

Randomized Trial of a DVD Intervention to Improve Readiness to Self-Manage Joint Pain

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ABSTRACT

A DVD (digital video disk) intervention to increase readiness to self-manage joint pain secondary to hemophilia was informed by a 2-phase, motivational-volitional model of readiness to self-manage pain, and featured the personal experiences of individuals with hemophilia. The DVD was evaluated in a randomized controlled trial in which 108 men with hemophilia completed measures of readiness to selfmanage pain (Pain Stages of Change Questionnaire) before and 6 months after receiving the DVD plus information booklet (n = 57) or just the booklet (n = 51). The effect of the DVD was assessed by comparing changes in Pain Stages of Change Questionnaire scores (precontemplation, contemplation, and action/maintenance) between groups. The impact on pain coping, pain acceptance, and health-related quality of life was tested in secondary analyses. Repeated-measures analysis of variance, including all those with complete baseline and follow-up data regardless of use of the intervention, showed a significant, medium-sized, group _ time effect on precontemplation, with reductions among the DVD group but not the booklet group. Significant use _ time effects showed that benefits in terms of contemplation and action/maintenance were restricted to those who used the interventions at least once. The results show that low-intensity interventions in DVD format can improve the motivational impact of written information, and could be used to help prepare people with chronic pain for more intensive self-management interventions. The findings are consistent with a 2-phase, motivational-volitional model of pain self-management, and provide the first insights to our knowledge of readiness to self-manage pain in haemophilia.

1. Introduction

Pain self-management programs usually consist of small group instructional sessions based on cognitive-behavioral or psycho-social principles. Randomized trials with book-only or waiting list controls showed they led to improvements among people with various chronic pain conditions [31, 35, 44]. However, many people referred to pain programs do not attend or engage [38, 42, 43], so increasing motivation or 'readiness' to self-manage pain could potentially contribute to more cost-effective management of pain across multiple chronic pain populations.

In Jensen et al.'s preliminary motivational model, beliefs about costs and benefits, learning histories, experiences, contingencies, modeling, verbal persuasion, and perceived barriers influence readiness to self-manage, which then influences coping and other self-management behaviors; "Patients will

engage in specific pain self-management strategies as a function of their readiness (or motivation) to use these strategies” [23, p. 484].

Readiness to self-manage pain is measured by the Pain Stages of Change Questionnaire (PSOCQ), which has four scales: precontemplation, contemplation, action, and maintenance [28, 29]. The scales are named after the stages in the Stages of Change model [37], but in fact represent independent aspects of readiness to self-manage, and the PSOCQ was specifically *not* designed for stage classification; “the construct it operationalizes is readiness to adopt a self-management approach to chronic pain, which can entail simultaneously endorsing seemingly inconsistent views about change. This is to be distinguished from a measure of stage per se, which the PSOCQ is not” [30, p. 303]. Self-managing pain involves numerous complex behaviors, and individuals may hold contradictory beliefs and positions about their readiness to self-manage, so changes in one scale may not necessarily accompany changes in another.

PSOCQ scores predicted several aspects of engagement in self-management programs, including participation, adherence and completion [7, 9, 22, 28], and *changes* in PSOCQ scores are also associated with better outcomes [17, 26, 28]. This led researchers to suggest that, “studies regarding how PSOCQ scores change over time with specific interventions would be useful in providing information regarding how to motivate patients to become more active participants in pain treatment” [7, p. 357].

Video interventions improved patient participation and decision making in treatment for benign prostatic hyperplasia [6] and ischemic heart disease [32], and a review concluded that video presentation was more effective than written information alone [36]. We evaluated a DVD intervention to increase motivation to self-manage chronic joint pain secondary to hemophilia, an inherited bleeding disorder in which repeated bleeding into joints causes hemophilic arthropathy [10, 33].

The DVD targeted influences on readiness to self-manage identified in Jensen et al.’s model [23]. It featured individuals’ personal descriptions of their experiences, but did not provide instruction in specific self-management techniques. We predicted greater reductions in precontemplation, and greater increases in contemplation, action, and maintenance among those who received the DVD, especially those with more severe hemophilia or more intense pain, and those who made greater use of the DVD. We did not predict changes in outcomes associated with self-management itself, because *readiness* to self-manage was the target outcome, and increases in that would represent an important first step towards changes in other outcomes. However, effects on pain coping, pain acceptance, and health-related quality of life were also tested in secondary analyses.

2. Methods

2.1. Design

In a longitudinal, randomized controlled trial, changes in PSOCQ scores were assessed among individuals who received the DVD plus a booklet containing similar information in written form, or just the booklet. Almost all individuals with hemophilia receive or have access to written information about joint pain, so a no-information control group was unrealistic, and the aim of the trial was to evaluate the additional impact of the DVD format and method of delivery.

2.2. Participants and Procedure

Participant recruitment was through the membership and registration list of the Haemophilia Society UK. The inclusion criteria were Society membership or registration with good mailing status, having hemophilia A or B, being aged over 18 years, and completing baseline assessment. The exclusion criteria were medical conditions that complicate pain self-management (such as Alzheimer's disease) or having previously indicated unwillingness to participate in research. Eligible individuals who gave informed consent and completed baseline assessment were enrolled in the trial. We planned for an baseline sample size of 200 in order to achieve 0.80 power to detect small-to-moderate effects (0.25), assuming 25% attrition over six months, based on the Haemophilia Society's experience with other programs for Society members. In fact 196 participants were enrolled, of whom 136 (69%) were followed up six months later, of whom 108 (79%) had complete data and were included in the analysis. Fig. 1 shows participation in the form of a Consort flowchart [2]. Participant details at each stage are given in Table 1.

A computer-generated random sequence of 0s and 1s, with equal numbers of 0s and 1s within each block of 10, was used to allocate those enrolled to one of two mailings: the DVD plus booklet, or booklet only. Blind allocation was achieved by assigning each participant a study number in a sequence from 1 to 196. Those numbers, separated from all identifying information about participants, were then sorted into a random sequence and merged with the computer-generated sequence to determine which individuals received which mailing.

The procedure for recruitment and data collection preserved the anonymity of participants, who were identified only by a number assigned specifically for the study. The Haemophilia Society retained all information about the identity and contact details of participants, and mailings to deliver the booklet/DVD and collect study data were undertaken by the Society. Baseline data were collected before the DVD and/or booklet were mailed, and only those who returned baseline questionnaires were enrolled in the trial. After the 6-month follow-up, the DVD was sent to all those who previously received only the booklet. The research protocol was approved by the University ethics committee. As described in a cross-sectional analysis of baseline data, the most common reasons given for not taking part in the study were having a mild form of hemophilia and experiencing little or no bleeding pain, and participants differed from non-participants in being more likely to have severe hemophilia, but did not differ in age or type of hemophilia [15].

2.3. Measures

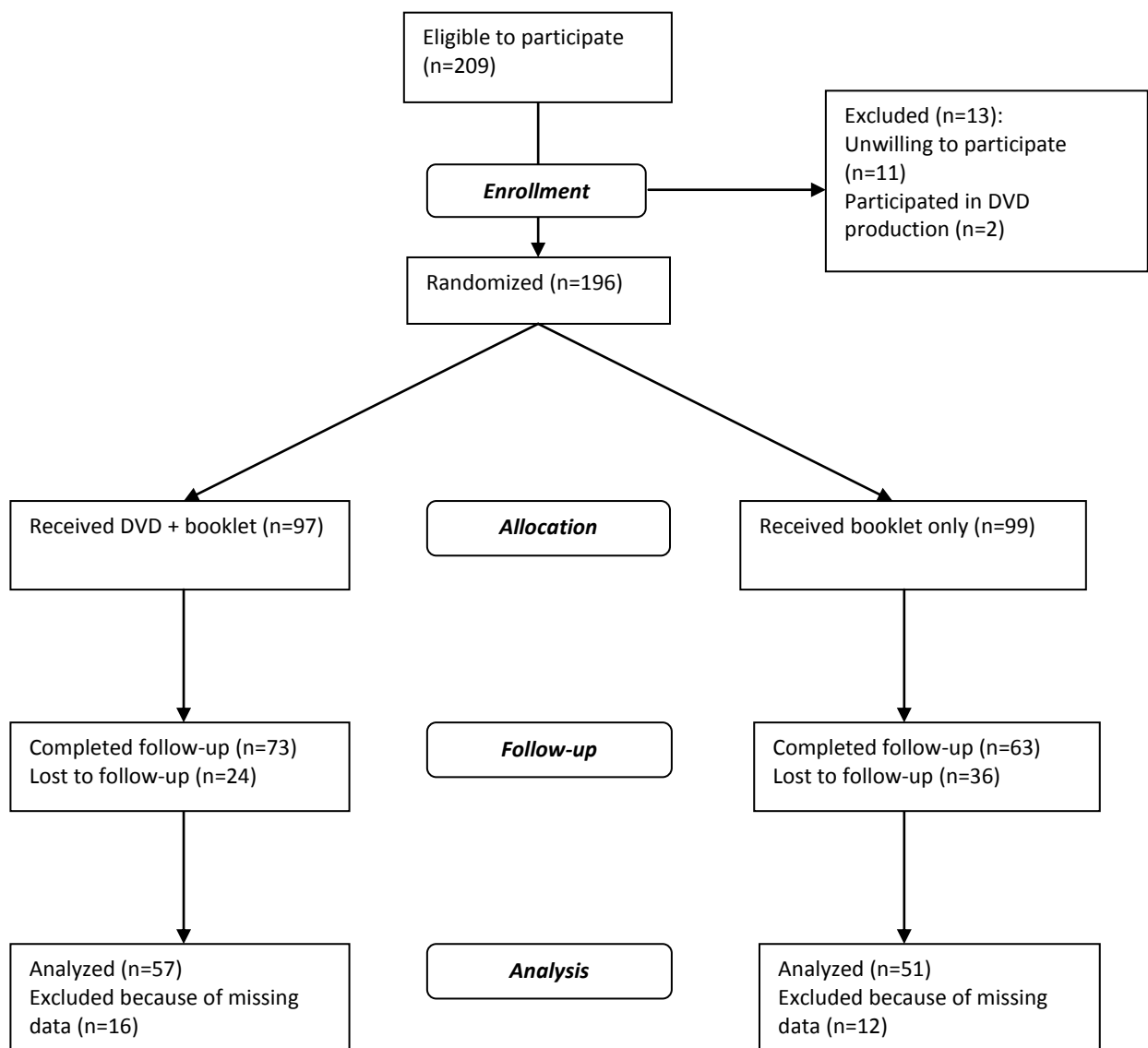
The primary outcome was readiness to self-manage pain, measured by the four scales of the pain stages of change questionnaire. Secondary outcomes were pain coping, pain acceptance, and health-related quality of life. All those factors were measured at baseline and six-month follow-up. Age, pain intensity, and hemophilia type and severity were recorded at baseline, and measures of DVD/booklet use and direct evaluative feedback were obtained at follow-up.

2.3.1. Readiness to self-manage pain

The pain stages of change questionnaire [PSOCQ; 29] is a 30-item self-report questionnaire with four scales: Precontemplation (7 items) measures intentions and motivation to self-manage pain, with high scores indicating little perceived personal responsibility for pain control and no interest in adopting self-management. Contemplation (10 items) measures consideration of behavioral changes associated with self-management of pain, and awareness of personal responsibility for pain control. Action (6 items) measures active involvement in learning self-management strategies for pain control, and maintenance (7 items) measures incorporation of self-management techniques into

daily life. Each item is scored on a five-point scale, from ‘strongly disagree’ (1) to ‘strongly agree’ (5), and scale scores are obtained by summing scores across items and dividing by the number of items. The reliability and validity of the PSOCQ has been shown to be good, with internal reliability for the four scales ranging from 0.77 to 0.88, test-retest reliability ranging from 0.74 to 0.86, and substantial support for criterion-related and predictive validity [19, 24, 25, 28, 29]. In the present sample (n=108), internal reliabilities (Cronbach’s Alpha) at baseline and follow-up respectively were 0.73 and 0.75 for precontemplation, 0.83 and 0.85 for contemplation, 0.73 and 0.70 for action, and 0.82 and 0.85 for maintenance.

Figure 1. Study flowchart



2.3.2 Pain coping

The hemophilia pain coping questionnaire (HPCQ) is a brief measure of pain coping and negative thoughts about pain in hemophilia [14]. Scores for 27 items, each rated on a seven-point scale from ‘never do that’ (0) to ‘always do that’ (6) are used to compute three scale scores by summing across

items and dividing by the number of items. The active coping scale (10 items) measures active pain coping strategies, with higher scores indicating greater use of diverting attention from pain, ignoring pain sensations, reinterpreting pain sensations, increasing behavioral activities when in pain, and coping self-statements. The negative thoughts scale (9 items) measures negative and emotional thinking about pain, with higher scores indicating more catastrophizing, anger, fear, and seeking isolation when in pain. The passive adherence scale (6 items) measures passive/adherent pain coping strategies with higher scores indicating greater use of resting, painkillers and ice when in pain. In a previous report of 209 people with hemophilia, internal reliabilities (Cronbach's Alpha) were 0.80 for active coping, 0.86 for negative thoughts, and 0.76 for passive adherence, and validity was demonstrated by differential relationships with other measures of responses to pain [14]. In the present sample (n=108) internal reliabilities at baseline and follow-up respectively were 0.82 and 0.83 for active coping, 0.85 and 0.88 for negative thoughts, and 0.77 and 0.76 for passive adherence.

2.3.3. Pain acceptance

The chronic pain acceptance questionnaire (CPAQ) is a self-report measure of the extent to which individuals are able to desist from attempts to avoid or reduce their chronic pain, with 20 items scored on a six-point scale, from 'never true' (0) to 'almost always true' (5) [34]. Two subscale scores are obtained by summing across items, with higher scores indicating greater pain acceptance. The activity engagement subscale comprises 11 items about engaging in activities when in pain, and the pain willingness subscale comprises nine items about recognizing that avoidance and control are often unworkable methods of adapting to chronic pain. In a study of people with chronic pain conditions, the internal reliabilities of activity engagement and pain willingness were 0.82 and 0.78 respectively, and significant relationships with other measures of patient functioning supported their validity [34]. In the present sample (n=108), internal reliabilities at baseline and follow-up respectively were 0.80 and 0.82 for activity engagement, and 0.78 and 0.82 for pain willingness.

2.3.4. Health-related quality of life

The RAND 36 (SF-36) is a 36-item questionnaire measure of health-related quality of life [20, 21]. There are eight subscales (physical functioning, role limitations due to physical health problems, role limitations due to emotional problems, energy/fatigue, emotional well-being, social functioning, pain, and general health), from which mental and physical component summary scales (PCS and MCS) are derived by standardizing each subscale score, computing two aggregate component scores, and then transforming the component scores to T scores with means of 50 and SDs of 10 [46]. For all the subscales and component summary scales, higher scores indicate greater health-related quality of life. The SF-36 was recommended for use in chronic pain samples [3], and has good reliability and validity in painful conditions like rheumatoid arthritis [39]. It is frequently used in hemophilia [16], and has good internal consistency and discriminates well between patients with differing severity of hemophilia [40]. In the present sample (n=108), internal reliabilities at baseline and follow-up respectively were 0.85 and 0.86 for PCS, and 0.85 and 0.86 for MCS.

2.3.5. Other measures

Pain intensity in the last month was rated on a 10cm visual analogue scale labeled 'no pain' to 'worst pain possible'. DVD and booklet use were measured at follow-up by items asking how often participants had watched the DVD/read the booklet, using 7-point response scales labeled 'I haven't looked at it;' 'I looked at it but didn't watch/read it properly;' 'I watched/read it once;' 'I watched/read it occasionally;' 'I watched/read it about once a month;' 'I watched/read it about once a week;' and 'I watched/read it more than once a week'. Evaluative feedback was collected at

follow-up by items asking how helpful participants found the DVD/booklet, with 4-point ratings scales ranging from ‘not at all helpful’ to ‘very helpful’.

Table 1. Participant details

	Baseline	Follow-up	Analysis
N	196	136	108
Mean age (SD, range)	49.3 (12.7, 20-84)	51.4 (12.4, 25-84)	51.1 (12.2, 26-84)
Type of disorder			
Haemophilia A	156 (79.6%)	109 (80.1%)	86 (79.6%)
Haemophilia B	35 (17.9%)	22 (16.2%)	20 (18.5%)
Not known	5 (2.6%)	5 (3.7%)	2 (1.9%)
Haemophilia severity			
Mild	44 (22.4%)	30 (22.1%)	20 (18.5%)
Moderate	22 (11.2%)	14 (10.3%)	12 (11.1%)
Severe	124 (63.3%)	89 (65.4%)	76 (70.4%)
Not known	6 (3.1%)	3 (2.2%)	-
Marital status			
Single	38 (19.4%)	23 (16.9%)	12 (11.1%)
Married/cohabiting	133 (67.9%)	96 (70.6%)	82 (75.9%)
Divorced/separated	20 (10.2%)	12 (8.8%)	10 (9.3%)
Other	5 (2.6%)	5 (3.7%)	4 (3.7%)
<i>Educational level</i>			
High school only ¹	70 (35.7%)	51 (37.5%)	42 (38.9%)
Post-16 education ²	70 (35.7%)	51 (37.5%)	39 (36.1%)
Higher education ³	51 (26%)	29 (21.3%)	22 (20.4%)
Other/not known	5 (2.6%)	5 (3.7%)	5 (4.6%)

Notes to table 1:

1. Left school at 16 years
2. High school to 18 years or Further Education
3. University undergraduate or postgraduate study

2.4. The intervention

The DVD intervention aimed to increase motivation to self-manage pain. It was not a self-management treatment or education program, and did not provide instruction in self-management skills or techniques, but aimed to increase *motivation* to adopt a self-management approach, in a way that maximized viewer engagement and could be used easily at home. It took the form of a 25-minute film, with content based on evidence and theory, but with all the information and messages delivered by five people with hemophilia who described their own experiences of living and coping with hemophilia joint pain. The film content covered factors previously identified as influences on readiness to self-manage, including beliefs about costs and benefits, learning histories, contingencies, personal experience, modeling, verbal persuasion, and perceived barriers [23]. In terms of Abraham and Michie’s taxonomy of behavior change techniques [1], the film provided information about behavior-health links and consequences, prompts to intention formation and barrier identification, prompts to goal-setting, general encouragement, and modeling behavior.

The individuals portrayed in the film described their personal experiences of hemophilia-related pain and its impact on their lives, and how they had adjusted life goals and values accordingly. They described experiences of how negative thinking, anger, and passive coping led to low moods, restricted activities and social isolation. They described the goals they set for themselves in relation to everyday activities, social activities, and exercise. They described the importance of keeping going with activities and setting personal goals, and were portrayed undertaking everyday tasks and leisure and exercise activities, both inside and outside the home. They described the costs and

benefits of using painkillers in negative and positive ways, and the benefits of having hope and believing things could get better.

There was no narration, and all the content was delivered by the individuals who appeared in the film, who spoke directly to camera or whose spoken words accompanied film of them undertaking different activities. Key messages were endorsed by two health professionals, a health psychologist and a physiotherapist, who also appeared in the film.

In consultation with the Haemophilia Society, the film was delivered as a DVD (rather than online, for example) in order to maximize availability and use among participants, many of whom were not expected to be technologically skilled or well-equipped. The DVD was designed as a low intensity motivational intervention, to be mailed to participants with brief instructions and no need for personal instruction or clinical support.

The booklet contained the same information as the DVD but in written format, with descriptions of types of pain in hemophilia, the impact of pain on emotions and other aspects of life, positive and negative ways of using painkillers, and descriptions of the benefits of active coping and exercise. The points made in the booklet were illustrated with quotations from the individuals portrayed in the film, and some of the booklet text corresponded directly to the film narrative, but the booklet did not refer to the film or contain photographs of the individuals in the film, and was designed to stand alone as a source of information about living with hemophilia joint pain and the benefits of greater pain self-management and active coping. Both DVD and booklet are available from the first author on request.

2.5. Data analysis

SPSS 16.0 for Windows was used for the statistical analysis. Mean values were substituted for questionnaire items where more than half of the items in a scale were non-missing. The numbers of cases where values were substituted in this way for each scale at baseline and follow-up respectively were: precontemplation 5 and 1; contemplation 3 and 3; action 1 and 1; maintenance 1 and 7; active coping 2 and 2; negative thoughts 1 and 1; passive adherence 0 and 0; activity engagement 2 and 2; pain willingness 2 and 4; physical health composite 10 and 9; mental health composite 10 and 9.

Differences at baseline between those randomized to each group, and between those who did and did not participate at follow-up, were tested with independent groups T-tests (for age and questionnaire scores) and Chi Square tests (for marital status and hemophilia type and severity).

Multivariate repeated measures analysis of variance was used to test the effects of the DVD on precontemplation, contemplation, action, and maintenance scores. The analysis included all randomized participants with follow-up data, regardless of use of the DVD/booklet. Univariate effects (on individual PSOCQ scores) were examined only where there were significant multivariate effects (where PSOCQ scores were combined). For the multivariate tests we report Wilks' Lambda (Λ) and for both multivariate and univariate tests we report Partial Eta Squared (η_p^2), a measure of effect size, as well as F and p. Values of η_p^2 between 0.01 and 0.06 are considered small, those between 0.06 and 0.14 are considered medium, and those greater than 0.14 are considered large [11, p. 283].

The effect of the DVD was tested by the group x time interaction. The moderating effects of hemophilia severity, pain intensity, and DVD/booklet use were tested by the group x severity x time, group x pain intensity x time, and group x use x time interactions, for which the measures of severity, pain intensity, and use were dichotomized. For severity, those with mild or moderate versus severe hemophilia were compared. For pain intensity, those with ratings above versus below

the median (0-5 versus 6-10) were compared. For use, those who reported watching/reading the DVD/booklet at least once were compared with those who did not.

In secondary analyses, the effects on pain coping, acceptance, and health-related quality of life were examined. There was one analysis with pain coping measures as the dependent variables (active coping, negative thoughts, and passive adherence); one with pain acceptance measures (activity engagement and pain willingness); and one with health-related quality of life measures (mental and physical components). Each analysis used the same design and independent variables as in the analysis of PSOCQ scores. Because there were three secondary analyses, the critical value of p was set at 0.0167 (0.05 divided by three), to correct for multiple tests.

Table 2. Correlations among baseline, follow-up (italicized) and change (underlined) PSOCQ scores (n=108)

	0.30**	
2. Contemplation	<i>0.20*</i>	
	<u>0.07</u>	
	-0.16	0.30**
3. Action/maintenance	<i>-0.14</i>	<i>0.41***</i>
	<u>-0.15</u>	<u>0.38***</u>
	Precontemplation	Contemplation

* p < 0.05; ** p < 0.01; *** p < 0.001

3. Results

3.1. Preliminary analysis

There were no significant differences in age, hemophilia type, hemophilia severity, marital status, or any of the questionnaire scores at baseline, between those randomized to receive DVD plus booklet or booklet only. Those who were followed-up were older than those who were not (mean age 51.4 compared with 45.2 years, $T = 3.33$, $p = 0.001$), and had lower physical health-related quality of life at baseline (mean score 30.47, compared with 35.90, $T = 2.63$, $p = 0.01$), but there were no significant differences in hemophilia type, severity, marital status, or any other questionnaire scores.

The correlations between the action and maintenance scales were 0.66 at baseline and 0.70 at follow-up. Because these approached the reliability of the scales, and because previous research employed a 0.70 cut-off for combining scores [25], we computed the mean of each participant's action and maintenance scores, and used the combined measure in all subsequent analyses. High correlations between action and maintenance have been reported in many previous studies. In one review, the five action-maintenance correlations reported were 0.66, 0.68, 0.74, 0.79, and 0.80, leading to the conclusion that "the action and maintenance scales largely assess the same phenomenon" [12, p. 32]. The correlations among baseline, follow-up and change (follow-up minus baseline) scores are given in Table 2. These are also broadly consistent with patterns observed in previous research [12], and show that contemplation and action/maintenance were positively correlated in all three cases; that precontemplation and contemplation were positively correlated at baseline and follow-up but not in terms of change; and that there was no significant relationship between precontemplation and action/maintenance.

Table 3. Means (SDs) for study variables at baseline and follow-up

	DVD + booklet (n=57)		Booklet only (n=51)	
	Baseline	Follow-up	Baseline	Follow-up
Pain intensity	5.53 (2.84)	5.05 (2.50)	5.53 (2.78)	5.33 (2.73)
<i>Readiness to self-manage</i>				
Precontemplation	2.80 (0.70)	2.67 (0.56)	2.88 (0.64)	2.91 (0.71)
Contemplation	3.11 (0.66)	3.02 (0.63)	3.23 (0.55)	3.11 (0.60)
Action/maintenance	3.07 (0.60)	3.13 (0.57)	3.12 (0.55)	3.09 (0.59)
<i>Pain coping</i>				
Active coping	2.35 (0.97)	2.59 (1.07)	2.44 (1.31)	2.93 (1.08)
Negative thoughts	1.62 (1.31)	1.77 (1.16)	2.10 (1.25)	2.46 (1.33)
Passive adherence	3.13 (1.47)	2.97 (1.21)	3.66 (1.35)	3.28 (1.44)
<i>Pain acceptance</i>				
Activity engagement	41.15 (10.38)	43.00 (8.99)	39.40 (10.83)	39.50 (10.77)
Pain willingness	26.48 (8.91)	27.82 (9.19)	22.96 (8.48)	25.48 (9.61)
<i>Quality of life</i>				
Physical health composite	30.26 (11.36)	31.68 (12.36)	29.70 (10.25)	31.09 (10.15)
Mental health composite	48.19 (9.33)	49.62 (8.94)	46.72 (12.92)	44.92 (13.50)

Descriptive statistics for study variables are given in Table 3. The distributions of those variables were all approximately normal. Non-normal distributions occurred in the measurement of DVD and booklet use. Of those who received only the booklet, eight (15.7%) reported not looking it at, six (11.8%) reported looking at it but not reading it properly, 27 (52.9%) reported reading it once, and 10 (19.6%) reported reading it more than once. Of those who received the booklet plus DVD, eight (14%) reported not looking at the booklet, six (10.5%) reported looking at it but not reading it properly, 38 (66.7%) reported reading it once, and five (8.8%) reported reading it more than once. Of those who received the DVD, 12 (21.1%) reported not looking it, three (5.3%) reported looking at it but not watching it properly, 35 (61.4%) reported watching it once, and seven (12.3%) reported watching it more than once.

Booklet and DVD use were dichotomized so that those who reported watching/reading the DVD/booklet at least once were compared with those who reported not looking at them or looking at them but not watching/reading them properly. A single variable was computed that for the booklet-only group recorded booklet use, with 37 (72.5%) users and 14 (27.5%) non-users, and for the booklet-plus-DVD group recorded DVD use, with 42 (73.7%) users and 15 (26.3%) non-users. Hemophilia severity was also non-normally distributed, with frequencies given in table 1. This was handled by dichotomizing severity, with 32 (29.6%) with mild or moderate hemophilia and 76 (70.4%) with severe hemophilia.

3.2. Primary analysis

In the main analysis of PSOCQ scores, there were significant multivariate effects of time [$\Lambda = 0.90$, $F(3, 94) = 3.44$, $p = 0.020$, $\eta_p^2 = 0.099$], group x time [$\Lambda = 0.88$, $F(3, 94) = 3.44$, $p = 0.008$, $\eta_p^2 = 0.118$], use x time [$\Lambda = 0.89$, $F(3, 94) = 3.80$, $p = 0.013$, $\eta_p^2 = 0.108$], and group x use x time [$\Lambda = 0.83$, $F(3, 94) = 6.25$, $p = 0.001$, $\eta_p^2 = 0.166$], but not group x severity x time, group x pain intensity x time, group x use x severity x time, or group x use x pain intensity x time.

The univariate tests showed that the main effect of time was significant for contemplation [$F(1, 96) = 6.40$, $p = 0.013$, $\eta_p^2 = 0.062$], but not precontemplation or action/maintenance. The group x time effect was significant for precontemplation [$F(1, 96) = 12.04$, $p = 0.001$, $\eta_p^2 = 0.111$], but not contemplation or action/maintenance. The use x time effect was significant for contemplation [$F(1, 96) = 5.50$, $p = 0.021$, $\eta_p^2 = 0.054$] and action/maintenance [$F(1, 96) = 9.40$, $p = 0.003$, $\eta_p^2 = 0.089$],

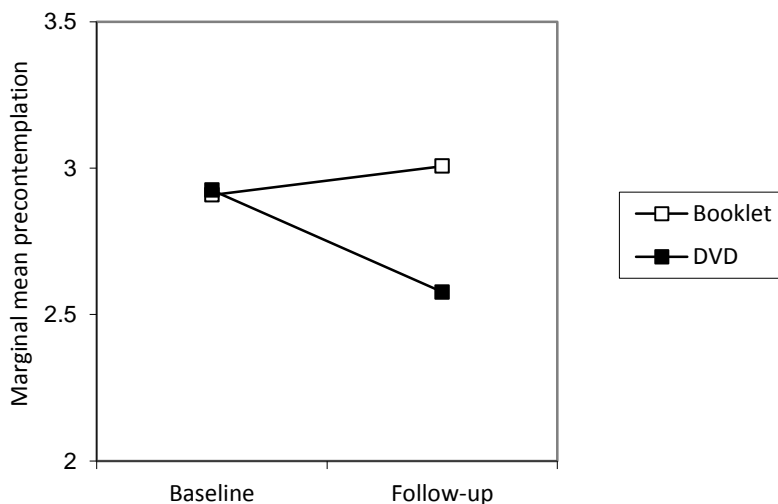
but not precontemplation. The group x use x time effect was significant for precontemplation [F (1, 96) = 18.35, p < 0.001, $\eta_p^2 = 0.160$], but not contemplation or action/maintenance.

For precontemplation, the marginal means (adjusted for covariates) for booklet and DVD groups at baseline and follow-up are shown in fig 2. These show that the DVD led to reductions in precontemplation whereas written information led to small increases. Partial Eta Squared was 0.111, a medium effect size according to Cohen’s criteria [11], but we also calculated the size of the effect of the DVD on precontemplation using methods commonly employed in the self-management literature. A major meta-analysis of randomized trials of self-management programs calculated effect size as the difference between the end points of the treatment and control groups, divided by the standard deviation of the control group [47]. Using the baseline and follow-up precontemplation means and SDs reported in table 3, that method gives an effect size of 0.33 for the DVD relative to booklet.

Another approach is to calculate separate effect sizes for each group, using the formula $ES = (m_1 - m_2) / s_1$, where m_1 is the baseline mean, m_2 the follow-up mean, and s_1 the baseline standard deviation [27]. That method gives effect sizes of 0.19 for the DVD compared with -0.05 for the booklet using the means and SDs given in table 3.

However, the group x time effect on precontemplation was modified by a group x use x time effect. The marginal means showed that between baseline and follow-up, precontemplation fell from 2.95 (SE 0.12) to 2.79 (SE 0.11) among those who used the booklet and from 2.73 (SE 0.11) to 2.68 (SE 0.10), among those who used the DVD, but among those who did not use the interventions, precontemplation increased from 2.87 (SE 0.20) to 3.22 (SE 0.19) among those who received just the booklet and fell from 3.12 (SE 0.21) to 2.48 (SE 0.20) among those who received the DVD.

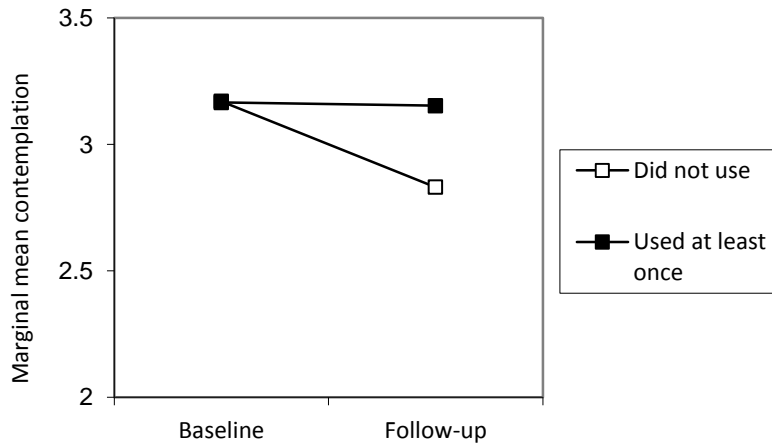
Figure 2. Changes in precontemplation by group



For contemplation, the main effect of time showed decreases in marginal mean scores from 3.17 (SE 0.076) at baseline to 2.99 (SE 0.076) at follow-up, but that decrease was modified by the use x time effect, which showed that contemplation scores remained at about the same level from baseline to follow-up among those who used the DVD or booklet, and fell among those who did not (Fig. 3). For

action/maintenance, the use x time effect showed that action/maintenance scores increased among those who used the DVD or booklet, and fell among those who did not (Fig. 4).

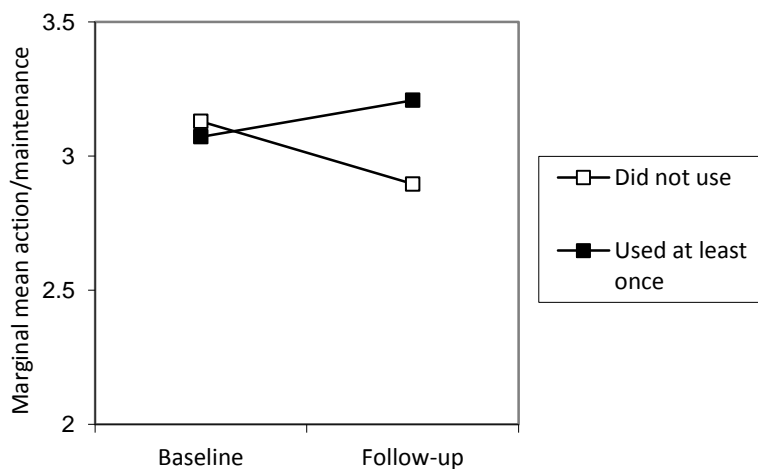
Figure 3. Changes in contemplation by use of DVD/booklet



3.3. Secondary analysis

For the three secondary analyses, the critical value of p was set at 0.0167 (0.05 divided by three). In the analysis of pain coping, there was a significant multivariate effect of time [$\Lambda = 0.86$, $F(3, 90) = 4.76$, $p = 0.004$, $\eta_p^2 = 0.137$], but not any of the interactions. Time had a significant univariate effect on active coping [$F(1, 92) = 6.48$, $p = 0.013$, $\eta_p^2 = 0.066$], but not negative thoughts [$F(1, 92) = 5.26$, $p = 0.024$, $\eta_p^2 = 0.054$], or passive adherence [$F(1, 92) = 3.97$, $p = 0.049$, $\eta_p^2 = 0.041$]. Active coping increased from a marginal mean of 2.46 (SE 0.146) at baseline to 2.72 (SE 0.137) at follow-up. In the analyses of pain acceptance and quality of life, there were no significant multivariate effects of time or any of the interactions.

Figure 4. Changes in action/maintenance by use of DVD/booklet



3.4. Supplementary analysis

The group x use x time effect seemed to show that precontemplation decreased among those who received the DVD but reported not using it, so we conducted further exploratory analyses. First, we considered the possibility that changes in precontemplation among those who received the DVD plus booklet were due to reading the booklet rather than watching the DVD. In fact, however, use of DVD and booklet were closely associated. Cross-tabulating the two binary measures of use, there were nine individuals (15.8%) who reported using neither, 37 (64.9%) who reported using both, five (8.8%) who reported using DVD but not booklet, and six (10.5%) who reported using booklet but not DVD, so use of DVD and booklet coincided in 80.7% of cases (chi square = 11.3, $p = 0.001$).

Using the 7-point ratings scales, the correlation between DVD and booklet use was 0.65 ($p < 0.001$), and both were significantly correlated with increases in precontemplation (DVD use $r = 0.312$, $p = 0.018$; booklet use $r = 0.332$, $p = 0.012$). In multiple linear regression, ratings of DVD and booklet use together accounted for a significant proportion (12.6%) of the variance in precontemplation change scores, but neither were significant independent predictors.

We then repeated the primary analysis with different measures of intervention use for those who received booklet plus DVD: 1) use of booklet, 2) use of either booklet or DVD, 3) use of both booklet and DVD. In each case, the same pattern of results were obtained as in the main analysis reported above, with significant effects of time on contemplation, group x time on precontemplation, use x time on contemplation and action/maintenance, and group x use x time on precontemplation. This seems to show that the DVD and booklet could almost be treated as a combined intervention for which the effects of use were robust, with small measurement variations making no difference to the pattern of effects.

Second, we considered the possibility that the three participants who reported 'looking at the DVD but not watching it properly' had been miscoded when treated as non-users. From baseline to follow-up, the precontemplation scores of those individuals fell from 3.43 (SD 0.43) to 2.71 (SD 0.62), compared with reductions from 2.91 (SD 0.79) to 2.60 (SD 0.70) for those who reported not looking at it at all ($n=12$), and from 2.73 (SD 0.68) to 2.69 (SD 0.53) for those who reported watching it at least once ($n=42$). Those who reported looking at the DVD but not watching it properly therefore had greater reductions in precontemplation, and from a higher baseline.

For reported booklet use among the same group (those who received DVD plus booklet), the same pattern was observed, with reductions in precontemplation from 3.17 (SD 0.95) to 2.86 (SD 0.58) among those who reported looking at the booklet but not reading it properly ($n=6$), from 2.97 (SD 0.78) to 2.50 (SD 0.55) among those who did not look at it ($n=8$), and from 2.72 (SD 0.64) to 2.68 (SD 0.57) among those who reported reading it at least once ($n=43$).

We then repeated the primary analysis with those who reported looking at but not watching/reading the DVD/booklet properly excluded from the analysis. The same pattern of results were obtained as in the main analysis, with significant effects of time on contemplation, group x time on precontemplation, use x time on contemplation and action/maintenance, and group x use x time on precontemplation. This seemed to show that participants who reported very cursory use of the interventions had not skewed the analysis.

4. Discussion

The group x time effect on precontemplation showed that the DVD reduced precontemplative thinking more than written information alone, suggesting the DVD format can influence early-stage motivational processes, whereas the use x time effects on contemplation and action/maintenance showed that those changes depended on engagement rather than format, suggesting volitional processes. This pattern of findings is consistent with Jensen et al.'s preliminary model [23], in which motivational changes precede volitional changes. There were no differential effects on any of the secondary outcomes, but the DVD was not designed to influence pain coping, acceptance, or quality of life. Changing those outcomes may require more behaviorally-oriented interventions, and improvements in readiness to self-manage represent an important first step towards changes in other outcomes.

Preparatory interventions to reduce precontemplation could increase engagement with more intensive, behavioral interventions, thereby increasing the impact of self-management initiatives. In previous research, brief preparatory sessions were used to increase attendance at community-based pain management workshops [18], but the reductions in precontemplation associated with the DVD were achieved with no direct interaction between participants and health professionals, making the DVD a much more cost-effective intervention.

The size of the DVD effect on precontemplation was medium, according to Cohen's criteria [11], and compared well with those achieved by more intensive interventions. For example, among chronic pain patients who completed a multidisciplinary pain program, mean precontemplation scores fell from 2.83 (SD 0.63) pre-treatment to 2.67 (SD 0.88) at 6-month follow-up [26], giving an effect size of 0.25 (2.83-2.67/0.63). However, the group x time effect on precontemplation was modified by a group x use x time effect, which showed reductions in precontemplation among those who reported not watching the DVD. Our supplementary analyses seemed to rule out two potential explanations for that, which were that the DVD effect was actually caused by reading the booklet, or that the results were skewed by extreme scores among those who reported looking at but not watching the DVD. General misreporting of DVD and booklet use seems unlikely because the effects of use on contemplation and action/maintenance were as expected, so the most likely explanations are either that the DVD influenced precontemplation without being used as intended, or that some people did not watch the DVD *because* of their high baseline levels of precontemplation.

Motivational changes might occur in unpredictable ways, including by providing materials that are not used as intended, and one could perhaps be too prescriptive about how people should use low intensity, motivational interventions that are designed to be used in a flexible way. For example, perhaps receiving the DVD activated latent motivational changes by prompting reflection or consideration of change.

The fact that the measures of DVD and booklet use among those who received both were virtually interchangeable in the analyses seems to suggest that the DVD and booklet could be treated as a combined package. It is also possible that the additional benefit associated with the DVD actually derived from double exposure to similar messages, rather than from the DVD's distinctive presentation of individual narratives. More research is needed on how different elements of combined interventions produce the effects they have on motivation to self-manage pain.

The study treated readiness to self-manage pain as an outcome, but any initiative to increase motivation must confront the problem that motivational factors could also influence engagement with that initiative, so there is a potentially infinite regress of motivation to engage. More research is needed into how people actually use interventions that are designed to be used flexibly and

conveniently, away from central delivery points, and what factors influence their use. This could include a focus on individuals who very nearly use them as intended, for the fact that the highest levels of baseline precontemplation were found among those who reported nearly engaging with the DVD ('looking at it but not watching it properly') is perhaps not as counter-intuitive as it first appears. People who look at an intervention like the DVD but then do not watch it may do so for reasons that are related to precontemplative thinking, whereas those who fail to engage at all may do so for unrelated reasons, like forgetting or being too busy.

This was a prospective randomized trial with a relatively large sample, and 69% of those enrolled were followed-up. The sample size was smaller than anticipated, but the final sample size provided sufficient power to test the hypotheses (observed power was 0.93 for the group x time effect on precontemplation, for example), and there were not significant differences between those who were followed up and those who were not. All the participants were members of the Haemophilia Society UK, but baseline levels of pain coping and quality of life in the present sample were unremarkable by comparison with previous samples, and a previous study showed that Haemophilia Society members were demographically and clinically very similar to the UK population of people with hemophilia [13]. Care should always be taken in generalizing from samples to wider populations, and members of patient organizations might be expected to have more interest in patient education than non-members, but there is no obvious reason to believe the present sample is unrepresentative of people with hemophilia more generally.

The analysis was not restricted to those who read or watched the DVD/booklet, and testing the group x time interaction is more conservative than just testing for differences in outcome between groups. Of those who received the DVD, over 70% reported watching it at least once, so uptake was reasonable, but only 57% of those who received it, and 66% of those who watched it at least once, rated it as helpful. We regarded the fact the DVD featured people with hemophilia relating their own experiences as one of its most positive features, but those evaluations suggest the DVD could still be improved on. More impressive results might also be obtained by selecting participants, or preparing participants beforehand to manage expectations, or tailoring the intervention for different groups of participants, or combining DVD viewings with discussion groups, exercises, or interactive activities to promote self-management strategies and behaviors. In a previous self-management intervention for people with arthritis, for example, interviews with participants suggested the intervention could be improved by providing more information in advance, using counseling techniques to enhance motivation to change, and tailoring the intervention with respect to participants' motivation and concerns [8].

Future research could evaluate preparatory motivational interventions in other painful conditions. In hemophilia, meanwhile, chronic joint pain is likely to continue to be a major consequence of the condition, especially where the availability of clotting factor concentrates is limited. Researchers could evaluate more intensive interventions of the kind that have been effective in other painful chronic conditions, such as self-management training programs [4, 5], cognitive behavioral therapy [41], or acceptance-based treatments [45], provided that care is taken not to encourage patients to overlook or ignore the acute pain that signals bleeding, for a vital part of self-management in hemophilia is recognizing and promptly treating bleeding episodes, which are the ultimate cause of arthritic joint pain.

Most previous research on readiness to self-manage pain has focused on chronic pain conditions, and these are the first data to our knowledge on readiness to self-manage pain among people with hemophilia. We would like to see more research like this on chronic conditions that cause chronic pain but where pain is not the primary feature of the condition. Research like that could lead to a better understanding of the interplay between generic and condition-specific influences on

responses to chronic pain, which is needed to adapt interventions and programs more effectively for different patient groups.

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