinical setting it was assessed through self-report (subjective recovery).

The following hypotheses were tested: a) aversive feedback would exert immediate effects on responding, thus interfering with adherence during sessions; b) persisting with physiotherapy sessions would be predicted by self-efficacy and outcome expectancies, and therefore c) subjective recovery would be affected by self-efficacy, outcome expectancies, and aversive feedback.

Method

Design

A longitudinal observational design was used to determine the predictors of adherence to physiotherapy over an 8-week period. The aspects of adherence resembled those assessed in the simulation: adherence during sessions (i.e., whether participants performed exercises within sessions as prescribed, measured here by completed vs. prescribed exercise time); persistence with therapy (measured here by how often prescribed sessions were skipped at home); and subjective recovery, presumed as in Study 1 to be influenced by both persistence with therapy and adherence during sessions. Measures of self-efficacy, outcome expectancies, therapy expectations and pain were administered at baseline and after early experience of physiotherapy (2 weeks) and 8 weeks from the start of treatment.

Participants and Procedure

Potentially eligible patients (*N* = 551) were invited by clinic staff at an NHS hospital to participate just before or at their first appointment for physiotherapy. Of the 137 who returned a consent form and screening questionnaire, 106 met the inclusion criteria (adults prescribed home-based physiotherapy exercises for a musculoskeletal problem), 79 took part, and 69 completed the study (females = 44, males = 25; age range = 20 to 79, *M* = 50.9, *SD* = 15.7). Conditions treated included injuries to upper and lower limbs and back, osteoarthritis and lower back pain, with a duration ranging from 1 week to 20 years (median = 26 weeks). A minority of participants (*n* = 18; 21.6%) had previously had physiotherapy. A few participants had missing data on each of the outcome variables, and so exact numbers responding to each variable are reported below.

Baseline questionnaire packs were sent to participants as soon as possible after their first appointment, to be completed at home and returned by prepaid mail (with postal and telephone follow-up of non-respondents). A second questionnaire pack was sent 2 weeks later, and a final questionnaire pack after 8 weeks.

Measures

Successful completion of physiotherapy. Three self-report measures were administered at week 8, broadly to correspond to the three simulation measures. As a measure of adherence during sessions, *exercise time* per home-based session was assessed on a scale from 1 (*1-5 minutes*) to 4 (*over 45 minutes*). In the simulation, all participants were instructed to respond at the same rate, whereas patients were advised to exercise for differing lengths of time. Therefore, this measure was standardized by assessing the prescribed duration of exercise per session at baseline (on the same scale) and subtracting the prescribed duration from the time participants reported that they had exercised.

As a measure of persistence, participants rated from '*very often*' to '*never'* how often they skipped therapy sessions at home. This item yielded a score for *sessions completed* ranging from 0 to 5. *Subjective recovery* was assessed following therapy on a 5-point scale (1 = *no progress towards recovery*, 5 = *totally recovered*).

Baseline and week 2 measures. Self-*efficacy* was assessed with the 8-item Self-Efficacy for Exercise scale (Resnick, Palmer, Jenkins, & Spellbring, 2000). The scale asks how confident the participants are that they could exercise (changed here to 'complete your physiotherapy') in the face of obstacles (e.g., if they were bored, felt pain while doing it, were too busy). Responses range between 0 (*not very confident*) and 10 (*very confident*). One item referring to bad weather was omitted, because the physiotherapy was performed at home. Cronbach's α was .91. *Outcome expectancies* were assessed with the same scale as in the simulation. However, this scale now referred to physiotherapy rather than the simulation. Moreover, the social expectancies referred to pleasing the physiotherapist. In particular, three items referred to *social expectancies* (e.g., pleasing the physiotherapist; example item: "I expect the physiotherapist will be pleased with me if I complete my physiotherapy"), three referred to *self-evaluative expectancies* (e.g., sense of accomplishment; example item: "I expect I will be impressed with myself if I complete my physiotherapy"), and three items referred to *task expectancies*, which corresponded to the perceived pleasantness/aversiveness of the task (example item: "I expect my physiotherapy will be pleasurable to complete"). The self-evaluative scale had very poor reliability (Cronbach's α = .13). After dropping these items, Cronbach's α was .70 for the whole scale, .84 for social expectancies and .82 for task expectancies.

The *Problematic Experiences of Therapy Scale* (PETS; Yardley & Kirby, 2006) was adapted to assess *physiotherapy expectations.* The 11 items were reworded to measure anticipated rather than past therapy experiences, with a maximum score of 55 for positive expectations. As in the original PETS, four sub-scales assessed expectations concerning: belief in treatment *efficacy* (3 items); whether *symptoms* would interfere with or be aggravated by therapy (3 items); *competence* to carry out the exercises correctly (2 items); and the likelihood of *practical* obstacles (3 items). Cronbach's α was .75 for the whole scale, .65 for symptoms, .74 for competence, .84 for efficacy and .75 for practical obstacles.

Pain was assessed with the intensity scale of the short form of the Brief Pain Inventory (Cleeland, 1991). This inventory comprised four 10-point items measuring intensity of pain experienced over the past 24 hours. Cronbach's α was .89.

Statistical Analyses

t-tests (gender, previous physiotherapy) and correlations (age, duration of condition) were used to examine relationships of participant characteristics to successful completion of physiotherapy. To reduce the risk of Type II error, correlations between the predictors and the measures of successful completion of physiotherapy were initially examined, with one-tailed tests of all relationships predicted from Study 1. To reduce the risk of Type I error, correlations with sub-scales were only examined when significant correlations with total scale scores had been found. Given that competence expectations and social outcome expectancies were markedly skewed, we used Spearman's rank correlations to examine relationships with these variables.

To further reduce the risk of Type I error, multiple regressions were also carried out to determine the minimum combination of variables that predicted each measure of successful completion of physiotherapy. For the regressions, stepwise selection was used, first from a block comprising all baseline variables with significant correlations with the measure of successful completion of physiotherapy, and then from a block comprising all week 2 variables with significant correlations with the measure of successful completion of physiotherapy. Participant characteristics were controlled for when these were related to the measure of successful completion of physiotherapy.

Results

Examination of the relationship of successful completion of physiotherapy to patient characteristics (age, gender, duration of condition, previous physiotherapy) indicated that older age was positively related to longer time exercising (r = .31, p = .02). Age was therefore controlled for in all analyses using exercise time.

Most participants (n = 49, 74.2% of the 66 who responded) admitted to skipping some therapy sessions, and 9 (13.6%) missed numerous sessions. Only 9 (15% of a sample of 60) participants reported shorter exercise sessions than first recommended, but 27 (45%) reported longer exercise sessions than originally prescribed. Of the 67 participants who reported their recovery, 18 (26.8%) mentioned total or near total recovery, whereas 25 (37%) mentioned they had made only slow or no progress.

Predictors of Successful Completion of Physiotherapy

Levels of the predictor variables at baseline and week 2 are shown in Table 2.

Exercise time (adherence during sessions). Having carried out longer exercise sessions (relative to what was prescribed) was predicted by less pain and more positive outcome expectancies at baseline (Table 3). Follow-up analyses revealed that task expectancies were related to exercise time ($r = .27$, $p = .02$). Exercise time was also related to self-efficacy and expectations of therapy at week 2, and was predicted significantly by expectations that the therapy would be efficacious ($r = .35$, $p = .005$) and marginally by anticipated therapy-related symptoms ($r = .21$, $p = .06$). A regression equation with baseline task expectancies and week 2 therapy efficacy expectations best predicted exercise (Table 4).

Sessions completed (persistence with therapy). Having completed a greater number of the sessions prescribed was predicted by self-efficacy and outcome expectancies at baseline and week 2. Follow-up analyses indicated that task expectancies were related to sessions completed ($r = .49$, $p < .001$). Both baseline task expectancies and self-efficacy contributed to the regression predicting sessions completed (Table 3).

Subjective recovery. Reporting greater subjective recovery at week 8 was predicted by all of the baseline measures except pain, and by all the measures at week 2 including pain. Expectancies were related to subjective recovery at baseline and week 2 task expectancies ($r = .27$, $p = .02$; $r = .26$, $p =.02$). Subjective recovery was also predicted by baseline and week 2 expectations that the therapy would be efficacious ($r = .29$, $p = .009$; $r = .31$, $p = .005$), and with baseline and week 2 anticipated therapy-related symptoms ($r = .27$, $p = .02$; $r = .44$, $p < .001$). The regression equation predicting subjective recovery included baseline task expectancies and expectations concerning therapy efficacy, and expectations at week 2 concerning the likely level of therapy-related symptoms.

Discussion

The findings from this observational study of physiotherapy were broadly consistent with those from the simulation. As in the simulation, persistence with completion of sessions was predicted solely by self-efficacy and outcome expectancies. Indeed, the proportion of prescribed sessions completed was predicted by baseline task outcome expectancies and self-efficacy, indicating that experiences of feedback from carrying out physiotherapy had no influence on this aspect of adherence. However, subjective recovery and adherence during sessions (i.e., time spent on each exercise session) were predicted not only by self-efficacy and outcome expectancies but also by pain. Baseline pain was negatively related to time spent exercising, and week 2 pain was negatively related to subjective recovery. Pain did not directly predict these outcomes after controlling for self-efficacy and outcome expectancies following experience of treatment, but recovery was predicted by treatment-based expectations that physiotherapy would provoke pain.

GENERAL DISCUSSION

The key findings from the simulation and clinical studies both support the hypothesis that self-efficacy and outcome expectancies, and aversive feedback experienced during therapy, have different effects on different aspects of adherence. Higher baseline and virtual day 2 task and self-evaluative outcome expectancies were predictive of persistence in the simulation study. Similarly, higher baseline task and self-evaluative outcome expectancies and self-efficacy were predictive of persistence with therapy in the clinical study (i.e., *completing more physiotherapy sessions)*. However, the experience of aversive feedback when exercising, such as pain and symptoms associated with therapy, influence *how* therapy sessions are undertaken, leading to reduced engagement in exercise (i.e., worse adherence during sessions). Receiving aversive feedback resulted in slower responding in the simulation study, whereas less time spent exercising was predicted by higher pain levels at baseline in study 2. Both aspects of adherence influenced recovery, which was predicted by both cognitions and aversive feedback. Aversive feedback resulted in less simulated recovery in Study 1, and self-efficacy at virtual day 2 mediated this relationship. Lower pain and higher expectations of therapy efficacy and improvement of therapy-related symptoms at week 2 was related to more subjective recovery in Study 2.

The present findings are consistent with previous research suggesting that both self-efficacy and outcome expectancies and symptoms are related to adherence (Dobkin, et al., 2005; Engström &

Öberg, 2005; Fleury & Sedikides, 2007; Griva et al., 2000; Sluijs et al., 1998; Brewer et al., 2003; Iverson et al., 2003; Jensen & Lorish, 1994; Luszczynska & Sutton, 2006; Maddux et al., 1995; Rejeski et al., 1998; WHO, 2003; Yardley & Donovan-Hall, 2007), but the use of the simulation allowed us to delineate more clearly the potential roles of these variables. The outcome expectancies that were most predictive of adherence in the current studies concerned whether participants believed that carrying out the required tasks would be enjoyable or unpleasant. This finding has parallels with recent suggestions that anticipated affect from exercise (e.g., the extent to which exercising is perceived as enjoyable or boring) is an important predictor of undertaking physical activity (Lowe, Eves, & Carroll, 2002; Williams, Anderson, & Winett, 2005).

However, there may be additional and more complex inter-relationships among cognitions, aversive feedback, and adherence than those that were identified. For example, research on adherence to exercise suggests that self-efficacy and adherence are reciprocally related (McAuley, Courneya, Rudolph, & Lox, 1994; Oman & King, 1998), and that self-efficacy can influence perceptions of physiological symptoms (McAuley, Talbot, & Martinez, 1999). In addition, cognitive factors, such as the individual's representation of their condition that necessitated physiotherapy (as described in the common sense model of self-regulation) may impact on adherence behavior (Leventhal, Halm, Horowitz, Leventhal, & Ozakinci, 2004).

The present studies had complementary strengths and weaknesses. The simulation had good internal validity but poor external validity, whereas the reverse was the case for the clinical study. The simulation differed from real-life physiotherapy in ways that could have an important influence on beliefs and behavior. The financial incentive for persisting with the simulation is a different motivation from the desire to achieve better health and physical functioning by persisting with physiotherapy. Symptoms experienced by physiotherapy patients can be more aversive than the unpleasant auditory feedback in the simulation, and are more likely to provoke emotional reactions such as fear of harm and despondency about the likely success of therapy. The simulation could be completed within an hour, whereas physiotherapy generally takes weeks. The clinical study had better ecological validity, but participation rates were low and it possible that those who took part were not a wholly representative sample of all patients undergoing physiotherapy. It is probable at least that adherence was higher in the current sample than in the wider patient population. The clinical study also suffered from the typical problems associated with the use of self-report measures and an observational design (Weinstein, 2007), making it virtually impossible to isolate the effects of aversive symptoms and cognitions about symptoms, or to validate measures of adherence behavior. Because of the limitations of each study in isolation, this general discussion has focused on the broad and common findings.

To conclude, the findings of these studies highlight the importance for researchers and clinicians of considering not only the total number of therapy sessions completed, but also the way in which they are completed. Examination of the way in which therapy sessions are completed should preferably be carried out by means of independent observation, given that participants may not be able to report their behavior and the sources that influence it accurately. Therapist evaluations of the quality of adherence to supervised physiotherapy have proved useful (Brewer et al., 2003), but measurement of the quality of adherence to home-based therapy remains a challenge. However, technological advances in movement sensors may offer potential for future monitoring of home-based physiotherapy for clinical and research purposes. In addition, our study suggests that simulating key features of the therapeutic experience can provide a valuable means of studying their effects under conditions that permit experimental control as well as detailed independent observation. Finally, our findings have implications for clinicians or researchers who seek to intervene to improve adherence to home-based physiotherapy. Interventions that promote self-efficacy and positive outcome expectancies are likely to encourage patients to continue with therapy, but to optimise adherence during sessions, it may be necessary to help patients to minimise or cope with aversive symptoms experienced during therapy sessions.

REFERENCES

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: W.H. Freeman and Company.

Baumeister, R. F., & Heatherton, T. F. (1996). Self-regulation failure: An overview. *Psychological Inquiry, 7,* 1-15.

Brewer, B. W., Cornelius, A. E., van Raalte, J. L., Petitpas, A. J., Sklar, J. H., Pohlman, M. H., et al. (2003). Protection motivation theory and adherence to sport injury rehabilitation revisited. *The Sport Psychologist, 17,* 95-103.

Carter, S., Taylor, D., & Levenson, R. (2003). *A question of choice: Compliance in medicine taking*. London: Medicines Partnership.

Cleeland, C. S. (1991). Pain assessment in cancer. In D. Osoba (Ed.), *Effect of cancer on quality of life* (pp. 293-305). CRC Press.

Courneya, K. S., Friedenreich, C. M., Arthur, K., & Bobick, T. M. (1999). Understanding exercise motivation in colorectal cancer patients: A prospective study using the theory of planned behaviour. *Rehabilitation Psychology, 44,* 68-84.

Dobkin, P. L., Abrahamowicz, M., Fitzcharles, M. A., Drista, M., & da Costa, D. (2005). Maintenance of exercise in women with fibromyalgia. *Arthritis and Rheumatism, 53,* 724-731.

Engström, L. O., & Öberg, B. (2005). Patient adherence in an individualized rehabilitation programme: A clinical follow-up. *Scandinavian Journal of Public Health, 33,* 11-18.

Fleury, J., & Sedikides, C. (2007). Wellness motivation in cardiac rehabilitation: The role of self-knowledge in cardiovascular risk modification. *Research in Nursing and Health, 30*, 373-384.

Griva, K., Myers, L., & Newman, S. (2000). Illness perceptions and self-efficacy beliefs in adolescents and young adults with insulin dependent diabetes mellitus. *Psychology and Health, 15,* 733-750.

Hölzl, R., Kleinböhl, D., & Huse, E. (2005). Implicit operant learning of pain sensitization. *Pain, 115,* 12-20.

Iversen, M. D., Fossel, A. H., & Katz, J. N. (2003). Enhancing function in older adults with chronic low back pain: A pilot study of endurance training. *Archives of Physical Medicine and Rehabilitation, 84,* 1324-1331.

Jensen, G. M., & Lorish, C. D. (1994). Promoting patient cooperation with exercise programs: Linking research, theory, and practice. *Arthritis Care and Research, 7,* 181-189.

Johnston, M., Bonetti, D., & Pollard B.(2002). Disability as behavior: Models of measurement and explanation. In L. Backman, & C. von Hofston (Eds.), *Psychology at the turn of the millennium, Vol. 1: Cognitive, biological and health perspectives* (pp. 319-333). Psychology Press: Sussex.

Leventhal, H., Halm, E., Horowitz, C., Leventhal, E.A., & Ozakinci, G. (2004). Living with chronic illness: A contextualized, self-regulation approach. In S. Sutton, A. Baum, & M. Johnston. (Eds.), *The Sage handbook of health psychology* (pp. 196-240). London: Sage.

Levine, A. J., Hinkin, C. H., Marion, S., Keuning, A., Castellon, S. A., Lamm, M. M., et al. (2006). Adherence to antiretroviral medications in HIV: Differences in data collected via self-report and electronic monitoring. *Health Psychology, 25,* 329-335.

Lowe, R., Eves, F., & Carroll, D. (2002). The influence of affective and instrumental beliefs on exercise intentions and behavior: A longitudinal analysis. *Journal of Applied Social Psychology, 32,* 1241-1252.

Luszczynska, A.., & Sutton, S. (2006). Physical activity after cardiac rehabilitation: Evidence that different types of self-efficacy are important in maintainers and relapsers. *Rehabilitation Psychology, 51,* 314-321.

Maddux, J. E., Brawley, L., & Boykin, A. (1995). Self-efficacy and healthy behavior: Prevention, promotion and detection. In J. E. Maddux (Ed.), *Self-efficacy, adaptation, and adjustment: Theory, research, and application* (pp. 173-202). Portland: Plenum.

McAuley, E., Courneya, K. S., Rudolph, D. L., & Lox, C. L. (1994). Enhancing exercise adherence in middle-aged males and females. *Preventive Medicine, 23,* 498-506.

McAuley, E., Talbot, H. M., & Martinez, S. (1999). Manipulating self-efficacy in the exercise environment in women: Influences on affective responses. *Health Psychology, 18,* 288-294.

Michie, S., Rothman, A., & Sheeran, P. (2007). Current issues and new direction in Psychology and Health: Advancing the science of behavior change. *Psychology and Health, 22,* 249-253.

Oman, R. F., & King, A. C. (1998). Predicting the adoption and maintenance of exercise participation using self-efficacy and previous exercise participation rates. *American Journal of Health Promotion, 12,* 154-161.

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers, 36(4),* 717-731.

Rejeski, W. J., Ettinger, W., Martin, K., & Morgan, T. (1998). Treating disability in knee osteoarthritis with exercise therapy: A central role for self-efficacy and pain. *Arthritis Care and Research, 11,* 94-101.

Resnick, B., Palmer, M. H., Jenkins, L. S., & Spellbring, A. M. (2000). Path analysis of efficacy expectations and exercise behaviour in older adults. *Journal of Advanced Nursing, 31,* 1309-1315.

Rodgers, W. M., Hall, C. R., Blanchard, C. M., McAuley, E., & Munroe, K. J. (2002) Task and scheduling self-efficacy as predictors of exercise behaviour. *Psychology and Health, 17,* 405-416.

Rothman, A. J. (2000). Toward a theory-based analysis of behavioral maintenance. *Health Psychology, 19,* 64-69.

Ryan, M. P. (2005). Physical activity levels in young adult Hispanics and Whites: Social cognitive theory determinants. *Psychology and Health, 20,* 709-727.

Skinner, B. F. (1938). *The behavior of organisms: An experimental analysis.* New York: Appleton-Century-Crofts.

Sluijs, E. M., Kerssens, J. J., van der Zee, J., & Myers, L. B. (1998). Adherence to physiotherapy. In L.B. Myers & K. Midence (Eds.), *Adherence to treatment in medical conditions* (pp. 363-382). Amsterdam: Harwood Academic Publishers.

Sniehotta, F. F. Scholz, U., & Schwarzer, R. (2005). Bridging the intention-behaviour gap: Planning, self-efficacy, and action control in the adoption and maintenance of physical exercise. *Psychology and Health, 20,* 143-160.

Sobel, M. E. (1982). Asymptotic confidence intervals for indirect effects in structural equation models. *Sociological Methodology, 13,* 290-312.

Tice, D. M., Bratslavsky, E., & Baumeister, R. F. (2001). Emotional distress regulation takes precedence over impulse control: If you feel bad, do it! *Journal of Personality and Social Psychology, 80,* 53-67.

Tijou, I. (2007). *Treatment adherence: The contribution of different mechanisms.* PhD Psychology University of Southampton.

Weinstein, N. D. (2007). Misleading tests of health behavior theories. *Annals of Behavioural Medicine, 33,* 1-10.

WHO (2003). *Adherence to long-term therapies: evidence for action* Geneva: WHO.

Williams, D. M., Anderson, E. S., & Winett, R. A. (2005). A review of the outcome expectancy construct in physical activity research. *Annals of Behavioural Medicine, 29,* 70-79.

Yardley, L., & Donovan-Hall, M. (2007). Predicting adherence to exercise-based therapy in rehabilitation. *Rehabilitation Psychology, 52,* 56-64.

Yardley, L., & Kirby, S. (2006). Evaluation of booklet-based self-management of symptoms in Ménière's disease: a randomized controlled trial. *Psychosomatic Medicine, 68,* 762-769.

Yardley, L., & Moss-Morris, R. (2007). Current issues and new directions in Psychology and Health: 'Plus ca change, plus c'est la meme chose'. *Psychology and Health, 22,* 1-5.

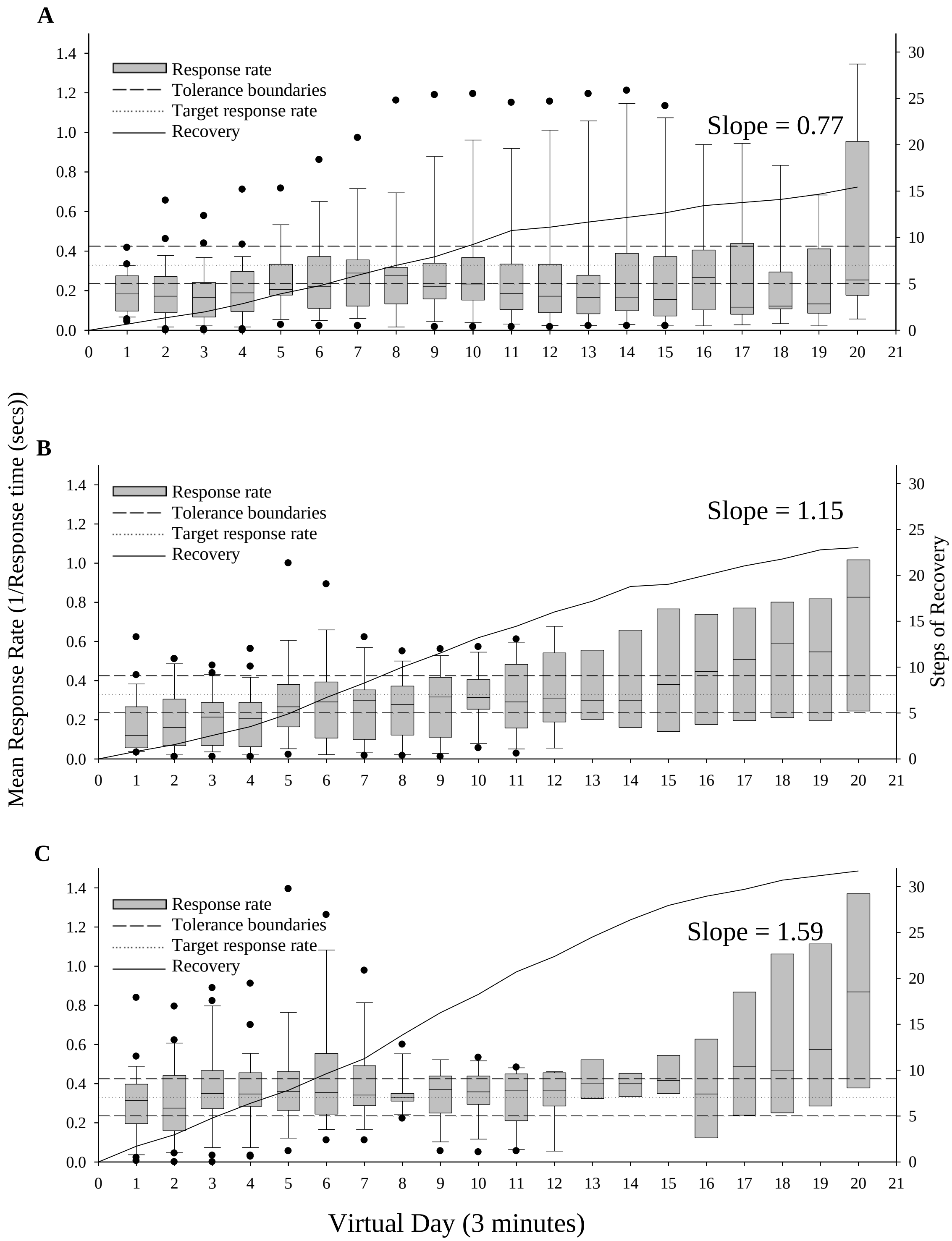

Figure Caption

Figure 1. Study 1 boxplots displaying the mean response rate and stage of recovery achieved each virtual 'day' in each of the three conditions.

Note. Graphs show responding with aversive feedback (panel A), combined feedback (panel B) and informational feedback (panel C). Shaded bars represent from the 25th to 75th percentile, whiskers denote the 10th and 90th percentiles. Lines within the shaded bars indicate the median. The more variable data for the later virtual days is based on a small number of participants who had neither recovered nor dropped out.

Table 1

Study 1 means and standard deviations for baseline and virtual day 2 self-efficacy and outcome expectancies in persistence (those who completed or dropped out of the simulation)

	Completed (n = 36)		Dropped out (n = 48)	
Measure	*M*	*SD*	*M*	*SD*
Self-efficacy (baseline)	15.66	4.10	14.60	5.04
Self-efficacy (virtual day 2)	16.20	4.94	12.08	5.62
Outcome expectancies (baseline)	35.81	6.57	31.66	7.19
Outcome expectancies (virtual day 2)	32.80	5.80	27.26	7.16
Social expectancies (baseline)	11.67	2.93	11.91	2.77
Social expectancies (virtual day 2)	11.17	2.52	10.64	2.64
Self-evaluative expectancies (baseline)	11.31	3.27	9.81	3.78
Self-evaluative expectancies (virtual day 2)	11.08	2.02	9.81	3.70
Task expectancies (baseline)	12.58	2.61	10.19	3.36
Task expectancies (virtual day 2)	10.36	3.48	7.00	3.64

Table 2

Study 2 distributions of baseline and week 2 measures in the clinical study (i.e., potential predictors of successful completion of physiotherapy)

Measure	*n*	Range	*M*	*SD*
Pain (baseline)	68	2-29	13.7	6.9
Pain (week 2)	67	0-39	14.1	8.4
Self-efficacy (baseline)	66	15-80	53.1	15.4
Self-efficacy (week 2)	67	13-80	51.2	15.7
Outcome expectancies (baseline)	68	14-35	24.5	4.9
Outcome expectancies (week 2)	66	15-33	24.3	4.7
Social expectancies (baseline)	68	6-18	15.0	3.0
Social expectancies (week 2)	66	7-18	14.8	3.1
Task expectancies (baseline)	68	0-17	9.6	3.6
Task expectancies (week 2)	66	1-17	9.5	3.5
Therapy expectations (baseline)	68	16-48	37.0	5.7
Therapy expectations (week 2)	67	29-47	37.9	4.1
Efficacy expectations (baseline)	68	1 - 5	4.0	0.8
Efficacy expectations (week 2)	67	2.3-5	4.1	0.6
Symptom expectations (baseline)	68	1.3-5	3.6	0.7
Symptom expectations (week 2)	67	1.3-5	3.7	0.7
Competence expectations (baseline)	68	1 - 5	4.0	1.0
Competence expectations (week 2)	67	1 - 5	4.2	0.8
Practical expectations (baseline)	68	1 - 5	3.0	1.1
Practical expectations (week 2)	67	1 - 5	2.9	1.0

Table 3

Study 2 correlations (with n in brackets) of baseline and week 2 predictors with measures of successful completion of physiotherapy

Baseline and week 2 predictors	Exercise time[a]	Sessions completed	Subjective recovery
Self-efficacy (baseline)	.17 (52)	.29 (64) **	.32 (65) **
Self-efficacy (week 2)	.27 (52) *	.31 (64) **	.29 (65) **
Outcome expectancies (baseline)	.29 (52) *	.42 (65) **	.29 (66) **
Outcome expectancies (week 2)	.19 (52)	.29 (63) *	.24 (64) *
Therapy expectations (baseline)	.10 (52)	-.05 (66)	.38 (67) **
Therapy expectations (week 2)	.24 (52) *	.09 (64)	.43 (65) **
Pain (baseline)	-.28 (52) *	.10 (65)	-.14 (66)
Pain (week 2)	-.11 (52)	.12 (64)	-.27 (65) *

Note. The *n*s vary because of missing data. [a]Relationships with exercise time are partial correlations controlling for age.

* $p < .05$; ** $p < .01$ level, one-tailed test.

Table 4

Study 2 results of regression analyses predicting exercise time, sessions completed and subjective recovery

Predictors	ΔR^2	*SE B*	*B*	*β*
		Exercise time (*n* = 55)		
Task outcome expectancies (baseline)	.09 *	.04	.07	.23
Therapy efficacy expectations (week 2)	.07 *	.28	.56	.27 *
		Sessions completed (*n* = 61)		
Task outcome expectancies (baseline)	.22 ***	.03	.12	.44 ***
Self-efficacy (baseline)	.05 *	.02	.01	.24 *
		Subjective recovery[a] (*n* = 62)		
Therapy efficacy expectations (baseline)	.06 *	.14	.38	.33 **
Task outcome expectancies (baseline)	.11 **	.08	.03	.32 **
Symptom expectations (week 2)	.09 **	.45	.16	.32 **

Note. [a]Baseline self-efficacy was selected for entry into the equation predicting subjective recovery on Step1 but was removed on Step 4. * $p < .05$; ** $p < .01$; *** $p < .001$, two-tailed test