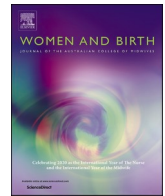




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Emotional wellbeing of student midwives during COVID-19

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ABSTRACT

Background: Mental health of students in higher education was affected during the COVID-19 pandemic.**Aim:** To examine the emotional wellbeing of midwifery students in the Netherlands and Flanders (Belgium) during COVID-19.**Methods:** A cross-sectional online-based survey with 619 Dutch and Flemish midwifery students. Sociodemographic details were obtained. Anxiety and depression were measured twice (T1, T2) during the COVID-19 pandemic.**Findings:** Flemish students had significantly higher mean depression and anxiety scores than Dutch students during the total period of study ($p < .001$; $p < .001$). Total group mean depression and anxiety scores were significantly higher at T2 compared to T1 ($p < .001$; $p < .001$). In the Dutch student group, there was a significant increase of depression from T1 to T2 ($p < .001$). In the Flemish student group, both depression and anxiety scores significantly increased from T1 to T2 ($p < .001$; $p < .001$). A history of psychological problems predicted both depression and anxiety, irrespective of COVID-19 period or country ($p < .001$; $p < .001$). Being single ($p.015$) and having a job ($p.046$) predicted depression, irrespective of period or country. A history of psychological problems predicted depression ($p.004$; $p < .001$) and anxiety ($p.003$; $p.001$) during the total period of study. Being single also predicted depression during T2 ($p.024$).**Conclusion:** These findings inform how emotional wellbeing of midwifery students was affected during the COVID-19 pandemic and identify those students that might need extra attention after the pandemic, during another pandemic or similar situations with social restrictions.

STATEMENT OF SIGNIFICANCE

Problem or issue

The COVID-19 pandemic presented unique emotional challenges for midwifery students.

What is already known

Irrespective of the impact of COVID-19, midwifery students seem to be at risk for emotional health problems, based on age, gender, the emotional demanding and clinically and academic challenging nature of the study programme, and balancing student- and personal life.

What this paper adds

This study, conducted in two different countries, provides information on midwifery students' emotional wellbeing throughout the first 15 months of the COVID-19 pandemic with successive (complete and partial) lockdown restrictions.

Introduction

The severe acute respiratory syndrome coronavirus (COVID-19) disease was declared as a pandemic by the World Health Organization on 11 March 2020. The COVID-19 pandemic affected higher education students due to disruptions in school and in social behaviours [1]. The pandemic presented unique challenges for students, of which academic work, mental health and isolation were most often reported [2–5].

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Midwifery education was greatly affected by the lockdown measures imposed by governments [6,7], causing anxiety, uncertainty, and emotional burden among students [8]. Theoretical education in the university context changed, adopted, and enhanced digital readiness in a rapid pace to manage student learning [9].

Mental health of midwifery students pre and peri-COVID-19

In Europe, midwifery students are predominantly women and nearly two-third are younger than 21 years of age [10]. Adolescent students are known to be more at risk for feeling distressed compared to other age groups [11,12], and female students are more likely to experience depression and anxiety than male peers [3,13,14]. There were serious concerns about the pre-COVID mental health of student midwives because assessment of emotional health indicated that student midwives' emotional wellbeing was not optimal [15]. Midwifery education is recognised as being stressful with the (emotional) demands of the theoretical and practical components of the study, including clinical, academic, and financial challenges [15–17]. Younger midwifery students [18] and students who juggle their study with other commitments, such as a job, social activities, and family life, struggle more to keep up with their academic and clinical demands and their personal commitments [19]. Irrespective of the impact of COVID-19, midwifery students seem to be more at risk for emotional health problems, based on age, gender, the demanding and challenging nature of the study programme, and balancing student- and personal life [3,14,20,21].

Mental health problems of students in higher education increased during the pandemic compared to pre-pandemic prevalence rates [2,3,12–14,22,23]. Students reported fear and worry about their own health and that of family and friends, difficulty in concentrating and disruptions to sleeping patterns. They reported worries about their course progression and assessment, increased concerns on academic performance, decreased motivation to study, and difficulties with adjusting to new online teaching methods, study strategies and the reduction of social interactions with their peers [1–3,12,21,22]. Being younger and a higher number of years of study were positively associated with peri-pandemic depression and anxiety [13].

Midwifery research collaboration between the Netherlands and Flanders

In a European cross-border mental health project (<https://path-perinatal.eu>), operational during the COVID-19 pandemic, a Dutch and a Flemish Higher Education Institution (HEI) collaborated in monitoring the peri-pandemic emotional wellbeing of Dutch and Flemish student midwives. Midwifery related research collaboration between Flanders (the northern and Dutch speaking part of Belgium) and the Netherlands, and midwifery research involving both populations is common [24–27]. Approximately 48 % of the midwifery students in Flanders are Dutch, and after graduation they often start their career as a qualified midwife in a Dutch primary or secondary care setting [28–30]. Of the current Dutch practising midwives, 20 % have been educated in Flanders [29]. In many ways Flanders and the Netherlands are similar with comparable political systems and demographic characteristics, and both countries face the same societal challenges such as ethnic diversity and socio-economic inequalities [24]. Flanders and the Netherlands have some vocabulary differences but overall speak the same language.

Midwifery education in the Netherlands and Flanders

In the Netherlands, midwifery education is a four-year programme while in Flanders it is a three-year programme, both full-time undergraduate, direct entry programmes. In both countries, professional development of student midwives occurs through theoretical learning and exposure to relevant practice learning activities. Students spend over a third of their program in the clinical area, being community practices and/or hospital settings (for further details, see Box 1). A significant difference with the Netherlands is that Flanders has a five-year combined nursing-midwifery Bachelor programme and a top-up nursing-midwifery programme at master's level [28,30].

Midwifery education in the Netherlands and Flanders during the COVID-19 pandemic

In both countries the first COVID-19 pandemic wave with its concurrent lockdown, began in March 2020, easing in June 2020. A quick succession of a second wave and a third wave, both with lockdown

Box 1

Midwifery education in Flanders and the Netherlands.

	Flanders	Netherlands
Number of HEIs*	9	3
Number of schools where the Bachelor midwifery programme is provided	12	4
Approximate number of students who enrol on the Bachelor midwifery program/year	700	220
Approximate number of students graduating/year	300	150
Approximate total number of midwifery students on the programme (all years)	2240	880
Total number of years pre-registration midwifery programme	3	4
Number of European Credit Transfer and Accumulation System (ECTS) at graduation	180	240
Restricted number of available programme places (<i>Numerus Clausus</i>)	No	Yes
Entry/admission/selection tests	No	Yes
Entry requirements: Biology	Not required	Required
Entry requirements: Chemistry	Not required	Required
Entry requirements: Mathematics	Not required	Required
Pre-entry required number of years of formal education	12	11
Clinical practice-theory ratio* *	33 %–67 %	35 %–65 %
Study fees per year	€1.120	€2.143
Compulsory attendance in-school education	No	No
Hours of face-to-face/online education theoretical education year 1 ^a	285	279
Hours of face-to-face/online education theoretical education year 2 ^a	266	264
Hours of face-to-face/online education theoretical education year 3 ^a	172	80–93 ^b
Hours of face-to-face/online education theoretical education year 4 ^a	N/A	0–58 ^b

regulations followed in October 2020 and March 2021, respectively. In each country, regulations for HEIs showed similarities in adapting the organisation of clinical placement and education up to June 2020, apart from examination and campus access [31–33]. Exams in the Netherlands were a combination of both on-campus and online exams, opposed to the Flemish students who did all their exams online. The first three months of the pandemic, clinical placements were discontinued. In June 2020, students returned to the clinical area. There was no one-size-fits-all approach about the presence and involvement of the students. This depended on hospital and practice regulations, the situation and the woman's preferences [31–34]. In both Flanders and the Netherlands, students who do not meet the minimal required European Credits (ECs) at the end of the first year of study, receive a binding recommendation that they cannot continue their study. During the pandemic, the binding recommendations were postponed to the end of the second year of study, allowing students more time to obtain the necessary ECs [32–34]. In both countries, theoretical education was provided online although from June 2020 and onwards, Dutch students were allowed to come to campus for individual studying, opposed to the Flemish students. Weekly in-school skills/practical training re-started in the Netherlands in June 2020 with an adjusted group size adhering to the hygiene and social distancing rules and the square meters per classroom, while in Flanders this re-started in September 2020 with one lesson per fortnight in small groups of 15 students [31,33]. In April 2021, in-school education returned to one-day per week for the Dutch students, while there was no scale up of in-school activities for the Flemish students [32,34]. Belgium had a more active approach to vaccination compared to the Netherlands and the overall uptake was higher in Belgium than in the Netherlands [35]. From April 2021 and onwards, tests were freely available for students in both countries. HEIs in both countries were not allowed to ask students whether they were vaccinated or whether they had (self-) tested because both were not mandatory [32,34].

Earlier studies about emotional wellbeing of midwifery students during COVID-19 did not distinguish between the pandemic waves [7,8,12,20]. Being able to follow students based on common features such as country, age group, education programme, and being exposed to similar pandemic (lockdown) regulations, is of merit to make a statement whether emotional wellbeing of midwifery students changed during the pandemic and what affected their emotional wellbeing. Including several pandemic waves allows the effect of the initial shock and uncertainty of the first wave, and the adaptation to the lockdown and social distancing measures during the subsequent waves [36,37]. Although the COVID-19 pandemic is a universal stressor experienced across the globe, it is likely that the psychological health impact of this event will differ among students, based on (inter)personal and contextual factors [38]. By exploring these factors, this study can contribute to the recognition of students who have been vulnerable to the adverse psychological effects of pandemic, providing suggestions for post-pandemic care [38,39]. Additionally, addressing this knowledge gap is important to understand the effects of a global pandemic and prepare for effective emotional support mechanisms for midwifery students during similar disruptions [40]. In this study we examined the emotional wellbeing of midwifery student in the Netherlands and Flanders during the first, second and third pandemic COVID-19 pandemic waves. We sought answers to the following questions:

- What is the level of emotional wellbeing among midwifery students in the Netherlands and Flanders during the COVID-19 pandemic?
- Are there differences in emotional wellbeing between Dutch and Flemish students during the COVID-19 pandemic?
- Are there changes in emotional wellbeing over time within and between the groups of Dutch and Flemish students during the COVID-19 pandemic waves?
- Are there student characteristics that predict changes in emotional wellbeing during the COVID-19 pandemic?

Methods

Design

A cross-sectional online survey study was conducted with midwifery students in the Netherlands and Flanders. Eligible participants were 18 years of age or older, during any stage of their study. The data were collected between 17 March 2020–23 June 2021, using online self-completed questionnaires (Limesurvey®).

Sampling

The three Dutch and nine Flemish HEIs providing midwifery education were approached and informed about the study with all agreeing to recruit students. To obtain a representative sample, students were purposively recruited. To secure informed consent and confidentiality requirements, we followed a procedure: A lecturer of each HEI (who was not involved in the study) distributed information about the study to the students, including the link and quick response (QR) code to the questionnaire through the HEIs' intranet and, if available, HEI-moderated private social media platforms (Instagram®, Facebook®). The link and QR-code anonymously directed the participants to the questionnaire.

Measures

Sociodemographic and personal details (e.g., age, country of education, year of education, hours spent on individual study/week, clinical hours up to point of measurement, job, children, relational status and living circumstances) were collected. Two items measured the participant's history of psychological problems (*yes/no*) by asking if the participant had ever experienced psychological problems pre-COVID or was still experiencing psychological problems, with or without treatment (e.g., medication, professional help). The following item included a list of several psychological issues (e.g., depression, burn out), of which one or more could be selected. Emotional wellbeing was measured with the Hospital Depression and Anxiety Scale (HADS).

Hospital anxiety depression scale (HADS)

The Hospital Anxiety Depression Scale (HADS) was designed to measure anxiety and depression in a general population [41] and has shown to have good psychometric properties and to perform well in assessing anxiety and depressive disorders [42]. The HADS is a 14-item self-administered measure including two 7-item subscales, one measuring anxiety and the other subscale measuring depression. Each item is rated on a scale from 0 to 3 and participants rate the response which comes closest to how they have been feeling in the past week. A subscale score between 8 and 10 identifies *possible* presence and a score of ≥ 11 the *probable* presence of a clinically meaningful anxiety or depressive condition [43]. The HADS has been translated into Dutch [43] and has been validated for use among different age groups, including a random sample of young adults [44] and undergraduate students [45]. The HADS showed an overall good sensitivity/specificity balance for the anxiety and depression subscales in adolescents and students (0.73/0.93; 0.82/0.88) [44,45].

Statistical analysis

The analyses were performed using the Statistical Package for the Social Sciences® (SPSS) version 28. We calculated descriptive statistics for the participants' characteristics. The scores of the HADS depression and anxiety subscales were summed and the possible and probable presence of anxiety and depression were established using the HADS cut-off values [43]. Cronbach's alpha was calculated for the HADS total, and the depression and anxiety subscales. Normality of distribution was checked with the Kolmogorov-Smirnov test. The Mann-Whitney U test

was used for continuous data and Chi-square for dichotomous data.

The strategy for model building was as follows: based on the pandemic waves, we divided the sample in two periods. T1 included participants who completed the questionnaire between 17 March-30 September 2020 (wave 1). T2 included participants who completed the questionnaire between 1 October 2020–23 June 2021 (wave 2 and 3). We hypothesized that there would be differences in emotional wellbeing based on the initial shock about the pandemic and complete lockdown and being accustomed to the pandemic regulations during the following waves with its alternating partial and complete lockdown regulations, affecting emotional distress (i.e. wearing off or intensifying) [8,36,37]. We calculated the differences in depression and anxiety between T1 and T2. We examined the within-group changes of the Dutch and Flemish students by comparing T1 and T2 means for HADS depression and anxiety and the proportions according to the cut-off levels. To investigate which characteristics (predictors) predict anxiety or depression (outcome measures), two dichotomous dependent outcomes variables were computed: possible depression/anxiety, scores 8–10 (*yes/no*) and probable depression/anxiety, scores ≥ 11 (*yes/no*). Possible and probable scores of depression and anxiety were collapsed into one dichotomous outcome variable (*yes/no heightened scores*). The predicting variables (students' characteristics) were computed in dichotomous variables (*yes/no*) and compared with the heightened anxiety and depression scores, using two-tailed Pearson Chi-square coefficients. Binary logistic regression and Chi-square tests examined the variables predicting depression and anxiety. Predictors were chosen based on significant Pearson Chi-square coefficients. The *p*-value was set at $<.05$.

Sample size

A power analysis, with G*Power (3.9.1.2) indicated that a sample size of 482 would be sufficient to detect a significant small effect (Odds Ratio [OR] = 1.68) [46], assuming a power of 0.80 and an alpha of 0.05, based on a 19 % increase of depression among student midwives pre and peri-COVID-19 [12,13]. To draw true inferences about the population, a minimum sample of 329 Dutch students and 268 Flemish students was required (95 % Confidence Interval, $p < .05$).

Ethical approval

The study protocol was reviewed and approved by the Antwerp University Hospital Ethics Committee (Reference nr. EA_SHW_19_34). Participation was voluntary and anonymous and informed consent was obtained before the questionnaire could be completed (via box ticking).

Results

Of the 650 responders, 31 respondents discontinued the questionnaire after providing consent, leaving 619 completed questionnaires (95.2 % completion rate), showing no missing values. Of the 619 questionnaires (323 Dutch students and 296 Flemish students), 326 were completed between 17 March-30 September 2020 (T1), and 293 between 1 October 2020–23 June 2021 (T2). HADS total scores and the depression and anxiety subscale scores showed a non-normal distribution ($D(619) = .7, p < .001$; $D(619) = .11, p < .001$; $D(619) = .07, p < .001$).

Participants

The characteristics of the participants are shown in Table 1. Most of the respondents (64.8 %) were in their second or third year of study and most of the participants (73.3 %) indicated they spent more than 21 h per week on individual studying. The differences in study hours per week ($p < .001$) between Dutch and Flemish students were observed in all categories. Over a third of the participants (34.2 %) had spent more

Table 1
Characteristics student midwives.

	Total group N = 619 (100%)	Dutch students N = 323 (52.2%)	Flemish students N = 296 (47.8%)	<i>P</i> -value
Age (in years) mean (SD±) range	22.56 (±4.26) 18-49	22.72 (±4.59)	22.38 (±3.86)	.812
Age categories n (%)				.286
18-21 years	303 (48.9)	163 (50.5)	140 (47.3)	
22-25 years	246 (39.7)	118 (36.5)	128 (43.2)	
26-30 years	35 (5.7)	21 (6.5)	14 (4.7)	
>30 years	35 (5.7)	21 (6.5)	14 (4.7)	
Partnership status n (%)				.003
in relationship and co-habiting	224 (36.2)	84 (26)	49 (16.5)	
in relationship but not co-habiting	133 (21.5)	109 (33.7)	115 (38.9)	
single	262 (42.3)	130 (40.2)	132 (44.6)	
Living circumstances n (%)				<.001
living with parents (student)	281 (45.5)	134 (41.5)	147 (49.7)	
accommodation sharing with others	131 (21.2)	79 (24.5)	52 (17.6)	
combination of living with others/students & parental home	12 (1.9)	-	12 (4.1)	
living with partner and/or children	128 (20.7)	82 (25.4)	46 (15.5)	
independent	67 (10.8)	28 (8.7)	39 (13.2)	
accommodation/ living alone				
Caring for (non)biological children n (%)				.481
no	566 (91.4)	296 (91.6)	270 (91.2)	
yes	53 (8.6)	27 (8.4)	26 (8.8)	
Job next to study n (%)				.375
no	186 (30.1)	92 (28.5)	94 (31.8)	
yes	433 (69.9)	231 (71.5)	202 (68.2)	
on an on-call basis*	135 (31.2)	70 (30.3)	65 (32.2)	
<10 hours/week*	164 (37.9)	100 (43.3)	64 (31.7)	
10-20 hours a week**	113 (26)	57 (24.7)	56 (27.7)	
>20 hours/week	21 (4.9)	4 (1.7)	17 (8.4)	
Year of education n (%)				<.001
year 1	122 (19.7)	71 (22)	51 (17.2)	
year 2	185 (29.9)	80 (24.8)	105 (35.5)	
year 3	216 (34.9)	82 (25.4)	134 (45.3)	
year 4	77 (12.4)	71 (22)	-	
Extended study n (%)				.014
year 4 or more Flemish students/year 5 or more Dutch students	25 (4)	19 (5.9)	6 (2)	
Hours per week spent on study (school & personal study) n (%)				<.001
<10 hours/week	64 (10.3)	20 (6.2)	44 (14.9)	
10-20 hours/week	73 (11.8)	20 (6.2)	53 (17.9)	
21-30 hours/week	129 (20.8)	55 (17)	74 (25)	
31-40 hours/week	199 (32.1)	117 (36.2)	82 (27.7)	
41-50 hours/week	126 (20.4)	94 (29.1)	32 (10.8)	
>50 hours/week	28 (4.5)	17 (5.3)	11 (3.7)	
Hours of clinical practice in total n (%)				.004
<200 hours	144 (23.3)	75 (23.2)	69 (23.3)	
200-400 hours	131 (21.2)	54 (16.7)	77 (26.0)	
401-600 hours	132 (21.3)	65 (20.1)	67 (22.6)	
>600 hours	212 (34.2)	129 (39.9)	83 (28)	
History of psychological problems n (0%)				<.001
none	436 (70.4)	256 (79.3)	180 (60.9)	
yes	183 (29.6)	67 (20.7)	116 (39.2)	
depression*	117 (63.9)	48 (71.6)	69 (59.5)	
burn out*	63 (34.4)	24 (35.8)	39 (33.6)	

(continued on next page)

Table 1 (continued)

	Total group N = 619 (100%)	Dutch students N = 323 (52.2%)	Flemish students N = 296 (47.8%)	p-value
personality disorder*	43 (23.5)	20 (29.6)	23 (19.8)	
panic*	52 (28.4)	13 (19.4)	39 (33.6)	
anxiety*	88 (48.1)	24 (35.8)	64 (55.2)	
AD(H)D*	4 (2.2)	3 (4.5)	1 (.9)	
eating disorder*	8 (4.4)	7 (10.4)	1 (.9)	
post-traumatic stress*	3 (1.6)	2 (3)	1 (.9)	
HADS total score mean (SD ±)	14.7 (±8.23) 0-38	11.8 (±6.86) 0-35	17.8 (±8.48) 0-38	<.001
Depression scale mean (SD ±)	5.5 (±3.99) 0-20	4.1 (±3.24) 0-17	7 (±4.18) 0-20	<.001 ^a
Anxiety scale mean (SD±)	9.2 (±4.77) 0-21	7.7 (±4.24) 0-19	10.7 (±4.84) 0-21	<.001 ^b
Depression cut-off scores n (0%)				<.001
no symptoms	444 (71.7)	271 (83.9)	173 (58.4)	
possible depression	93 (15)	38 (11.8)	55 (18.6)	
probable presence clinically meaningful depression	82 (13.2)	14 (4.3)	68 (23)	
Anxiety cut-off scores n (0%)				<.001
no symptoms	240 (38.8)	167 (51.7)	73 (24.7)	
possible anxiety	128 (20.7)	58 (18)	70 (23.6)	
probable presence clinically meaningful anxiety	251 (40.5)	98 (30.3)	153 (51.7)	

Age was not normally distributed ($D(619) = .25, p < .001$).

* Percentages of positive answers ('yes' considered as the 100 % group).

^a $U = 28385, z = -8.74, r = -.35$.

^b Mann-Whitney U: $U = 27860, z = -9, r = -.36$.

than 600 h in clinical practice. The differences in clinical hours ($p.004$) between Dutch and Flemish students were observed in the categories 200–400 and >600 clinical hours. There were significant more students with a study delay among Dutch midwifery students compared to Flemish students ($p.014$). We observed significant differences in partner status between Dutch and Flemish students ($p.003$). Dutch students were more often co-habiting with their partner compared to Flemish students. Also, the living circumstances of Dutch and Flemish students were significantly different ($p < .001$), showing variation in with whom students lived, either being with other students, parents/family, partner and/or children. More than a third of the midwifery students in both countries (69.9 %) had a job next to their study. A third of the sample reported a history of psychological problems before the COVID-19 period. Flemish students significantly more often reported a history of psychological problems ($p < .001$). Dutch students more often reported a history of depression, personality disorders, and Attention Deficit (Hyperactivity) Disorder compared to the Flemish students, while Flemish students more often reported a history of panic and anxiety problems.

The T1 sample more often included first and second year students than third year and higher (T1 45 % vs T2 58 %, $X^2 8.5, p.003$) and the T1 respondents more often had a study delay (T1 6 % vs T2 1 %, $X^2 8.7, p.001$). The students spending of <21 h on study increased from T1 to T2 (T1 8 % vs T2 47 %, $X^2 123.9, p < .001$). The T1 and T2 respondents showed no further differences in characteristics.

HADS scores

HADS scores Dutch and Flemish student groups

The HADS showed excellent internal consistency for the total scores

($\alpha.92$), and good internal consistency for the depression subscale ($\alpha.85$), and the anxiety subscale ($\alpha.89$). The Mann-Whitney U test showed a significant difference in the HADS depression and in the anxiety scores between Dutch and Flemish students during the total period of study ($p < .001; p < .001$), with significantly higher mean scores for depression and anxiety among Flemish students compared to Dutch students. The scores below and above the HADS cut-off scores for possible and the probable presence of depression and anxiety showed significant differences between the two groups ($p < .001$). Flemish students more often reported elevated levels of depression and anxiety compared to the Dutch students (see Table 1).

HADS scores at T1 and T2 within and between Dutch and Flemish student groups

We observed a significant difference in the HADS depression and in the anxiety scores between T1 and T2 ($p < .001; p < .001$). Among the Dutch student group, the HADS depression scores showed a significant within-group change ($U = 3608, z = -3.55, r = -.20, p < .001$) but not the anxiety scores ($U = 4646.5, z = -1.63, r = -.09, p.102$). Among the Flemish student group, both the HADS depression and anxiety scores showed a significant within-group change ($U = 6607.5, z = -5.27, r = -.31, p < .001; U = 7493, z = -4.03, r = -.23, p < .001$). Table 2 shows the significant increase of the mean depression and anxiety scores from T1 to T2. For both depression and anxiety there was a significant total group decrease of scores below the cut-off level ≤ 7 from T1 to T2 in both groups. However, this decrease was more evident in the Flemish student group ($p < .001$) compared to the Dutch student group ($p < .001$ vs $p.06$) as well as for anxiety ($p < .001$ vs $p.3$).

Correlations between predictors and outcome measures at T1 and T2

The predicting characteristics are presented in Table 3. During both T1 and T2, heightened levels of both depression and anxiety significantly correlated with being single (T1 $p.048; p.036; T2 p.054; p < .039$) and having a history of psychological problems (T1 $p < .001; p < .003; T2 p < .001; p < .001$). During T1, depression significantly correlated with spending more than 21 h on study ($p < .001$), having children ($p.042$), having a job next to study ($p.009$), while living alone/independent significantly correlated with depression during T2 ($p.041$).

Predicting depression and anxiety during COVID-19

Table 4 shows the crude and adjusted odd ratios for the difference on the heightened anxiety and depression scores among the students per period, and per period and country. In the crude and adjusted models for anxiety, a history of psychological problems is the only predictor for anxiety, irrespective of period or country ($p < .001; p < .001; p < .001$). Being single ($p.026; p.008; p.015$), having a job ($p.036; p.041; p.046$), and a history of psychological problems ($p < .001; p < .001; p < .001$) remained as predictors for depression in the adjusted models (Table 4). An additional binary logistic regression analysis and Chi-square test for T1 and T2 (Table 5) showed that a history of psychological problems predicted depression and anxiety ($p.004; p < .001$). Being single also predicted depression during T2 ($p.024$).

Discussion

This study attempted to disentangle how midwifery students' emotional wellbeing evolved during the COVID-19 pandemic waves with different forms of lockdown (i.e. complete or partial), and which student characteristics played a role in heightened levels of depression and anxiety. This study covered a 15-month period and included three waves of the pandemic, allowing the effect of the initial shock and disruption of the first wave and the effect of adaptation to the restrictions during the two subsequent waves [8,36,37]. Overall, depression and anxiety scores were significantly lower during the first COVID-19 wave compared to the following waves, suggesting the reoccurrence of the pandemic and lockdown to be an important factor

Table 2
Between-group and within-group HADS scores from T1 to T2.

	Total students (N = 619)			Students Netherlands (N = 323)			Students Flanders (N = 296)					
	T1 (N = 326) Mean (± SD)	T2 (N = 293) Mean (± SD)	<i>p</i>	T1 (N = 212) Mean (± SD)	T2 (N = 111) Mean (± SD)	<i>p</i>	T1 (N = 114) Mean (± SD)	T2 (N = 182) Mean (± SD)	<i>p</i>			
HADS depression	4.3 (3.40)	7.7 (4.07)	<.001	3.9 (3.17)	5.8 (3.28)	<.001	5.4 (3.74)	8.1 (4.11)	<.001 ^a			
HADS anxiety	8.1 (4.45)	11.2 (4.70)	<.001	7.6 (4.26)	8.7 (4.03)	.102	9.2 (4.73)	11.7 (4.67)	<.001 ^b			
	N (%)	N (%)	χ²	N (%)	N (%)	χ²	N (%)	N (%)	χ²			
Depression 0–7	259 (82.4)	185 (64.5)	59.83	<.001	177 (83)	94 (85.6)	7.75	.06	82 (72)	91 (50)	13.88	<.001
Depression 8–10	48 (15.4)	45 (15.6)	7.67	.06	28 (13.2)	10 (9)	8.23	.004	20 (17.5)	35 (19.2)	.13	.717
Depression 11–21	19 (5.7)	63 (19.9)	54.10	<.001	7 (3.8)	7 (6.3)	7.21	.02	12 (10.5)	56 (30.8)	16.23	<.001
Anxiety 0–7	154 (49.4)	86 (32.2)	37.57	<.001	113 (53.3)	54 (48.7)	1.08	.3	41 (36)	32 (17.6)	12.75	<.001
Anxiety 8–10	61 (19.6)	67 (21.5)	1.2	.27	35 (16.5)	23 (20.7)	.15	.7	26 (22.8)	44 (24.2)	.07	.787
Anxiety 11–21	111 (35.6)	140 (46.3)	26.29	<.001	64 (30.2)	34 (30.6)	.66	.42	47 (41.2)	106 (58.2)	7.31	.007

^a Mann-Whitney U: $U = 23018$, $z = -9.86$, $r = -.40$.

^b Mann-Whitney U: $U = 28160$, $z = -7.43$, $r = -.30$.

Table 3
Chi-square coefficients dichotomized students' characteristics (both countries) correlating with heightened levels of depression and anxiety per period (T1, T2).

T1		
Characteristics	Depression	Anxiety
<26 years of age or younger	.084	.048
Single (yes)	.16*	1.00*
Living alone (yes)	.06	.052
Having children	.075*	.014
Job next to study	1.30**	.06
≥3 years of education (yes)	.09	.062
Study delay (yes)	.061	.069
Spending >21 hours/week on study (yes)	1.6***	.053
<401 hours clinical practice in total (yes)	.083	.021
History of psychological problems (yes)	1.7***	1.4**
T2		
Characteristics	Depression	Anxiety
<26 years of age or younger	.006	.045
Single (yes)	.12*	.14*
Living alone (yes)	.33*	.011
Having children	.063	.019
Job next to study	.039	.047
≥3 years of education (yes)	.04	.089
Study delay (yes)	.008	.043
Spending >21 hours/week on study (yes)	.062	.065
<401 hours clinical practice in total (yes)	.03	.065
History of psychological problems (yes)	2.7***	1.8***

Note* $p < .05$ (2-tailed); ** $p < .01$ (2-tailed); *** $p < .001$ (2-tailed)

contributing to emotional distress [36]. The results acknowledge that there is variation within emotional wellbeing between countries [2,3, 12–14,22,23,47]. This might be due to differences in organisational changes in education during the pandemic (e.g., returning to campus), as apparent in Dutch and Flemish midwifery education, but also to the extent individual students felt affected by the lockdown restrictions such as for example a curfew, closure of bars and restaurants, and number of people allowed to meet [7,8,28,37].

Having a history of psychological problems explained the vulnerability of the Dutch and Flemish midwifery students for anxiety as well as for depression during the pandemic. Having a history of psychological problems has been recognised as a pivotal factor for the heightened depression and anxiety levels during the pandemic [48]. In Europe, approximately 16% of adolescents have a history of or pre-existing psychological problems, usually anxiety or depression [49] - a lower number than reported by the students in our sample. Pre-pandemic research showed that pre-existing mental health problems of students are associated with experiencing emotional problems during education [50,51]. Based on the students' self-report of pre-pandemic emotional health problems, it can be assumed these intensified or reoccurred

during COVID-19 [12], highlighting the importance of offering services to support the emotional wellbeing of midwifery students [17,51], especially those with a history of/ pre-existing problem. A history of psychological problems played a significant role during the whole period of the study, while being single was only of influence on depression during the second measurement (T2). On a psychosocial level peri-pandemic loneliness carried the risk for the onset of negative feelings and emotions [48,55]. Being single was associated with students' vulnerability for depression during the second period of measurement. Loneliness caused by pandemic-related contact restrictions, seemed to have affected the emotional wellbeing of student midwives while the pandemic and restrictions continued [12,51]. Additionally, during the pandemic midwifery students experienced being neglected by staff and women, expendable and excluded from clinical practice [6,8]. It has also been suggested that relationships with parents and peers deteriorated during the pandemic [21]. All these aspects might have added to already existing feelings of loneliness caused by having no partner(relationship) and exacerbated in the context of the continuing COVID-19 pandemic [8], contributing to emotional fatigue, leading to stress and depression [56].

Midwifery students tend to develop resilience, that is, emotionally adapting to sources of stress such as COVID-19 [1,9,52]. As resilience has a linear association with emotional wellbeing, our findings suggest that the midwifery students in our sample were not able to build or maintain resilience during the pandemic [53]. Resilience in midwifery students involves to working out how to act in and how to respond to a situation, adopting a proactive approach [54]. Associating the significant reduction of mental health during the pandemic with the assumption that resilience and thus proactive behaviour reduced, suggest that the students in our study were less able to deal with the continuing pandemic. Additionally, Dutch students are more likely to show proactive behaviour compared to Flemish students, which might explain the mental health differences between the Flemish and Dutch students in our sample, although it is unclear why this difference exists [26]. Reduced peri-COVID-19 resilience should not be ignored as this might result to post-traumatic stress, emphasizing to put post-pandemic emotional support mechanisms in place for students with affected peri-pandemic emotional wellbeing [9,40].

Signs and symptoms of depression and anxiety were self-reported via a validated questionnaire. However, it should be taken into consideration that self-reporting questionnaires are not diagnostic instruments, and thus actual mental health problems might have been under- or overreported. A study among students showed that the high HADS anxiety scores overestimate the extent of clinical anxiety [45] as well as higher anxiety scores are associated with adolescence [11]. Therefore, the level of increased anxiety in this study might be overreported, but nevertheless present. Moreover, considering peri-pandemic anxiety to

Table 4
Crude and adjusted Odds Ratios (period, country) for depression and anxiety.

DEPRESSION									
Predictor	Crude ^a			Adjusted ^{*b}			Adjusted ^{**c}		
	OR	95%CI	P	OR	95%CI	P	OR	95%CI	P
(Constant)	1.57	-	.31	3.86	-	.005	3.94	-	.005
Being single	1.65	1.44-1.95	.026	1.58	1.44-1.09	.008	1.61	1.37-1.19	.015
Living alone	.68	.39-1.18	.17	.63	.34-1.09	.10	.67	.37-1.19	.17
Having children	.76	.40-1.43	.40	.73	.38-1.39	.34	.71	.37-1.38	.32
Having a job next to study	1.52	1.03-2.26	.036	1.53	1.02-2.30	.041	1.52	1.01-2.29	.046
Spending >21 hours/week on study	1.69	1.1-2.58	.016	.95	.59-1.53	.83	.96	.60-1.54	.86
History of psychological problems	1.29	1.20-1.43	<.001	1.37	1.25-1.5	<.001	1.40	1.25-1.57	<.001
ANXIETY									
Predictor	Crude ^d			Adjusted ^{*e}			Adjusted ^{**f}		
	OR	95%CI	P	OR	95%CI	P	OR	95%CI	P
(Constant)	2.55	-	.031	1.41	-	.002	6.36	-	.002
Being single	1.26	.89-1.76	.19	1.36	.96-1.94	.084	1.32	.96-1.88	.13
Living alone	.75	.43-1.31	.32	.85	.49-1.50	.57	.70	.45-1.41	.44
Having children	1.34	.73-2.48	.35	1.31	.70-2.47	.40	1.34	.71-2.54	.37
Having a job next to study	1.33	.92-1.92	.13	1.30	.89-1.91	.17	1.31	.89-1.93	.17
Spending >21 hours/week on study	1.05	.70-1.58	.82	.76	.49-1.18	.22	.55	.33-.90	1
History of psychological problems	1.37	1.25-.156	<.001	1.44	1.29-1.66	<.001	1.48	1.32-1.74	<.001

*Adjusted for period (T1, T2)

**Adjusted for period (T1, T2) & country

^a χ^2 69.96, $p < .001$, -2 Log likelihood 673.264, Cox & Snell R^2 .098, Nagelkerke R^2 .141

^b χ^2 97.73, $p < .001$, -2 Log likelihood 639.493 Cox & Snell R^2 .146, Nagelkerke R^2 .210

^c χ^2 107.82, $p < .001$, -2 Log likelihood 629.412 Cox & Snell R^2 .160, Nagelkerke R^2 .230

^d χ^2 32.14, $p < .001$, -2 Log likelihood 794.49, Cox & Snell R^2 .051, Nagelkerke R^2 .069

^e χ^2 71.74, $p < .001$, -2 Log likelihood 755.16, Cox & Snell R^2 .109, Nagelkerke R^2 .148

^f χ^2 81.60, $p < .001$, -2 Log likelihood 745.04, Cox & Snell R^2 .124, Nagelkerke R^2 .168

Table 5
Differences Odds Ratios depression and anxiety per period (T1, T2).

DEPRESSION						
Predictor	T1 ^a			T2 ^b		
	OR	95%CI	P	OR	95%CI	P
(Constant)	1.60	-	.68	1.79	-	.023
Being single	1.20	.82-1.76	.035	1.58	1.36-1.93	.024
Having a job next to study	1.31	.86-1.2	.2	1.13	.69-1.83	.63
History of psychological problems	1.50	1.31-1.83	.004	1.29	1.29-1.83	<.001
ANXIETY						
History of psychological problems	T1			T2		
	χ^2		P	χ^2		P
	8.82		.003	10.38		.001

^a χ^2 11.49, p .009, -2 Log likelihood 293.31, Cox & Snell R^2 .096 Nagelkerke R^2 .035

^b χ^2 29.13, $p < .001$, -2 Log likelihood 419.73, Cox & Snell R^2 .084, Nagelkerke R^2 .113

be higher than pre-pandemic anxiety [2-4,12-14,22,23], the number of students with heightened levels is therefore quite worrying, particularly the Flemish students with a nearly 60% anxiety rate during the second period of measurement.

Several study limitations warrant discussion. We did not perform a longitudinal study, allowing the follow up of the same sample of students during the different pandemic periods. Instead, our cross-sectional study, included different students during different pandemic periods, albeit there were only a few significant differences in student characteristics between T1 and T2. Additionally, due to the cross-sectional nature of this study, no causality can be established between reduced emotional wellbeing and its predictors. A further limitation of the study is that we did not measure emotional wellbeing before COVID-19. It is therefore not possible to assess possible within-group differences of pre versus peri-pandemic emotional wellbeing, although other studies

suggest that emotional wellbeing decreased during COVID-19, among the general population, midwives, as well as among (midwifery) students [2-4,12-14,22,23,55,57]. Acknowledging the worrying pre-COVID mental health of student midwives [15], the further peri-pandemic poor mental health is quite alarming. Regarding the already existing concerns about the mental health of student midwives, continuous monitoring can be recommended to offer adequate support which seems necessary as midwifery students more often have a history of psychological problems or more often develop psychological problems compared to students in other than midwifery studies [59].

Although we included enough respondents to allow reliable statistical inferences, we do not know which students completed the survey. Due to self-selection, we might have included students with a particular interest in the topic or maybe did not reach students who were not motivated or unable to focus or engage [1]. Moreover, Flemish students were better represented than Dutch midwifery students, although the number were sufficient to draw true statistical inferences. Including or excluding certain students is likely to induce confounding and a possible over- or underreport of emotional wellbeing. A large part of the sample consisted of second- and third-year students, who are known to report higher levels of emotional exhaustion than first year students [16]. Additionally, some of the characteristics of the student midwives in both countries showed to be significantly different in addition to programme differences (e.g., hours spent-on study) - also likely to cause confounding. Flemish students had significantly higher depression and anxiety scores than Dutch students but comparing the sample's heightened depression and anxiety to that of Australian midwifery students, the prevalence of moderate and severe depression in our sample showed to be lower, while anxiety was higher [13]. Therefore, generalisation of the findings warrants some caution as our findings acknowledge that peri-pandemic emotional wellbeing of midwifery students varied between countries. Despite the differences in emotional wellbeing, the predictors for depression and anxiety during COVID-19 were similar for the Dutch and Flemish students. A history of psychological problems was also found to predict reduced peri-pandemic emotional wellbeing in a general student population [60], although it might be that other factors play a role in other countries.

The models with added covariates, showed higher R^2 values than the models without, but it is difficult to judge whether the difference is large enough to be important as the R^2 values are low. Although the prediction models were significant, it is likely that other variables predicted possible and probable depression and anxiety among midwifery students during COVID-19. We did not ask if students had been infected and/or ill due to COVID-19, whether they had lost (significant) others, how they experienced the restrictions, nor did we ask details about their study progress - which all without a doubt must have affected their emotional wellbeing [1–4,12,22]. Additionally, we did not have pre-pandemic prevalence rates of emotional wellbeing of the midwifery students in our sample, we would be able to examine post-COVID 19 emotional wellbeing of midwifery students to compare peri and post-pandemic figures, to better advice on post-pandemic emotional support as some scores are extremely worrying (e.g., anxiety scores Flemish students). We cannot assume that peri-pandemic emotional problems and changes just cease to exist after the pandemic and its restrictions [21,58] and therefore further research and post-pandemic emotional support is necessary to prevent post-traumatic stress, depression, and substance use [58]. We have no information about the midwifery students' course of emotional wellbeing throughout the course without the pandemic. Therefore, further research is needed to conclude if anxiety and depression worsened because of the pandemic or whether this a phenomenon that is typical for midwifery students due to challenges and demands of the course and balancing student- and personal life [3,14,20,21].

Conclusion

The emotional wellbeing of midwifery students in Flanders and the Netherlands during the first three waves of the COVID-19 pandemic was significantly reduced, likely to be worse than pre-pandemic prevalence rates and to have intensified while the pandemic and its restrictions continued. Certain students were more affected than others, specifically students with a history of psychological problems and students that were single. The study contributes to the knowledge of the negative effect of the pandemic on midwifery students' emotional wellbeing, highlighting the emotional vulnerability of midwifery students - regardless of whether there is a pandemic or not. There is an urgent need for post-pandemic emotional support of student midwives. Because students' emotional wellbeing continues to matter, we recommend that HEIs make a systematic plan for routinely regulated support of midwifery students' emotional wellbeing, including potential other serious non-pandemic or future pandemic-related sources of stress.

CRedit authorship contributions statement

Yvonne Kuipers Conceptualization; Formal analysis; Funding acquisition; Investigation; Methodology; Roles/Writing – original draft; Supervision. **Eveline Mestdagh** Investigation; Formal analysis; Funding acquisition; Validation; Project administration; Writing – review & editing

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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