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Behavioral Treatment Parameters with Primary Dysmenorrhea

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Fourteen women with primary dysmenorrhea were administered four sessions of systematic desensitization (SD) by either a male or a female therapist. The following measures were taken during the flow periods before and after treatment and at a 6-month follow-up: menstrual symptom checklist, medication usage, invalid hours, and menstrual attitudes. At pretreatment, menstrually distressed women had significantly higher scores on all measures compared to a normative group and an explicitly nondistressed group. At posttreatment, treated women's scores on the dependent variables were significantly reduced. All indices were reduced to a "nondistressed level" at posttreatment and at 6-month follow-up. Type of dysmenorrhea (congestive vs. spasmodic), trait anxiety level, and therapist sex did not predict differential responsiveness to SD. SD did not affect frontalis EMG, peripheral blood flow, or pain threshold. A Retrospective Symptom Scale of menstrual distress was found to be highly reliable, valid, and sensitive.

KEY WORDS: menstrual cycle; primary dysmenorrhea; systematic desensitization; behavior therapy; menstrual symptoms.

INTRODUCTION

Green (1971) estimates that 35% of female adolescents, 25% of college women, and 60–70% of single females in their 30s and 40s are invalid during menstruation. Novak *et al.* (1975) state that menstrual distress is the greatest

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cause of lost work hours among women; Kistner (1971) estimates this to be 140 million annual hours.

Hormonal treatment is the most frequent and effective medical intervention (Novak *et al.*, 1975), although Tyler (1973) raises a cautionary note over possible adverse physiological side effects. The rationale for such treatment (Novak *et al.*, 1975) is that ingested estrogen inhibits production of progesterone, which in turn precludes secretion of the muscle contractant neurohormone prostagladin $F_{2\alpha}$ from the endometrium.

However, Sturgis speculates:

> No single factor has ever been shown to be wholly responsible for the severity of these painful episodes. . . . There are two components, however, that have been generally accepted as responsible for all such complaints. The first of these is physical: the action of progesterone on the menstruating uterus. . . . The second is psychological: the reaction of the individual to pain associated with feminine function. (Sturgis, 1970, p. 150)

On the basis of such considerations, Mullen (1968) demonstrated systematic desensitization (SD) effective in reducing menstrual distress of a single case. Similarly, Lackie (1964) employed hypnosis to reduce anticipatory anxieties surrounding menstruation that exacerbate menstrual distress. Subsequently, various researchers have investigated multiple behavioral treatment parameters. Mullen (1971) demonstrated that SD, administered for 4–6 weeks, was equally effective in reducing menstrual distress whether administered by an experienced male or an inexperienced female therapist. Unfortunately, this study confounded experience and sex.

Reich (1972) administered SD in a group context to college coeds with primary dysmenorrhea. Only women who had low scores on the Taylor Manifest Anxiety Scale (Taylor, 1953) demonstrated significant symptom reduction. This finding was supported by a significant interaction effect and a −0.66 correlation between trait anxiety scores and change in dysmenorrhea.

Chesney and Tasto (1975b), using a waiting list and placebo control, demonstrated SD effective with five group sessions using a female therapist. They found a significant interaction between treatment effect and type of primary dysmenorrhea. Spasmodic dysmenorrhea (predominant symptomology during the flow period) accounted for the total treatment effect, while those with congestive dysmenorrhea (those suffering from premenstrual symptoms) experienced no relief.

Consequently, SD has been repeatedly demonstrated effective in reducing menstrual symptoms as measured by retrospective symptom checklists for either low anxious or spasmodic women. However, Parlee (1973, 1974) pointed out that such retrospective symptom checklists have little validation and few reliability checks; they are susceptible to stereotypic beliefs regarding dysmenorrhea and are influenced by memory factors.

The purpose for this study was to replicate previous research using multiple dependent variables that were assessed for validity and reliability. The null hypotheses tested were

1. SD will not produce any significant symptom reduction.
2. High and low anxious patients will respond equally.
3. Spasmodic and congestive women will respond equally.
4. Male or female therapists will be equally effective.

This assessment was conducted with a multivariate analysis. Symptom checklists, menstrual attitudes, medication usage, and invalid hours were used for convergent validation of any treatment effect. Recording of peripheral skin temperature, frontalis EMG, and pain threshold was employed in an attempt to identify underlying mediating mechanisms.

A Daily Symptom Scale (DSS) as well as a Retrospective Symptom Scale (RSS) was filled out by distressed and nondistressed women during and after flow periods. A DSS was assumed to be less vulnerable to stereotypic beliefs and memory factors and more reflective of experienced symptoms, and thus capable of functioning as a validation criteria for the Retrospective Symptom Scale. The use of both scales was for the following validation purposes: (1) to correlate a retrospective and daily symptom checklist, (2) to see if such scales discriminate between women who report menstrual distress and those who do not, and (3) to assess sensitivity to treatment impact.

METHODS

Subjects

This study required solicitation of three subject groups: a Distressed Group (DG), a Nondistressed Group (NG), and a Normative Control Group (NCG). Eighteen menstrually distressed coeds (DG) were solicited from surrounding universities through a school newspaper article. Two women declined participation. Pregnancy and inability to practice required daily exercises accounted for two treatment dropouts. As can be seen in Table I, DG subjects differed significantly from NG subjects only in terms of length of dysmenorrhea.

Nondistressed subjects (NG) consisted of 14 coeds solicited from the same universities, via classroom announcements, who explicitly reported no menstrual distress. Because all normally ovulating females have some degree of menstrual discomfort (Green, 1971), NG was necessary to assess how nondistressed women score on the dependent variables and to what extent the DG differed from NG at pre- and posttreatment. These subjects were given $5 to go through a pre- and posttreatment evaluation phase.

Table I. DG and NG Subject Characteristics

Subjects	Age range	Mean age	Mean length of distress[a]	Subjects using oral contraceptives	Subjects' parity	Mean trait anxiety score	Mean locus of control score
Distressed (DG)	18–31	22.1	7.9	1	2	13	7
Nondistressed (NG)	18–30	22.6	0	5	3	12	5

[a] $p < 0.05$.

Fifty-five women from three general psychology courses of local universities were requested to complete a menstrual attitude scale and the RSS. This Normative Control Group (NCG) sampling was thought to include a random distribution of females to assess the "average" distribution of the dependent variables.

Instruments

The Taylor Manifest Anxiety Scale (Taylor, 1953) was employed to assess pretreatment trait anxiety; the Menstrual Symptom Questionnaire (Chesney and Tasto, 1975a) was used to identify congestive and spasmodic dymenorrheic women.

The dependent variables were as follow: A menstrual semantic differential (Mullen, 1971; Cheney and Tasto, 1975b) assessed menstrual attitudes. The Retrospective Symptom Scale (see Table II) was developed for this research to tap intensity and extensity of commonly reported physical and emotional dysmenorrheic symtpms, invalid hours, and units of medication consumed. Because of the great variety of medicines used, a simple count of pills consumed was the index of medication used. The Daily Symptom Scale (DSS) was identical to the RSS except that "frequency ratings" differed to reflect difference in time span. Since the DSS was to serve as the validation criterion for the RSS (Parlee, 1974), the instruments were made as similar as possible so that variance would not reflect instrument difference.

The electromyograph recordings were taken from three surface electrodes taped over the frontalis, generating peak-to-peak voltage readings over a 1-sec interval (Cox *et al.*, 1975). A BFT 113a thermister was used to record peripheral skin temperature with a thermistor taped to the right index finger (Boudewyns, 19[illegible]).

Table II. Retrospective Symptom Scale (RSS)

Name: _____ Date: _____

Please rate each of these conditions for frequency of and severity of occurrence, on the basis of your experiences of your last menstrual period. *Total frequency* refers to the total amount of time you experienced a condition during your last period, while *average severity* refers to the average level of pain or distress of the condition when it did occur.

Total Frequency Ratings	Average Severity Ratings
0. Did not occur	0. Not noticeable
1. Lasted less than 3 hr	1. Slightly bothersome
2. Lasted 3–7 hr	2. Moderate bothersome
3. Lasted an entire day	3. Severely bothersome
4. Lasted several days	4. Very severely bothersome

Condition	Frequency Rating	Severity Rating
cramps	_____	_____
nausea	_____	_____
vomiting	_____	_____
loss of appetite	_____	_____
headaches	_____	_____
backaches	_____	_____
leg aches	_____	_____
dizziness	_____	_____
weakness	_____	_____
diarrhea	_____	_____
facial blemishes	_____	_____
abdominal pain	_____	_____
flushing	_____	_____
sleeplessness	_____	_____
general aching	_____	_____
depression	_____	_____
irritability	_____	_____
nervousness	_____	_____

How much *additional* time did you spend in bed because of menstrual problems over the duration of your last period? Give estimated total numbers of hours: _____ hours.

Considering the number of pills (any kind) taken for menstrual relief and the number of days you take such medication, how many pills did you take last menstrual period? _____

Therapists

None of the seven first-year graduate students (four male, three female) acting as therapists had previous experience with relaxation training or SD. All therapists went through similar training procedures: (1) read Bernstein and Borkovec's (1973) relaxation manual, (2) viewed a video tape demonstrating the relaxation procedures, (3) listened to relaxation tapes, and (4) administered the relaxation procedure to a fellow therapist. Additionally, therapists followed a detailed therapy outline throughout patient contact to ensure that subjects received the same therapeutic procedure (Cox, 1976). Therapists were "blind" to all pretreatment patient variables.

Procedure

NCG subjects were administered the RSS and the semantic differential on three occasions following menstrual cycles 1, 2, and 3. Each administration was separated from the next by 30 days. This took place in the classroom and temporally paralleled DG and NG administrations.

After initial telephone contact that briefly detailed the study, all DG and NG subjects were scheduled to meet individually with the author (D. J. C) for identical assessment sessions. On arrival to the clinic, subjects were seated in a room and requested to complete a package of questionnaires containing the RSS, Menstrual Semantic Differential, Taylor Manifest Anxiety Scale, Locus of Control Scale, and Menstrual Symptom Questionnaire. The order of these questionnaires within a packet was random. Subjects were then given Sturgis's (1970) rationale for dysmenorrhea. SD and self-administered relaxation were presented as a treatment that would control experienced pain and prevent its exacerbation through prevention of sympathetic arousal. Afterward, patients signed a treatment contract, made a $15 refundable deposit, and signed a physician's approval form.

Subsequently, pain threshold, EMG level, and thermal readings were recorded. Following Mulcahy and Janz's (1973) procedure, a blood pressure cuff was placed around the right upper arm and inflated 10 mm every 2 sec until the subject indicated feeling "the first sensation of discomfort." The reading was taken as the pain threshold. Subjects then reclined in a dimly lit room for 10 min. After this period, ten integrated 10-sec frontalis EMG readings were averaged and recorded along with a Fahrenheit finger temperature reading. Subjects then returned home and awaited their next flow period during which they completed their DSS records and mailed them in daily.

After pretreatment assessment, DG women were assigned to a therapist. Four treatment sessions were scheduled on days 1, 7, 12, and 17 following cycle 2. During the first treatment session subjects were taught relaxation training and

cued breathing (Cox *et al.*, 1975). Subjects were then given a relaxation tape by either a male or a female voice for home use and were requested to practice twice daily and to monitor home practice. Two days following the first treatment session, therapists telephoned the subjects to answer any questions concerning home relaxation and to encourage continued practice.

The second treatment session consisted of practicing Bernstein and Borkovec's (1973) condensed seven muscle group exercises, cued breathing, and presentation of SD images. The SD hierarchy was adopted from Reich (1972). Items ranged from "You look at the calendar and you realize that your period is due to begin in 10 days" to "You begin to feel severe pain and cramping." Following Goldfried's (1971) rationale and Reeves and Mealiea's (1975) procedure, subjects were instructed to continue imagining scenes when they elicited anxiety and attempt to relax away this felt anxiety with cued breathing. The intent is to facilitate, through imaginal practice, application of the Relaxation Response (Benson *et al.*, 1974) in coping with experienced tension. Continued twice daily practice and monitoring of relaxation and SD imagery were requested. Subjects were called 2 days following this session to facilitate and encourage home practice.

Treatment sessions 3 and 4 were similar, with continued relaxation training, cued breathing, SD imagery, and home practice. The third session used the four muscle group procedure, and session 4 used the single muscle group relaxation technique (Bernstein and Borkovec, 1973). RSS and the semantic differential were administered during session 3 in relation to cycle 2. No relaxation tape was provided following session 4, and there were no therapist telephone calls following session 3.

During cycle 3, distressed women used their Relaxation Response to cope with dysmenorrhea; DG and NG subjects completed the DSS throughout this flow period and underwent a postreatment assessment identical to pretreatment 2 weeks later. DG subjects used their cued breathing during pain threshold recordings in a psychoprophylactic procedure (Meichenbaum and Turk, 1975). At a 6-month follow-up, DG subjects completed the DSS and the menstrual semantic differential.

RESULTS

Validity and Reliability Data

RSS was administered three times (cycle 1, 2, and 3) to all groups. Total scores were calculated by summing the products of frequency-severity ratings for the 18 symptoms. Reliability correlates across the first two administrations (cycles 1 and 2) for DG, NG, and NCG were + 0.73 ($p < 0.01$), + 0.85 ($p < 0.01$),

Table III. Means and Standard Deviations for DG, NG, and NGC for the Multiple Dependent Variable at Respective Sampling Points[a]

	RSS total score				Medication usage (pills consumed)				Invalid hours (hr in bed)				Menstrual attitude				Pain threshold (mmHg)		Frontalis EMG (μV)		Finger temperature (°F)	
	C-1	C-2	C-3	F-U	C-1	C-2	C-3	F-U	C-1	C-2	C-3	F-U	C-1	C-2	C-3	F-U	Pre	Post	Pre	Post	Pre	Post
DG																						
$\bar{X}$	64	72	34	24	8	10	4	3	5	5	2	1	38	36	26	28	85	72	22	19	92	89
SD	48	38	34	25	7	12	6	4	6	6	2	1	5	5	7	6	73	81	11	12	5	6
NCG																						
$\bar{X}$	39	28	36		2	3	2		1	1	1		28	27	29							
	29	22	28		4	4	4		3	2	2		9	7	8							
NG																						
$\bar{X}$	13	19	11		1	1	3		0	0	1		23	23	22		81	54	18	20	88	89
SD	12	18	7		2	2	5		1	0	1		9	9	8		65	28	6	11	6	7

[a]C-1, menstrual cycle 1; F-U, follow-up; Pre, pretreatment assessment; and post, posttreatment assessment.

and + 0.76 ($p < 0.01$), respectively, indicating stability of scores across menstrual cycles. DSS was administered to DG and NG during cycles 2 and 3. Concurrent validity correlations (Mishcel, 1976) between RSS and DSS total scores were + 0.95 ($p < 0.01$) at cycle 2 and + 0.96 ($p < 0.01$) at cycle 3, indicating that retrospective and daily symptom scales were tapping similar parameters. Construct validity (Mischel, 1976) of the RSS, in terms of ability to discriminate between groups and sensitivity to treatment effect, was assessed with a three between (DG, NG, NCG) X three within (cycles 1, 2, and 3) ANOVA. This showed a significant group ($F = 8.75, p < 0.001$), cycles ($F = 13.12, p < 0.001$), and interaction ($F = 7.31, p < 0.001$) effect. DG was significantly more distressed ($p < 0.001$) at cycles 1 and 2 than either NG or NCG. NCG was significantly more distressed than NG at cycles 1 and 2 ($p < 0.05$). This indicates that RSS significantly discriminated among DG, NG, and NCG. Compared to pretreatment (cycles 1 and 2), there was a significant reduction at posttreatment (cycle 3) only for DG ($p < 0.01$), indicating RSS sensitivity to treatment effect. At posttreatment, DG and NCG were not significantly different from one another, while NG was still significantly less distressed ($p < 0.01$) than either of the other groups (see Table III).

Treatment Effectiveness Data

Convergent validation of treatment effectiveness was attempted on a pre- and posttreatment basis between DG and NG through a multivariate analysis of variance with the following dependent variables: DSS total scores, medication units, invalid hours (all generated from the DSS), menstrual semantic differential, pain threshold, EMG, and thermal recordings. As seen in Table IV, there was a significant group, cycle, and interaction effect. Newman-Keuls was applied to each statistically significant dependent variable (see Table IV). DSS scores were significantly reduced ($p < 0.01$) for DG but still significantly higher ($p < 0.01$) than NG scores postassessment. Posttreatment attitude scores were significantly lowered for DG ($p < 0.01$) and were not significantly different from pre- or posttreatment NG scores. Units of medication usage similarly were significantly lowered by treatment for DG, and posttreatment level was statistically equivalent to pre- and posttreatment NG levels. Finally, invalid hours for DG were significantly elevated at pretreatment compared to NG ($p < 0.01$) but were significantly lowered ($p < 0.01$) as a function of treatment to a level indiscriminable from that of pre- and posttreatment NG subjects.

The fact that these multiple measures all indicated significant treatment effect was impressive considering the minimal correlation between the dependent variables. A correlation matrix among the dependent variables revealed only two significant relationships: DSS total score with pain threshold ($r = -0.41$, $p < 0.05$) and DSS total score with medication usage ($r = +0.52, p < 0.01$).

Table IV. Multivariate Analysis of Variance for Groups (DG vs. NG) and Menstrual Cycles (Pretreatment vs. Posttreatment) with Univariate F Ratios for the Six Dependent Variables

Multivariate			Univariate	
Source	F	p	Source	F
Groups	3.62	< 0.011	Pain threshold	0.032
			EMG	0.319
			DSS	14.982[a]
			MSD	13.872[a]
			Medication units	2.965[b]
			Time in bed	7.184[c]
Cycles	3.389	< 0.015	Pain threshold	2.643
			EMG	0.000
			DSS	15.485[a]
			MSD	16.405[a]
			Medication units	8.289[c]
			Time in bed	4.790[b]
Interaction	3.254	< 0.018	Pain threshold	0.001
			EMG	1.465
			DSS	9.058[c]
			MSD	5.157[b]
			Medication units	14.249[a]
			Time in bed	5.236[b]

[a] $p < 0.001$.
[b] $p < 0.05$.
[c] $p < 0.01$.

In addition to the objective measures of treatment effectiveness, DG subjects were asked to rate on a 7-point scale (1) how effective the treatment was, (2) how worthwhile it was, and (3) whether they would recommend it to others. Scores of 1 indicated "not effective, not worthwhile, not recommended," while scores of 7 reflected "totally effective, totally worthwhile, and totally recommended." Respective mean ratings on these three scales were 5.2 (range 1–7), 5.9 (range 5–7), and 6.3 (range 6–7). Consequently, subjective and objective measures agreed that treatment was effective.

Treatment Parameters

DG subjects were divided into a Spasmodic-Congestive Group, a High-Low Anxious Group, and a Male-Female-Therapists Group. A separate MANOVA was applied to each grouping on all dependent variables. No significant differences using these various subgroupings were revealed, suggesting that type of dysmenorrhea ($F = 0.56$, $p < 0.77$), anxiety level ($F = 0.80$, $p < 0.62$), and therapist gender ($F = 0.80$, $p < 0.62$) were irrelevant variables

Since there was considerable variability in patient responsiveness, a *post hoc* comparison of successful vs. nonsuccessful patients was conducted. A median split of pre-post DSS total score reductions defined successful and nonsuccessful patients. A one-way MANOVA compared these two groups on pretreatment: pain threshold, EMG, temperature, DSS total scores, attitude scores, as well as the number of times patients used their Relaxation Response during cycle 3 to control menstrual pain. An $F = 2.664$ ($p < 0.148$) indicated that successful-nonsuccessful subgroups did not differ on any of these variables. However, number of times subjects used the relaxation response approached significance ($F = 4.416$, $p < 0.057$), with nonsuccessful patients using the Relaxation Response more frequently.

Follow-up

At 6 months following postassessment, DG subjects were contacted by telephone and mailed out five DSSs to be completed during their next menstrual cycle and a menstrual semantic differential to be completed and mailed back 2 weeks following this. A 2 X 2 MANOVA on cycle 2 and 3 data of NG with cycles 2 and follow-up data of DG was conducted.

The findings were similar to those reported at postassessment. The two exceptions were that (1) symptom relief had continued to improve for DG participants to where DSS total scores were statistically equivalent to cycles 2 and 3 of NG and (2) menstrual attitude scores for DG had regressed to baseline (cycles 1 and 2).

DISCUSSION

Null hypothesis 1 was thoroughly rejected at posttreatment and follow-up; the treatment procedure significantly reduced medication usage, invalid hours, negative menstrual attitudes, and symptom complaints. The former three were lowered to a "nondistressed" level (NG) while the latter was lowered to a "normative" level (NCG) at posttreatment. Symptoms were lowered to a "nondistressed" level at 6-month follow-up. These findings add significant clarity to previous research. Previously, SD was shown to significantly reduce symptoms and improve attitudes, but this had little meaning since it was unknown whether or not such improvements placed treated women "within normal limits." This is because previous research had not ascertained what "within normal limits" constituted for the various dependent measures. Also, previous research typically used only one or two dependent measures.

However, this research did not clarify what was the mechanism for such improvement. Since there was no significant reduction in EMG or peripheral

temperature (peripheral blood flow), improvement does not appear related to shifts in tonic sympathetic functioning. Nor do the results appear related to phasic shifts in sympathetic arousal since the number of times a subject implemented her Relaxation Response during menstrual distress was negatively related to symptom reduction.

Shift in pain threshold is not an adequate explanation either, since treatment did not affect this parameter. However, as Cox (1977a) suggests, the pain *threshold* measure used may be less appropriate than a pain *tolerance* measure.

Initially, it appeared that attitude shifts may be related to symptom improvement. Since menstrual attitudes regressed over follow-up while DSS scores improved, attitude shift does not seem a reasonable explanation. We are left to conclude that the most reasonable explanation of treatment gains resides in a desensitization effect, i.e., reduction of anticipatory anxieties.

Only with more detailed assessment utilizing appropriate controls will it be possible to clarify whether desensitization, relaxation training, self-monitoring, or placebo is the active therapeutic agent.

Null hypotheses 2 and 3 were not rejected, indicating that type of dysmenorrhea and anxiety level were unrelated to outcome. This may be explained in two ways.

Chesney and Tasto (1975a) hypothesized that congestive-spasmodic classification reflected a naturally occurring dichotomous distribution of primary dysmenorrhea. However, Cox (1977b) and McMahon (1977) demonstrated that congestive-spasmodic symptomology is a continuum in which women are just as likely to have both premenstrual and menstrual symptoms as to have either one (Golub *et al.*, 1959). It is not surprising that an artificially forced dichotomy is unable to predict the outcome.

A procedural factor differentiating this study from those of Chesney and Tasto (1975b) and Reich (1972) is that subjects were treated individually instead of in a group. Not only may this alllow a more intimate therapeutic context in which subjects' trait anxiety would be less significant, but also it allows all subjects to begin SD at the beginning of their menstrual cycle (day 1) during an asymptomatic period. It has been discussed (Cox, 1977b) that this may prevent a negative bias for congestive women who are distressed more days per months than spasmodic women.

Although Rumenik *et al.* (1977) suggest that therapist sex may be relevant in some behavioral treatments, it does not appear significant in application of SD for eleviation of primary dysmenorrhea. Hypothesis 4 was not rejected. This supports the previous suggestion put forth by Mullen (1971). However, a simple *t* test comparing EMG reductions indicated that DG subjects with female therapists demonstrated a greater reduction (Cox, 1977a).

Probably the most significant finding is that the Retrospective Menstrual Symptom Scale (RSS) used in this study demonstrated test-retest reliability and concurrent, construct, and content validity on three independent parameters of

menstrual distress (symptoms, medication usage, and invalid hours). Additionally, preliminary normative data were collected for distressed, normative, and nondistressed samples (see Table II). Since RSS frequency ratings correlated 0.96 with severity ratings and both correlated 0.97 with total score, subsequent research is not incorporating this quantitative-qualitative dimension. Instead, the single 5-point severity rating is being used.

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