

Effects of the colour and design of a new pelvic examination chair on comfort during gynaecological examination

C. Stenfelt^{1,*}, L. Ydenius¹, S. Lindberg², J. Spira³, G. Edelstam^{4,5}

¹Livio Gärdet, Storängsvägen 10, SE 115 42 Stockholm (Sweden)

²RISE Bioeconomy, Box 5604, SE 114 86 Stockholm (Sweden)

³InSpira Medical AB, Tyresö (Sweden)

⁴Department of Obstetrics & Gynaecology and of Clinical Sciences, Danderyd Hospital, SE 182 88, Stockholm (Sweden)

⁵Department of Women's and Children's Health, Uppsala University, SE-751 85 Uppsala (Sweden)

Summary

Objectives: The main question was whether the colour of a new design of pelvic examination chair could affect how the examination procedure was perceived. A prototype was constructed without vertical leg support and with built-in heating in the upholstery. To improve integrity, the perineum was exposed only during the examination. **Main Outcome Measures:** The patients were invited to evaluate the two different chair colours used, light blue and off-white, respectively. After vaginal ultrasound, the patients answered an anonymous questionnaire about their experience of the examination and how they perceived the comfort, warmth, integrity and colour of the chair. There were also questions regarding the absence of vertical leg support. **Results:** The questionnaire evaluation demonstrated the importance of colour since integrity was rated significantly higher in the light-blue chair than in the off-white. Similarly, the blue chair was experienced as significantly more comfortable than the white. **Conclusions:** The effect of colour was investigated in a new pelvic examination chair without vertical leg support, developed to suit men, women and also non-binary and transgender persons. It was also designed for increased comfort and integrity. The experience of colour had a significant positive ($p < 0.001$) effect on how the comfort, integrity and the absence of vertical leg support were perceived.

Key words: Ultrasound examination chair; Gynaecological examination; Comfort; Questionnaire; Colour.

Introduction

Pelvic examinations are carried out daily in fertility and gynaecological clinics. Most patients expect some discomfort in gynaecological examinations [1]. If one examination has been unpleasant, the patient will hesitate to undergo further pelvic examinations [2]. The examination is intrusive of patient integrity and, to compensate for unpleasantness, the procedure should provide maximal comfort [3, 4].

This comfort could be achieved using a pelvic examination chair capable of the highest possible individual adjustment. This is important for all patients, particularly those with a history of genital trauma, with disabilities and/or obesity; for sexual minorities and for the adolescent examined for the first time [5].

A pelvic examination involves exposure of intimate parts of the body in a vulnerable situation. Physical factors such as cold instruments, leg support with a hard surface, and chairs with uncomfortable covers all contribute to the experience of the examination [6, 7].

Little has previously been done to individually adjust the situation. The gynaecological chair with vertical leg support has remained basically unchanged for many years, except for the addition of a foot-pedal-operated electric motor that allows optimal positioning of the patient for the examining health-care worker. However, this does not affect the

patient's situation.

In the present project, innovations for comfort irrespective of age and gender have been developed in collaboration with patients. Studies of design perspective greatly affect physical and psychological factors [8].

There is much research on the psychological effects of colour on human emotions and behaviour. Although many such studies suffer from methodological shortcomings, mainly regarding stimuli control, the effect of colour on humans has been popularized in for example design and architecture [9]. Use of the PAD (Pleasure-Arousal-Dominance) emotion model and associated measures in a series of controlled studies showed that the feeling of pleasure from colours was highest for blue and blue-green (wavelengths 485- 525 nm) [10, 11]. Blue was associated with soothing and with lower anxiety scores than red or yellow. Thus, following the present overall aim, it was also important to investigate whether blue could further contribute to the chair's comfort and integrity.

The initial intention was to offer new, open-minded solutions to improve the traditional stirrup-fitted pelvic examination chair. A primary investigation focused on improving the examination situation for patients with endometriosis who evaluated the upholstery heating and the pelvic examination with lateral or vertical leg support as previously

Table 1. — The patients' rating comparing the colour of the gender-neutral pelvic examination chair (off-white group $n = 23$) and (light-blue group $n = 25$).

Rating 1-5 from negative to positive (mean \pm SEM)	Off-white	Light-blue	<i>p</i> -value
1. Expectation of a gynaecological examination?	4.4 \pm 0.20	4.5 \pm 0.16	NS
2. Comfort in the pelvic examination chair?	4.2 \pm 0.18	4.9 \pm 0.06	$p < 0.001^*$
3. Warmth of surface layer?	4.5 \pm 0.17	4.7 \pm 0.12	NS
4. Feeling of integrity during pelvic examination?	4.2 \pm 0.15	4.7 \pm 0.11	$p < 0.0102^*$
5. Feeling of control during examination?	4.4 \pm 0.14	4.7 \pm 0.12	$p < 0.09$
6. Experience of colour of pelvic examination chair?			
a) negative - positive	4.1 \pm 0.28	4.1 \pm 0.23	NS
b) worrying - calming	3.6 \pm 0.35	3.8 \pm 0.22	NS
7. Attitude towards future examination in the same pelvic examination chair?	4.9 \pm 0.07	4.9 \pm 0.08	NS
8. Experience of resting legs without vertical leg support?	4.3 \pm 0.25	4.9 \pm 0.09	$p < 0.0115^*$
9. Experience of resting feet on foot plate?	4.7 \pm 0.09	4.8 \pm 0.11	NS

*) In favour of the blue chair.

reported [12]. The present aim was to investigate how the patient experienced the colour of the examination chair.

Materials and Methods

A prototype according to the criteria for developing a new pelvic examination chair without vertical leg support was constructed. Also, the sink under the traditional pelvic examination chair was replaced by a smaller bowl, easy to move out of the patient's sight. Instruments and disposables could thus be hidden after the examination (Figure 1). The present participants ($n = 48$) had ongoing or upcoming fertility treatment and underwent a vaginal ultrasound examination.

Two prototypes of different colours, off-white (colour code: ece5da), and light blue (colour code: 3a78a3) were evaluated at the Livio Fertility Center outpatient clinic, Gärdet, Stockholm, Sweden. The examination chairs were each placed in separate examination rooms (Figure 2).

After vaginal ultrasound examination, the patients answered a previously unseen questionnaire about how they experienced the chair (Table 1). The questionnaire consisted of nine important items for the design. The answers were anonymous and coded. Likert scales were used to collect data on a five-point graded scale with a no-opinion option (Table 1).

The study lasted three months, during which 50 complete questionnaires were filled out (two incomplete questionnaires were excluded). Twenty-three patients filled out the questionnaires for the off-white chair, and 25 for the light blue.

The project was evaluated by the Regional Ethics Committee (2015/6-31/4) in Stockholm. As the project anonymously addresses methodological development, ethical approval was not necessary under Swedish law. However, the Ethics Committee had no objections to the investigation.

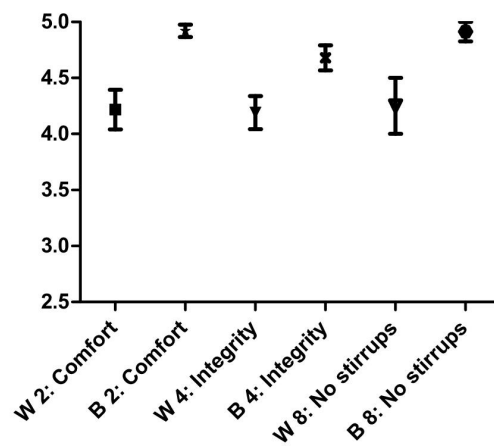


Figure 1. — Differences between off-white (W) and light-blue (B) gynaecology chairs. Figures on x-axis indicate numbers of answers with significant differences.

Results

The results were evaluated using a *t*-test with chair colour (off-white or light blue) as dependent variable. There were no differences in the attitude towards a gynaecological examination between the patients examined in the off-white chair (*off-white group*) and those in the light blue (*light-blue group*).

The light-blue examination chair was rated significantly more comfortable than the off-white ($p < 0.001$). Also, the feeling of integrity ($p < 0.01$) and the experience of resting the legs with lateral leg support ($p < 0.01$), were rated significantly more favourably in the light-blue chair. Further, there was a not-significant ($p < 0.09$) tendency towards a greater feeling of control in the light blue examination chair than in the off-white. Notably, the patient's reported colour preferences showed no significant differences between the two chairs.

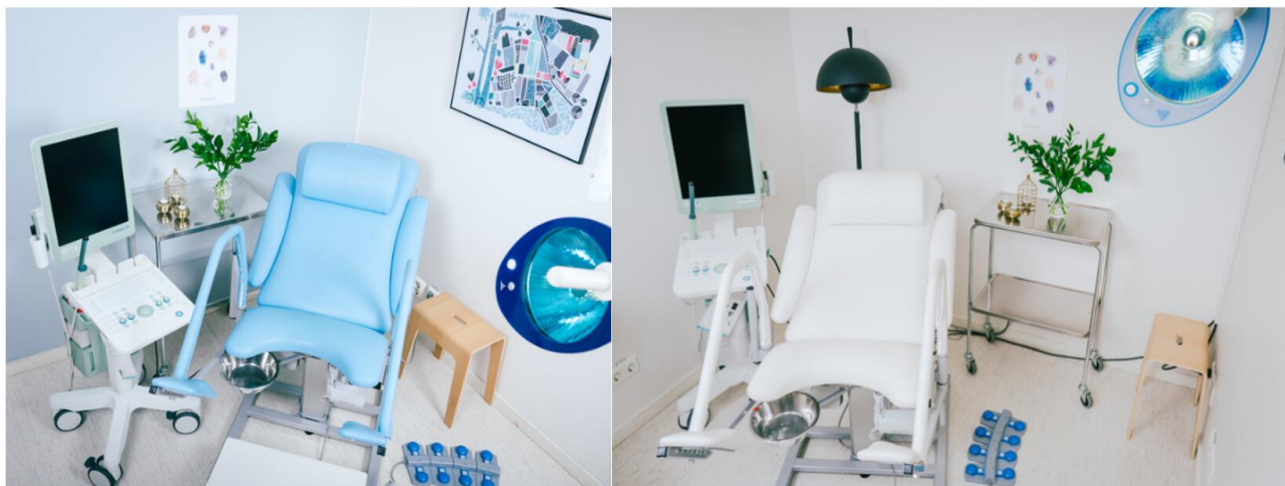


Figure 2. — The off-white (W) and light-blue (B) pelvic examination chairs.

Discussion

We evaluated a new type of pelvic examination chair concerning its colour and its possible effect on perceived attributes relating to comfort and integrity.

An interesting point is that the two chairs were rated almost identically when straightforward questions regarding colour preference were posed. The colours of the chairs were perceived as equally positive (average rating 4.0 vs. 4.1) and equally calming (average rating 3.6 vs. 3.8). However, comfort, integrity and the absence of vertical leg support were all rated significantly more favourably in the light-blue chair. This could indicate that although the patients had no conscious awareness of the chair colour, the light blue had an indirect effect on the feeling of comfort and integrity and on the more favourable rating of the absence of vertical leg support.

The gynaecological chair with vertical leg support has remained basically the same for the past 100 years. Any technical development of the traditional pelvic examination situation is an important step forward. Depending on the gynaecological procedure, there is always a risk that the patient will be reluctant to undergo further pelvic examinations: a feeling of safety, comfort and individual approach is essential [13]. Comfort, for example a warm speculum and the doctor's sensitivity towards women's feelings, contributes to easing the procedure [14].

Certain patient groups may require specific attention in this respect. How the first examination is carried out powerfully affects future attitudes [15]. For transgender men, the pelvic examination may be a traumatic procedure causing anxiety. Such men are less likely to be conversant with cervical cancer screening programmes, and have a higher rate of inadequate cytological sampling [16, 17]. Fewer homosexual women attend gynaecological examinations than heterosexual women do [18]. Patients with chronic pain during intercourse (dyspareunia) represent another group who require extra consideration during examination [19].

The further development of new technical solutions of the pelvic examination chair is a highly relevant area for all these patients and all healthcare professionals. The ultimate goal is a normative neutral product improving the experience of the pelvic examination irrespective of gender and disabilities. The present study evaluating the importance of colour in health care indicates that minor adjustments of a gynaecological chair can have significant effects on how an examination is perceived.

The gynaecological examination process requires communication between designers, patients and health-care staff. They should co-operate to develop optimal pelvic examination chairs [20] combining maximum comfort and the highest possible integrity for the patient with a high degree of ergonomics for the examining doctor or midwife.

Acknowledgments

The project was carried out using an innovation grant from Vinnova and the Stockholm County Council.

Conflict of Interest

The authors declare no conflict of interest.

Submitted: February 28, 2019

Accepted: April 29, 2019

Published: August 15, 2020

References

- [1] Yanikkerem E., Ozdemir M., Bingol H., Tatar A., Karadeniz G.: "Women's attitudes and expectations regarding gynaecological examination". *Midwifery*, 2009, 25(5), 500-8.
- [2] Larsen L.P., Olesen F.: "Women's knowledge of and attitude towards organized cervical smear screening". *Acta Obstet Gynecol Scand*, 1998, 77(10), 988-96.
- [3] Hilden Midenius K., Langhoff-Roos J., Wijma B., Schei B.: "Women's experiences of the gynecologic examination, factors associated with discomfort". *Acta Obstet Gynecol Scand*, 2003, 82(11), 1030-6.
- [4] Neuhaus L.R., Memeti E., Schäffer M.K., Zimmermann R., Schäff-

- fer L.: "Using a wrap skirt to improve the pelvic examination experience". *Acta Obstet Gynecol Scand*, 2016, 95(5), 534-40.
- [5] Bates C.K., Carroll N., Potter J.: "The challenging pelvic examination". *J Gen Intern Med*, 2011, 26(6), 651-7.
- [6] Millstein S.G., Adler N.E., Irwin C.E. Jr.: "Sources of anxiety about pelvic examinations among adolescent females". *J Adolesc Health Care*, 1984, 5(2), 105-11.
- [7] Seymore C., Du Rant R.H., Jay M.S., Freeman D., Gomez L., Sharp C., Linder C.W.: "Influence of position during examination, and sex of examiner on patient anxiety during pelvic examination". *J Pediatr*, 1986, 108(2), 312-7.
- [8] Ehrnberger K., Räsänen M., Börjesson E., Hertz A.C., Sundbom C.: "The androchair, performing gynaecology through the practice of gender critical design". *The Design Journal*, 2017, 20, 181-198 (<http://androstolen.se>).
- [9] Birren F.: "Color and human response". *Van Nostrand Reinhold Company*, New York, 1978, 141.
- [10] Mehrabian A.: "Basic dimensions for a general psychological theory, Implications for personality, social, environmental, and developmental studies". *Cambridge, MA, Oelgeschlager, Gunn & Hain*, 1980.
- [11] Valdez P., Mehrabian A.: "Effects of color on emotions". *J Exp Psychol Gen*, 1994, 123(4), 394-409.
- [12] Edelstam G., Makdessi M., Moberg M., Olovsson M., Spira J.: "Optimised gynaecological examination with a new concept of a pelvic examination chair". *Sex Reprod Healthc*, 2019, 19, 84-87
- [13] Szymoniak K.: "Women's expectations towards gynecological examination". *Ann Acad Med Sietin*, 2014, 60(1), 52-9.
- [14] Broadmore J., Carr-Gregg M., Hutton J.D.: "Vaginal examinations, women's experiences and preferences". *N Z Med J*, 1986, 22, 99(794), 8-10.
- [15] Wijma B., Gullberg M., Kjessler B.: "Attitudes towards pelvic examination in a random sample of Swedish women". *Acta Obstet Gynecol Scand*, 1998, 77(4), 422-8.
- [16] Peitzmeier S.M., Khullar K., Reisner S.L., Potter J.: "Pap test use is lower among female-to-male patients than non-transgender women". *Am J Prev Med*, 2014, 47(6), 808-1
- [17] Peitzmeier S.M., Reisner S.L., Harigopal P., Potter J.: "Female-to-male patients have high prevalence of unsatisfactory Paps compared to non-transgender females, implications for cervical cancer screening". *J Gen Intern Med*, 2014, 29(5), 778-84.
- [18] Moegelin L., Nilsson B., Helström L.: "Reproductive health in lesbian and bisexual women in Sweden". *Acta Obstet Gynecol Scand*, 2010, 89(2), 205-9.
- [19] Boyer S.C., Pukall C.F.: "Pelvic examination experiences in women with and without chronic pain during intercourse". *J Sex Med*, 2014, 11(12), 3035-50.
- [20] Brüggemann A.J., Swahnberg K.: "Patients' silence towards the healthcare system after ethical transgressions by staff, associations with patient characteristics in a cross-sectional study among Swedish female patients". *BMJ Open*, 2012, 2(6), 1-9.

Corresponding Author:

CAMILLA STENFELT, M.D.

Livio Gärdet, Storängsvägen 10

SE 115 42 Stockholm (Sweden)

e-mail: camilla.stenfelt@livio.se