

## Influence of the birthing room design on midwives' job satisfaction – A cross-sectional online survey embedded in the 'Be-Up' study

Sonja Wangler<sup>a,b,\*</sup>, Anke Simon<sup>b</sup>, Gabriele Meyer<sup>a</sup>, Gertrud M. Ayerle<sup>a</sup>

<sup>a</sup> Institute of Health and Nursing Science, Medical Faculty, Martin Luther University Halle-Wittenberg, Halle (Saale), Germany

<sup>b</sup> School of Health Sciences and Management, Baden-Wuerttemberg Cooperative State University (DHBW), Stuttgart, Germany

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### ABSTRACT

**Background:** Job satisfaction is an important factor influencing work performance, personal well-being, commitment and retention. The working environment influences job satisfaction. The design of the birthing room could influence the practice of midwives and their satisfaction. This study investigates whether the alternative design of the birthing room implemented in the randomized controlled trial 'Be-Up' (Birth environment-Upright position) has an impact on job satisfaction of midwives.

**Method:** A cross-sectional survey using an online questionnaire with 50 items addressing job satisfaction and birth room design was performed. The sample (n = 312) consists of midwives whose obstetric units participated in the Be-Up study and, as comparison group, midwives working in non-study obstetric units. These two independent groups were compared using t-tests; correlations and impacts were examined.

**Results:** The results of the T-tests revealed statistically significant higher global job satisfaction and higher satisfaction with team support of midwives in the Be-Up room. However, midwives working in customary birthing rooms were more satisfied with the design of the room. The most important predictors of job satisfaction were team factors and understaffing in both groups.

**Conclusion:** Reasons for diminished satisfaction with the working environment in the Be-Up study may be assumed in uncertainties about emergency management in a new and unfamiliar environment. Furthermore the impact of a single redesigned room within a customary obstetric unit on job satisfaction seems small, as the room is embedded in the ward and hospital environment. More comprehensive concepts on the potential of the work environment influencing midwives' job satisfaction are needed.

### Introduction

In recent years, an increasing workload for midwives has been observed in various health care systems, combined with a steady deterioration of working conditions [1,2]. This is due on the one hand to staff shortages and an increased bureaucratic and administrative burden, but on the other also to the medicalisation and mechanisation of obstetrics [3–5]. These conditions negatively influence midwives' job satisfaction and increase the desire to change or leave the profession [2,6]. Studies examining the factors influencing job satisfaction in a variety of ways are needed to allow this development to be counteracted and identify new approaches which can positively influence the job satisfaction of midwives.

### Job satisfaction and predictors

Job satisfaction is described as a comprehensive concept involving following aspects: Job scope including demands and tasks, social relevance and prospects for career growth, workplace relationships, teamwork, support from peers and supervisors, work organisation, working hours, working environment, and job security [7,8]. While most of these aspects have already been explored in many ways, the influence of the physical working environment on the staff members, their work performance and satisfaction is only now coming under examination [9–11]. The physical working environment includes all material objects and stimuli encountered by the employees through such factors as architecture and interior design [10]. The evaluation of the work environment looks at the 'fit' between the physical environment and the workplace tasks as well as the level of comfort experienced. The more

\* Corresponding author at: Baden-Wuerttemberg Cooperative State University (DHBW) Stuttgart, Tübingerstr. 33, 70178 Stuttgart, Germany.

E-mail address: [Sonja.wangler@dhbw-stuttgart.de](mailto:Sonja.wangler@dhbw-stuttgart.de) (S. Wangler).

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suitable to the task the workplace is perceived to be, the more satisfied the staff [9]. A work environment which makes the performance of work-related tasks difficult causes stress and reduces job satisfaction [9,12]. Studies have demonstrated that appropriate design of the work environment in terms of lighting, ventilation, temperature and noise, as well as comfortable and aesthetically pleasing furniture and architectural details positively affects workers' wellbeing and, moreover, their motivation, productivity and job satisfaction [12,13,14]. Employees feel more committed to their employer when they can identify with their surroundings and perceive them as both attractive and fit for purpose [9].

### *Design of birthing rooms*

Birthing rooms in most countries are characterised by a technical and risk-oriented view of obstetric care. This is reflected in their design and equipment [15,16]. Bowden et al. examined pictures of birthing rooms in developed countries on the Internet and were able to identify three distinct types of room. About half of the rooms were "technical" in design, with the feature of an (electrically operated) birthing bed in the centre of the room and additional technical equipment (cardiotocography machine (CTG), neonatal resuscitation unit, surgical lamp) in the field of view [17]. Furniture, surfaces and walls were described as cold, shiny and easy to clean. The second category of birthing rooms, which is much less common, was described as "homelike". They were characterised by warm colours, warm lighting, and comfortable furniture; the bed and medical equipment were not placed in the centre of the room. A third category represented a mixed form ("hybrid") which combined elements from both forms with a bed usually placed centrally, comfortable furniture, and colourful accents [17].

### *Influence of design*

Midwives spend a large proportion of their working hours in the birthing room, which thus represents an important component of their physical working environment. It can be assumed that the influence of the work environment on job satisfaction in general described in the literature [15,18,19] will apply to midwives and that birthing room design may impact midwives' job satisfaction.

While the influence of an alternative birthing room design on women in labour and on birth outcomes is already the subject of several studies [4,5,16,20–23], there is still little evidence regarding the influence on staff and their satisfaction. This exploratory study aimed to expand the current state of research by providing new insights into the job satisfaction of midwives in the hospital setting, especially with regards to aspects of the working environment and room design.

We examined the influence of the alternative design of the birthing room, which was embedded in the Be-Up study, on midwives' job satisfaction. We compared the job satisfaction of midwives working in the Be-Up birthing room with that of midwives attending births in standard hospital birthing rooms, and examined the factors influencing job satisfaction.

## **Methods**

### *Study design*

The cross-sectional survey was conducted in March and April 2021 using an online questionnaire via the SoSci Survey software [24].

This study is embedded in the randomised controlled trial Be-Up: Active Birth (Birth environment-Upright position) [25].

From 2018 to 2021, in this randomised controlled trial, a birthing room was redesigned as an 'alternative' Be-Up birthing room in a total of 22 hospital obstetric units in Germany with the intention of promoting vaginal births in hospitals. In the Be-Up birthing room, the bed was removed from the room (or concealed), and active birth, upright body

posture, and self-determination of the woman in labour were encouraged through various elements (floor mat, foam cube, birthing stool). Relaxation was facilitated via a large screen showing nature films. In addition, a table and chairs, a snack bar and dimmable lights. The elements of the Be-Up birthing room were designed in collaboration with midwives and representatives of users during the conceptualization phase of the study. The midwives from each participating hospital selected the colours of the Be-Up elements. As Be-Up was a multicentre trial, the layout of the Be-Up-room might differ e.g., in terms of room size or colours. The control birthing rooms were not changed. Women in labour, participating in the study, were randomly assigned either to the intervention (Be-Up birthing room) or the control group (one of the standard birthing rooms). Introductory events were held in the participating hospitals to inform and instruct midwives about the study and the Be-Up-elements. The Be-Up-room was to be used exclusively for the study, but due to the limited number of birthing rooms available in maternity units, the Be-Up-room was resorted to in cases of acute space shortage.

### *Sample*

The population for this aspect of the study consists of the midwives whose hospitals participated in the Be-Up study (Be-Up group, approximately 350 midwives) and, for comparison, midwives attending births in a hospital in Germany at the time of the survey. Our sample is a convenience sample.

### *Midwifery practice in hospital setting in Germany*

In accordance with German regulations, the attendance of a midwife is mandatory for all births. In a hospital setting, women are typically cared for jointly by midwives and obstetricians/gynaecologists. The midwife is the primary contact person during the birth and usually calls on the doctor in case of pathology and/or to attend the birth itself. Midwives and obstetricians/gynaecologists work collaboratively and, if necessary, involve professionals from other disciplines such as anaesthetists and paediatricians.

### *Sampling techniques*

All midwives working in a hospital participating in the Be-Up study were invited to take part in this survey. A poster with a QR code was hung up in the midwives' break room and the link to the questionnaire was also sent to all midwives by e-mail via the contact persons in the Be-Up hospitals. A reminder was sent after three weeks.

For the comparison group, midwives employed in hospitals were accessed via the relevant mailing lists of the German Midwives Association (Deutscher Hebammenverband: DHV), and invited to participate. In addition, the regional midwifery associations were asked to distribute the invitation to their members by mail. Further the German Society for Midwifery Science (Deutsche Gesellschaft fuer Hebammenwissenschaft: DGHWi), provided information on their homepage. In one federal state, the hospitals were contacted directly as part of information provided by the midwives' association. The social media platform *Facebook* was also used for further distribution.

A separating variable in the questionnaire assigned the midwives to either the Be-Up group or the comparison group. Since birthing rooms are equipped differently in German hospitals, midwives in hospitals without a Be-Up birthing room were asked to refer to their preferred birthing room. Midwives working in Be-Up-clinics were asked to refer to the Be-Up-room in our questionnaire, although they also worked in standard birthing rooms during the study period.

### *Measures*

For this survey, we used the questionnaire 'Job satisfaction and room design among midwives' (ARaH, supplement, see [Table 1](#)), which had

**Table 1**  
Domains and items of the ARaH questionnaire.

| Domains (examples)  | Number of items |
|---|-----------------|
| Global job satisfaction (satisfaction in general, likelihood of workplace recommendation)   | 3               |
| Room design (atmosphere, feeling comfortable in the room, colour design, lighting conditions, involvement of the midwifery team in birthing room design)                        | 9               |
| Team (communication, cooperation, appreciation, mutual support)   | 6               |
| Autonomy and opportunities for professional development (scope for decision-making, requirements, emergency situations)   | 6               |
| Health (general, physical complaints, e.g. back, shoulders, joints, physical stressors in the birthing room).   | 4               |
| Job Satisfaction Scale [32,33] (psychological stress, satisfaction with level of recognition, salary, working hours, diversity of tasks, autonomy in choice of working methods) | 8               |
| Room equipment (telemetry, birthing tub, seating, size and position of bed).  | 14              |

been developed and validated as part of the Be-Up study [26]. The questionnaire comprised items on demographic characteristics (age, sex, type of employment, working hours, and work experience) and information on the maternity unit (vacant positions, frequency of understaffing - assessed by the midwives using a four-point-scale from never to always, number and type of birthing rooms in the department). We also asked about the level of obstetric care. There are four defined levels of care in obstetric departments in Germany. Level one perinatal centres provide the highest level of care and include a Neonatology Department able to care for premature and sick neonates. Level four representing maternity units without in-house paediatricians (Birth centre without perinatal focus) [27].

The questionnaire integrated items from the Job Satisfaction Scale [28] developed and validated by Warr et al., also available in a German translation [29].

Seven-point Likert response scales were used to evaluate the aspects of the questionnaire. The items in *room equipment* were binary.

### Statistical analysis

To begin with, the sociodemographic characteristics of the two independent samples (Be-Up-group and comparison group) were compared. In both the Be-Up and the control groups a mean value was calculated for each of the domains listed in Table 1 (with the exception of *room equipment*). The two groups were compared using T-tests, apart from *room equipment*, for which the chi-square test was used. The mean values of the individual items were also compared for *room design*. Correlations (Pearson's correlation coefficient) were calculated to examine relationships between the domains of job satisfaction and *global job satisfaction*. In order to predict how the various aspects (predictors) influenced global job satisfaction (dependent variable), multiple linear regression was applied to both groups. Age, perinatal centre level, and understaffing were included in the regression analysis.

A p value of 0.05 or less was defined as statistically significant. Reliability analysis and confirmatory testing of the factor structure of the questionnaire were performed. Calculations were performed using the statistical program SPSS (version 27).

### Ethical considerations

The survey was anonymous, consent was given by filling out the questionnaire. The Ethics Committee of the medical faculty of the responsible university gave a positive vote (processing number: 2019–131 (B)).

## Results

### Sample

A total of 312 midwives participated in the survey: 84 midwives who worked in a Be-Up birthing room and 228 midwives from hospitals without a Be-Up birthing room. Table 2 shows the demographic characteristics of the two groups. Age, work experience, working hours, and type of employment of the participating midwives did not differ significantly in the two groups. The groups differed slightly with regard to level of the perinatal centre: midwives in the Be-Up group were more likely to work in level 3 and 4 perinatal centres, whereas midwives in the comparison group were slightly more likely to work in level 1 and 2 perinatal centres ( $U(N1 = 76, N2 = 206) = 6618.5, z = -2.183, p = .029, r = 0.168$ ). The groups also differed somewhat in regard to understaffing. The Be-Up group was significantly less likely to report understaffing ( $U(N1 = 70, N2 = 195) = 5722.00, z = -2.150, p = 0.032, r = 0.13$ ).

### Size of departments and type of birthing rooms

The number of birthing rooms per hospital ranged from 2 to 7, with 4 rooms being the most common. The design of the birthing rooms was predominantly (57%) classified as *hybrid*, defined as a mixture of technical furnishings with homelike elements, followed by a *technical* type (29%). The birthing rooms of the design classified as *homelike* were rather rare at 14%.

### Comparison of birthing room equipment

The following differences between the groups were found in the birthing room equipment (see Fig. 1): Technical equipment could be stored less easily in the Be-Up birthing room, and presence of a bathtub was rare. However, comfortable seating for the midwife was much more common, as was the opportunity for the birthing woman to manage

**Table 2**  
Demographics of the two groups.

|  | Be-Up Group   | Comparison group | p-value |
|--|---------------|------------------|---------|
| <b>Total (n = )</b>  | 84            | 228              |         |
| <b>Mean age in years (<math>\pm</math>SD)</b>                | 39.32 (10.95) | 38.14 (11.42)    | 0.488   |
| <b>Average work experience in years (<math>\pm</math>SD)</b> | 16.46 (11.13) | 14.53 (11.60)    | 0.232   |
| <b>Form of employment (mixed forms possible) (n; %)</b>      |               |                  |         |
| Employed   | 69 (82.1)     | 187 (82.0)       | 0.672   |
| Independent midwives with hospital privileges                | 6 (7.1)       | 20 (8.8)         | 0.673   |
| Freelance (in addition to employment)                        | 22 (26.2)     | 42 (18.4)        | 0.109   |
| Not specified  | 8 (9.5)       | 18 (7.9)         |         |
| <b>Work hours (n; %)</b>                                     | n = 84        | n = 228          | 0.167   |
| Full-time  | 22 (26.2)     | 79 (34.6)        |         |
| Part-time  | 54 (64.3)     | 130 (57.0)       |         |
| Not specified  | 8 (9.5)       | 19 (8.3)         |         |
| <b>Perinatal centre level (n; %)</b>                         | n = 84        | n = 228          | 0.029   |
| Level 1: Perinatal Centre Level 1                            | 30 (35.7)     | 101 (44.3)       |         |
| Level 2: Perinatal Centre Level 2                            | 3 (3.6)       | 23 (10.1)        |         |
| Level 3: Birth Centre with perinatal focus                   | 2 (2.4)       | 8 (3.5)          |         |
| Level 4: Birth Centre without perinatal focus                | 41 (58.8)     | 74 (32.5)        |         |
| Not specified  | 8 (9.5)       | 22 (9.6)         |         |
| <b>Understaffing (n; %)</b>                                  | n = 84        | n = 228          | 0.032   |
| Always   | 3 (3.6)       | 12 (5.3)         |         |
| Frequent   | 21 (25.0)     | 88 (38.6)        |         |
| Rare   | 34 (40.3)     | 68 (29.8)        |         |
| Never  | 12 (14.3)     | 27 (11.8)        |         |
| Can't judge  | 14 (16.7)     | 33 (14.5)        |         |

SD: Standard Deviation.

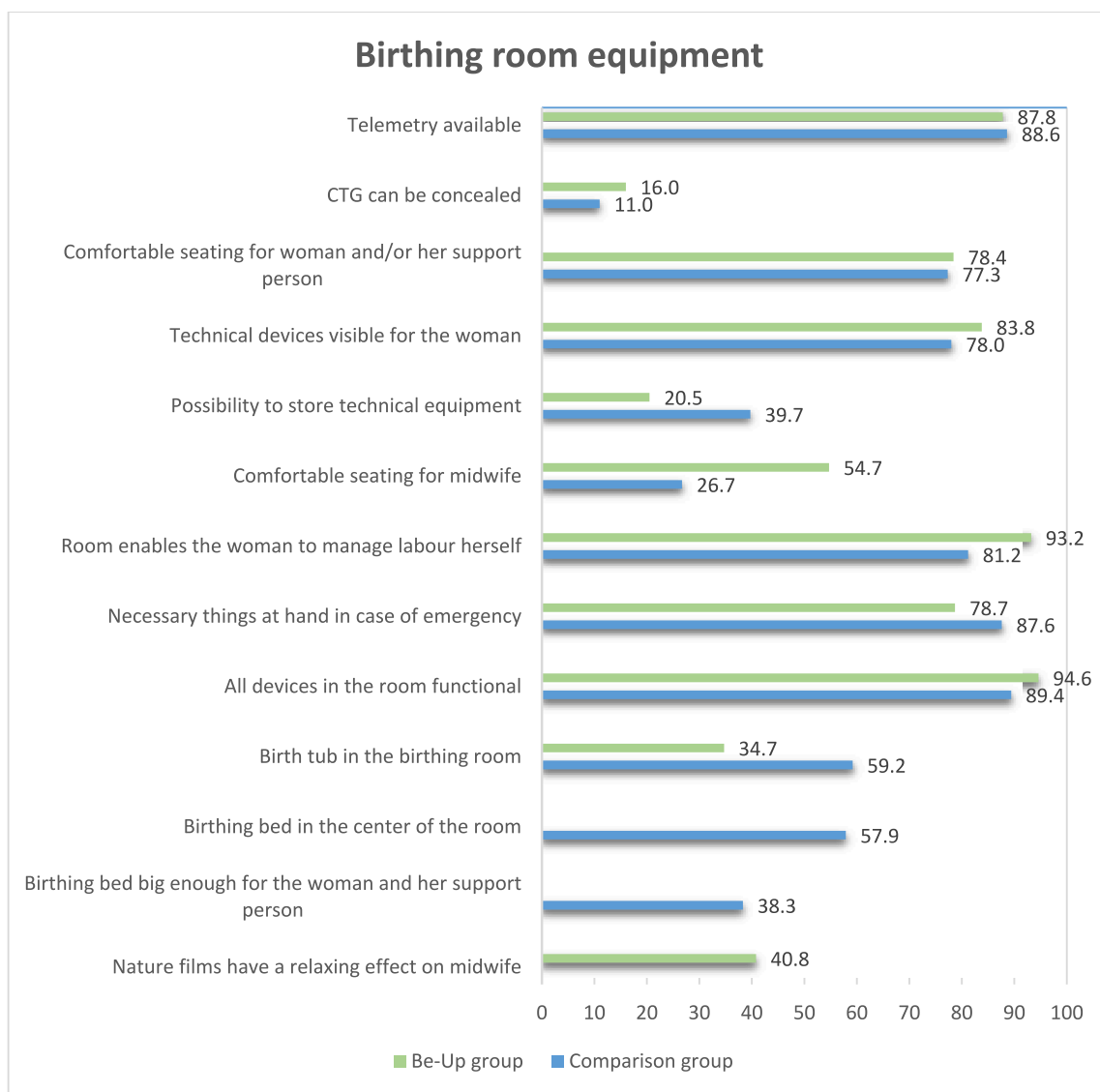


Fig. 1. Birthing room equipment (only yes answers in valid %).

labour herself ( $\chi^2(1) = 5.82, p = .016, \phi = -0.15$ ).

#### Level of satisfaction in comparison

Differences were identified between the two groups in five out of six domains of the questionnaire (T-tests; see Fig. 2). On average, the Be-Up group showed significantly higher *global job satisfaction* than the comparison group ( $t(172) = 3.67, p = .001, d = 0.44, 95\% CI [0.27, 0.90]$ ). Midwives in the Be-Up group rated the *team* items significantly higher on average than the comparison group ( $t(307) = 2.10, p = .036, d = 0.36, 95\% CI [0.02, 0.58]$ ). In contrast, the comparison group rated satisfaction with the *design of the birthing room* significantly higher ( $t(284) = -3.25, p = .001, d = -0.44, 95\% CI [-0.94, -0.23]$ ). *Autonomy* was also rated higher in the comparison group than in the Be-Up group ( $t(118) = -2.62, p = .01, d = -0.34, 95\% CI [-0.61, -0.08]$ ). There was no significant difference between the two groups with regard to the *health-related* items. The items of the *Job Satisfaction Scale* showed significantly higher satisfaction scores on average in the Be-Up group ( $t(174) = 2.86, p = .005, d = 0.34, 95\% CI [0.10, 0.56]$ ).

Since the focus of the study was on the impact of the design of the birthing room on midwives' job satisfaction, the domain *room design* is presented more detailed. Fig. 3 shows the distribution of the item 'overall

satisfaction of the birthing room' in both groups. In the Be-Up group 13.1% of the midwives had a very high satisfaction score (6 and 7), compared to 36% in the comparison group.

The individual items of the domain *room design* and their mean values are presented in Table 3.

#### Predictors of job satisfaction

Multiple linear regression identified the domains *team* and *understaffing* as significant predictors of *global job satisfaction* for the Be-Up group (see Table 4). In the comparison group, the *team*, *room design*, and *understaffing* domains were significant predictors. In both groups, the model had a high fit, with  $R^2 = 0.41$  in the Be-Up group and  $R^2 = 0.51$  in the comparison group (Be-Up:  $F [6.58] = 6.67, p < 0.001$ ; comparison group:  $F [6.18] = 31.05, p < 0.001$ ).

Reliability analysis yielded a Cronbach's alpha of 0.94 for the entire questionnaire in this sample.

#### Discussion

This study aimed to examine the influence of the birth environment on the job satisfaction of midwives, in comparing midwives in the Be-Up

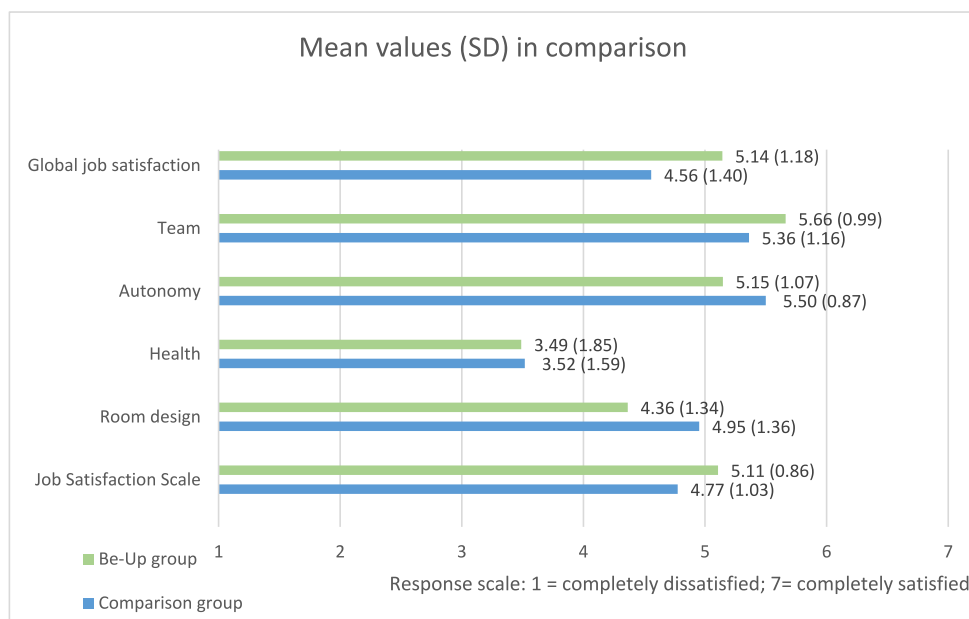


Fig. 2. Mean values (standard deviations) of the Be-Up and the comparison groups.

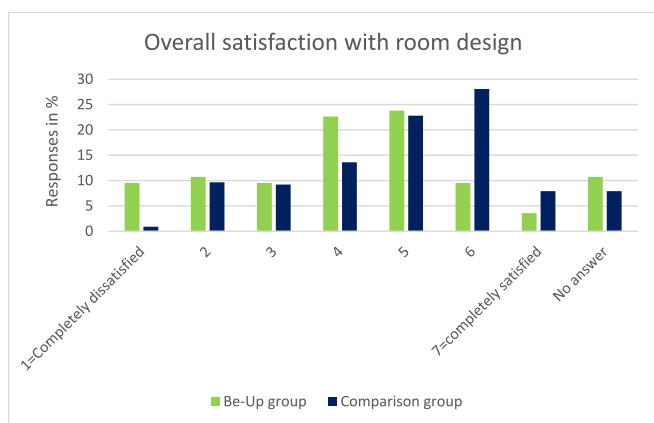


Fig. 3. Distribution of answers of the item “Overall, I’m satisfied with the design of the room” (in percentage).

study with midwives working in standard birthing rooms. We found that the midwives in the Be-Up group scored higher than the comparison group on both global job satisfaction and the general items of the *Job Satisfaction Scale*. Midwives in the Be-Up group were also more satisfied with their team. Communication, mutual appreciation and support, and being able to rely on each other were evaluated more positively in this group, and the team was shown to be the most important factor influencing job satisfaction in the regression model. Thus, it can be assumed that the greater satisfaction of the Be-Up group with the team also led to greater global job satisfaction. The great relevance of the team is supported by other research, which has found relationships and team support in the workplace to be some of the most important predictors of midwives’ job satisfaction [1,6,30–34]. Interventions which foster cooperation both amongst midwives and between midwives and healthcare professionals are therefore highly appropriate methods of job satisfaction.

While some studies describe an influence of the maternity unit design on communication [21,35,36] and on social interaction and relationships between obstetric personnel [21], we were unable to attribute higher team satisfaction to satisfaction with the design of the birthing room.

Table 3

Mean values (standard deviation) of the Be-Up and comparison groups for the domain *room design*.

| Satisfaction with the room design (Coding: 1–7)<br>Higher values mean higher satisfaction | Be-Up Group |             | Comparison group |             | p-value |
|---|-------------|-------------|------------------|-------------|---------|
|   | n           | Mean (SD)   | n                | Mean (SD)   |         |
| I feel comfortable in the birthing room   | 76          | 4.30 (1.62) | 210              | 5.30 (1.31) | <0.001  |
| I like being in the birthing room   | 76          | 4.28 (1.73) | 209              | 5.38 (1.31) | <0.001  |
| There is homelike furniture in the birthing room  | 75          | 3.88 (1.68) | 209              | 4.22 (1.75) | 0.150   |
| The design of the birthing room is appealing  | 75          | 3.95 (1.78) | 209              | 4.77 (1.63) | <0.001  |
| The birthing room is designed to create a pleasant atmosphere                             | 75          | 4.16 (1.76) | 210              | 4.90 (1.59) | 0.001   |
| I find the colours in the birthing room pleasant  | 75          | 4.17 (1.79) | 210              | 4.99 (1.76) | 0.001   |
| I can change the quality of light in the room myself                                      | 75          | 6.08 (1.25) | 210              | 5.66 (1.67) | 0.023   |
| The midwifery team was involved in the design of the birthing room                        | 64          | 4.02 (1.99) | 166              | 4.16 (2.12) | 0.647   |

SD: Standard Deviation.

Table 4

Regression model.

| Factor                 | Be-Up Group <sup>a</sup> | Comparison group <sup>b</sup> |
|------------------------|--------------------------|-------------------------------|
|                        | Beta (Sig.)              | Beta                          |
| Team                   | 0.519**(<0.001)          | 0.456** (<0.001)              |
| Autonomy               | 0.236 (0.062)            | 0.133 (0.198)                 |
| Room design            | 0.029 (0.790)            | 0.154* (0.019)                |
| Age                    | 0.003 (0.801)            | -0.004 (0.596)                |
| Understaffing          | 0.483** (0.003)          | 0.607** (<0.001)              |
| Perinatal centre level | -0.083 (0.342)           | 0.035 (0.527)                 |
| R <sup>2</sup>         | 0.41                     | 0.51                          |

Multiple linear regression model: dependent variable: mean global job satisfaction; influencing variables: Design<sub>mean</sub>, Team<sub>mean</sub>, Age, Understaffing, Perinatal Centre Level, Autonomy<sub>mean</sub>,<sup>a</sup> n = 83; <sup>b</sup> n = 226.

Contrary to our expectations, the satisfaction with the design of the birthing room was lower in the Be-Up group than in the comparison group. In particular the sense of wellbeing, atmosphere and the room colours had a lower rating in the Be-Up birthing room, although the midwife team using the Be-Up room were involved in the choice of colours of the Be-Up elements (floor mat, foam cube, mattress, birthing stool) and the lighting conditions could be adjusted for a pleasant atmosphere. The monitor/speaker with nature scenes installed for the relaxation of the birthing women has also been found to reduce staff stress [14,15,37]. In the present study, the monitor had a relaxing effect on 40% of the midwives and could thus counteract the perception of stress, but it remains unclear whether those midwives who did not report a relaxing effect actually used the monitor or possibly even felt disturbed. As stress is a factor that negatively influences job satisfaction, further research on how to influence stress levels by design elements could be of value here.

There are several possible reasons for the lower satisfaction rating of the Be-Up room: research has shown that the possibility of actively shaping the work environment can lead to more positive perception of it [9]. However, the Be-Up room was restricted to certain design specifications, and the midwives' influence on the design features was limited. In addition, midwives in the Be-Up group reported issues storing technical equipment out of sight and that this may have detracted from the calming atmosphere in the birthing room [22].

With regard to the equipment in the Be-Up room the midwives were less likely to agree that they had *everything they need at hand in case of an emergency* and that they were also less likely to feel able to *react appropriately in case of an emergency*. This suggests uncertainties in emergency management in a new and unfamiliar environment and illustrates that the design of the room influences possible courses of action. It can be assumed that procedures were less routine for midwives in the Be-Up room, and furthermore, that routines and the performance of certain actions are often rehearsed in relation to the birthing bed and require rethinking when performed in a different environment. These results are supported by Goldkuhl et al., who also noted uncertainties in addition to positive effects from the redesigning of birthing spaces [4]. The uncertainties related to task performance may have a negative impact on job satisfaction.

On comparison, the floor elements in the Be-Up room did not represent a higher physical burden for the midwives participating in the survey. This is important to note, as ergonomic aspects in the workplace have the potential to make it more difficult to perform job-related tasks and thus negatively affect job satisfaction [9].

In the Be-Up room there were more opportunities to encourage women to be active, mobile, and to facilitate self-determination compared to the equipment in the standard birthing rooms used by the comparison group. Midwives in the Be-Up group were more likely to report that *women were enabled to manage labour herself*. These findings contribute to other research results, showing a birthing room that promotes activity, movement, and a positive birth experience, supports midwives in their professional practice [15,25]. Qualitative studies have shown that rooms with a central bed make it more difficult to facilitate upright birthing positions and activity, and that midwives often go out of their way to move the bed out of focus [15,19,38]. Midwives attending home births also have a more critical view of the use of the bed [15,39]. It can be assumed that midwives working exclusively in the clinical setting see the birthing bed as a mandatory requirement and therefore do not primarily view the presence of a functionally adjustable bed in a negative light.

A good relationship between midwives and women in labour positively influences job satisfaction [40]. Midwives were more likely to find comfortable seating in the Be-Up birthing room. This could have a positive effect on the length of time the midwife is present in the birthing room. Two studies have demonstrated that the design of a birthing room can contribute positively to a model of care in which the midwife has a high presence [15,18]. However, in addition to the design of a room, the

time the midwife spends with women is influenced by what is going on outside the birthing room in the unit and the number of women she has to care for [15].

In both groups, the negative impact on job satisfaction due to understaffing was highly significant; in the comparison group this had an even greater impact than being satisfied with the team. Thus, lower levels of understaffing in the Be-Up group may have contributed to higher overall job satisfaction. The negative influence on job satisfaction of a high workload for midwives is also supported by other research [34,41].

Similar to the studies by Matthews et al. and Papoutsis et al. [6,30] our study did not identify any influence of age and work experience on job satisfaction for midwives, though they have been described as predictors of it in some studies [31–33].

Satisfaction with the birthing room design had no direct relationship to job satisfaction in the Be-Up group. This result indicates that the redesign of only one room within a unit with standard birthing rooms cannot illustrate its full effect. In future, if optimisation of the design of birthing rooms is planned, it seems reasonable to redesign the whole unit. This assumption is also supported by Setola et al. who describe the integration and relationship of a room to other rooms in the ward [21].

### Strengths and limitations

In order to investigate the influence of the design of the birthing environment on job satisfaction, we used a standardised questionnaire which was developed on the basis of literature and validated. This study is the first to quantitatively examine associations with job satisfaction among midwives working in differently designed birthing rooms. Thus, this study contributes to knowledge about the importance of birthing room design for job satisfaction of midwives in the hospital setting.

One limitation results from the cross-sectional design of the study, which meant that comparison before and after the changed room design, and thus directly attribution of changes in job satisfaction to the birthing room design was not possible. Another limitation is the fact that the midwives in the Be-Up group worked both in the Be-Up birthing room and in the standard birthing room, suggesting that job satisfaction could not be assessed with a high degree of accuracy. A further investigation with midwives who work exclusively in alternative rooms or in an alternatively designed unit is needed.

The changed conditions and, in some cases, increased demands due to the Covid 19 pandemic also had a limiting effect. Since job satisfaction as a multifactorial concept is also influenced by the workload factor, the impact of the Covid 19 pandemic, which also exacerbated existing staff shortages, cannot be ruled out here.

A bias may result from the fact that the midwives in the comparison group chose to evaluate the birthing room in their unit in which they preferred to care for women. The reasons given show that the choice of the room is guided by aspects such as the atmosphere of the room, functionality, equipment, but also noise level and intimacy. This choice is incorporated into the evaluation of the room design and, also influences the midwife's sense of wellbeing in the room, and thus may have captured the satisfaction of the comparison group with the room design in an overly positive way.

Another limitation of this online survey is the convenience sample. It is possible that particularly motivated midwives or midwives for whom job satisfaction is especially important participated in the study. The small sample of the Be-Up group leads to limited generalisability and the results on room design need further investigation.

### Conclusion

Midwives' job satisfaction has been increasingly compromised in recent years by worsening conditions in the hospital setting. A better understanding of the complex construct of job satisfaction and an understanding of how the physical working environment can influence

satisfaction might contribute to the development of interventions aimed to increase job satisfaction. The study underscores the multifactorial nature of job satisfaction, highlighting both the importance of team and collaboration in maternity care and the negative impact of inadequate staffing. Although the study was unable to demonstrate the direct influence of room design on job satisfaction, important insights into room design were gained. When redesigning the environment, it is important to prevent uncertainties in practice related to routines, especially in emergency situations, and to promote acceptance of the design through co-design. Further research on the potential of the work environment to positively influence midwives in their work and satisfaction and thus improve staff retention and the quality of care for women and families is needed.

### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.srhc.2023.100867>.

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