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Patient and wound factors associated with WOUND-Q scales measuring health-related quality of life: An international cross-sectional study

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Abstract

The WOUND-Q is a patient-reported outcome measure for individuals with any type of chronic wound. This study aimed to identify patient and wound factors associated with the four WOUND-Q health-related quality of life (HRQL) scales: Life impact, Psychological, Sleep, and Social. Adults with a chronic wound were recruited internationally through clinical settings between August 2018 and May 2020, and through an online platform (i.e. Prolific) in September 2022. Multivariable linear regression analyses were conducted to identify factors significantly associated with the WOUND-Q scales. The assessments obtained were 1273, 1275, 706, and 1256 for the Life Impact, Psychological, Sleep, and Social scales, respectively. The mean age of participants was 55 (SD = 18) years; most (66%) had a single wound, and most (56%) wounds had lasted more than 6 months. The most common causes were trauma, surgery, and diabetic foot ulcer. Wound characteristics associated with worse scores on at least one of the scales were drainage, vacuum treatment, aetiologies (i.e. diabetic foot ulcer, trauma, other, multiple), duration (i.e. 10–11 months), having four or more wounds, smell, and sleep interference, while wound location different from the face or neck was associated with better scores ($p < 0.05$). Patient factors associated with worse scores included having diabetes or a comorbidity, whereas increasing age or male gender were associated with better scores ($p < 0.05$). Sleep disturbances had

Abbreviations: COSMIN, COnsensus-based Standards for the selection of health Measurement INstruments; DM, diabetes; DFU, diabetic foot ulcer; HRQL, health-related quality of life; MID, minimal important difference; NWPT, negative wound pressure therapy; PROM, patient-reported outcome measure; PVD, peripheral vascular disease; SDC, smallest detectable change; VIF, variance inflation factor; VLUs, venous leg ulcers.

the largest negative influence on HRQL scores. This study identified factors affecting HRQL in individuals with chronic wounds. Understanding these associations can inform better management and treatment strategies to improve HRQL for these patients.

KEYWORDS
chronic wounds, patient-reported outcomes, predictors, PROM, quality of life, regression

1 | INTRODUCTION

Chronic wounds are a common condition with a prevalence of 2.21 per 1000 population, affecting millions of people worldwide.[1] Wounds can be defined as chronic when they fail to heal within 3 months[2] and are often a symptom of underlying conditions. Treatment is complex and requires elimination or improvement of the aetiology of the wound and underlying systemic or metabolic conditions such as infection, peripheral vascular disease, or diabetes.[3,4] Despite successful healing, up to 40% of patients with a diabetic foot ulcer (DFU)[5] and 50%–55% of patients with venous leg ulcers (VLUs)[6] will experience a recurrence within 1 year. This recurrence rate indicates that chronic wounds often become a lifelong condition with cyclic ulceration, healing, and recurrence.[5–7] Wounds can negatively affect patients' health-related quality of life (HRQL) due to symptoms that wounds cause, such as pain, and smell, but also social isolation, physical limitations, and financial and psychological distress.[7–11] To gain a better understanding of the impact of chronic wounds on patients' HRQL, a condition-specific patient-reported outcome measure (PROM) should be used.[11]

The WOUND-Q is a PROM developed for all types of chronic wounds.[12–15] Out of 33 wound-specific PROMs, the WOUND-Q and SCI-QOL (Spinal Cord Injury-QOL)[16] rated very good in PROM design according to the COnsensus-based Standards for the selection of health Measurement INstruments (COSMIN) guidelines, and the WOUND-Q was recommended for use in research and clinical care.[17] The WOUND-Q measures concepts that matter to patients with a chronic wound through 13 independently functioning scales assessing four domains: wound characteristics, HRQL, experience of care, and wound treatment.[13] The WOUND-Q evidenced good psychometric properties in two separate studies that involved international samples of people with chronic wounds,[13,18] including the ability to detect change.[19] The WOUND-Q scales present an opportunity to gain deeper insights into the patient experience, enabling the delivery of more personalised and effective care strategies. This study aimed to perform an exploratory analysis, using data from the two studies mentioned above.[13,18] The objective was to identify patient factors and wound characteristics associated with scores on the four WOUND-Q scales that measure aspects of HRQL, i.e. Life impact, Psychological, Sleep, and Social. The Life impact scale, with eight items, measures how a wound has affected the patient's quality of life over the past week, including impacts on close relationships, emotional wellbeing, and independence. The Psychological scale, with 10 items, captures the psychological effects of wounds, asking about feelings of hopelessness, anxiety, self-consciousness, and frustration. The Sleep scale, consisting of five items, assesses difficulties with sleep, including trouble falling or staying asleep. Finally, the Social scale, with five items, evaluates the social impact of wounds, including feelings of isolation and missing social activities.

2 | METHOD

Data for this study included data from two previously conducted international validation studies of the WOUND-Q.[13,18] These surveys collected patient demographics, wound characteristics, and WOUND-Q data. Ethical approval for both studies was secured from appropriate authorities. For the original field-test study, ethical board approvals were obtained in each participating country as described elsewhere.[13] For the study to further examine psychometric properties, ethics approval was obtained from the Hamilton Integrated Research Ethics Board at McMaster University (#14946).[18] All participants gave informed consent,[13,18] and the study adheres to the principles outlined in the 1975 Declaration of Helsinki.

2.1 | Participants and data collection

In both surveys, inclusion criteria required participants to be 18 years or older, have a chronic wound (at least 3 months) of any type, located anywhere on their body, and be able to complete the survey independently in the required language. The original field-test participants were recruited from clinical settings (hospital inpatient and outpatient clinics) in Canada, Denmark, the Netherlands, and the USA. Participants could complete the WOUND-Q independently in Danish, Dutch, or English. Depending on the recruitment site, they could complete the survey on tablets or paper booklets. Data collection was conducted from August 2018 to May 2020. In total, 1020 WOUND-Q assessments were gathered from 881 participants.[13] For the further validation study, participants were recruited through the online crowdworking platform Prolific Academic (www.prolifc.com), where members receive payment for completing surveys.[18] On Prolific, anyone aged 18 or older living in an OECD country with Internet access can create an account after attending a waitlist. Prolific enables researchers to use prescreen criteria, such as gender, language, or chronic condition, to identify a target population. In the study by

Simonsen et al.,[18] prescreening criteria (English fluency and having a chronic condition/illness) identified a pool of potential participants in screening surveys. Those who fulfilled the inclusion criteria (i.e. having a chronic wound) in these surveys were invited to complete a REDCap survey through a link distributed in Prolific. Prolific participants needed to be able to read, write, and speak English to complete the English version of the WOUND-Q.[18] Data were collected in September 2022, with 421 participants completing the WOUND-Q.[18]

Participants in both surveys reported demographic information (age, gender, weight, height, marital status, educational level, smoking status, country, health conditions), wound characteristics in the past week (smell, drainage, sleep interference), the four WOUND-Q scales (Life impact, Psychological, Sleep, Social), and the use of negative wound pressure therapy (NWPT) in the past 3 or 6 months.[13,18] Participants were only asked to complete the Sleep scale if they reported wound-related sleep interference, consistent with the development paper.[13] Data on wound characteristics (i.e. size, location, and type) for the original field-test study[13] were provided by Danish participants, and by both clinicians and participants in Canada, the Netherlands, and the United States. In the further psychometric study,[18] wound characteristics were self-reported. Each WOUND-Q scale score was converted into a Rasch transformed score from 0 to 100 according to the WOUND-Q User's guide (https://qportfolio.org/wound-q/). Higher values denote better outcomes.

As compensation, a small gift card was provided for the Canadian and American participants in the phase 2 sample,[13] while Prolific participants in the further validation study were paid an average of 10.6 £/h.[18] Participants without a chronic wound, having multiple assessments, or missing scores in all four HRQL scales were excluded.

3 | ANALYSIS

The two datasets[13,18] were merged in SPSS® version 29 (IBM Corporation, Armonk, NY, for Windows®). For participants with multiple assessments, only one assessment was retained to meet the assumption of independence required for linear regression. Descriptive statistics were performed in SPSS version 29. Normality was visually evaluated by quantile-quantile plots. Continuous data were reported with mean and standard deviation (SD), or with median and range if data were not normally distributed. Categorical data were reported with frequency and proportions (%). A univariable and multivariable linear regression, performed in Stata version 18 (StataCorp, College Station, TX, USA), was used to identify variables associated with WOUND-Q scale scores as outcome variables, i.e. Life impact, Psychological, Sleep, and Social. The univariable regression included variables not collected from all participants and is listed in Appendix A. Variables that were available in both samples and collected in each of the participating countries (i.e. Canada, Denmark, Netherlands, United States) in the original field-test study were included in the multivariable regression. As a rule of thumb, at least 10 observations were required per predictor variable, including indicator variables,[20] making our sample size sufficient for regression analysis (Figure 1). If there were ≤ 10 observations in a predictor or indicator variable, it was excluded from the regression analysis. Missing data in the regression analysis were automatically handled in Stata by listwise deletion (i.e. excluding any observations with missing data on any of the variables). Statistical significances were assigned at p values <0.05. Variable selection for the regression analysis was done a priori informed by the literature and clinically, and by available variables.[9,21–26] In the multivariable regression analysis, coefficients (β) for the scale scores of the four WOUND-Q scales were adjusted for the continuous, binary, and categorical predictors listed in Table 1. Besides β, we computed standardised coefficients (β^*) to assess which variables had the highest influence on the scale outcomes. The coefficient of determination (R^2) was provided for each model, representing the proportion of variance in the scale outcomes explained by the predictor variables. Adjusted R^2 was also provided for the multivariable regressions. Homoscedasticity and normality of residuals were assessed visually using a plot of residuals versus predicted values and a quantile-quantile plot, respectively. Multicollinearity was defined as a variance inflation factor (VIF) > 10. Cook's D was computed to evaluate if any observations highly influenced the regression model. Sensitivity analyses were conducted for each scale by removing observations where Cook's D exceeded >4/n. This was done to determine if the exclusion of these influential data points altered the variables that significantly impacted the scale scores.

4 | RESULTS

We included 1282 patients (Figure 1). All participants who filled out the scales more than once were from the original field-test sample from Denmark. Table 2 provides sample characteristics of the 1282 participants. Participants were residents of 22 different countries with the largest subgroup being residents of the United States (25%). The mean age of the participants was 54.6 ± 18.4 years (range 18–95 years), and their mean BMI was 28.6 ± 7.8 kg/m^2. Of the Danish participants in the original field-test sample and for all participants in the further validation study, most were married or living common law ($n = 355$, 27.7%). For the entire sample, the most common wound types were traumatic (17.5%), surgical (16.1%), and diabetic foot ulcers (14.5%). Participants most frequently had a wound on their lower extremities (59.4%), and most had a single wound (65.8%). The four WOUND-Q scale mean scores ranged from 48.3 to 64.3 (SD = 20.3 to 31.2), with the lowest score on the Sleep scale (Table 3). In total, 18 different variables were included in a univariable regression. Of these, 16 variables were associated with at least one of the four scale scores ($p < 0.05$), while BMI and educational level were not. Variables significantly associated with all four scales included gender, having drainage, wound aetiology, wound numbers, smell, and sleep interference. The results of the univariable regression are available in Appendix A and will not be discussed further. The results of the multivariable regressions are available in Tables 4 and 5. The main and sensitivity analysis are presented side by side in Appendix B.

4.1 | Life impact

Of 1273 available assessments, 990 were included in the multivariable linear regression. The multivariable regression model statistically significantly predicted the Life impact score ($p < 0.001$) and explained 34% of the variance in the scale score ($R^2 = 0.34$, $^*R^2 = 0.31$). No variables were associated with better Life impact scores. In contrast, worse Life impact scores were significantly associated with the occurrence of wound drainage, the use of NWPT in the past 3–6 months, having DM, having at least one comorbidity (excluding DM or PVD), having five or more wounds compared to one, having any degree of smell, or any degree of wound-related sleep disturbances compared to none. Evaluated by the β^* the variable with the highest impact on the Life impact score was wound related sleep disturbance, which indicator variables had β^* ranging from −0.2 to −0.33. In the sensitivity analysis 56 observations were excluded due to large Cook's *D*. The indicator variable having five or more wounds compared to one, changed from being significant to insignificant associated with the Life impact score Appendix B.

4.2 | Psychological function

A total of 990 out of 1275 assessments were included in the multivariable regression. The multivariable regression model statistically significantly predicted the Psychological scale score and explained 36% of the variance in the score ($p < 0.001$, $R^2 = 0.36$, $^*R^2 = 0.33$). Better Psychological scores were significantly associated with older age, male gender, and having a wound located anywhere other than the face or neck. Worse Psychological scores were significantly associated with having drainage, having a comorbidity (excluding DM and PVD), having a diabetic foot ulcer, multiple, or other wound aetiologies compared to an arterial wound, having any degree of smell or wound-related sleep interference compared to none. Indicator variables with the greatest impact on the model were having a wound located on the leg ($\beta^* = 0.27$), foot, toe(s) ($\beta^* = 0.24$) or having any wound-related sleep inference: sometimes ($\beta^* = -0.22$), often ($\beta^* = -0.29$), or very often ($\beta^* = -0.30$). We excluded 52 observations in the sensitivity analysis. The indicator variable that changed from being significant to insignificant associated with

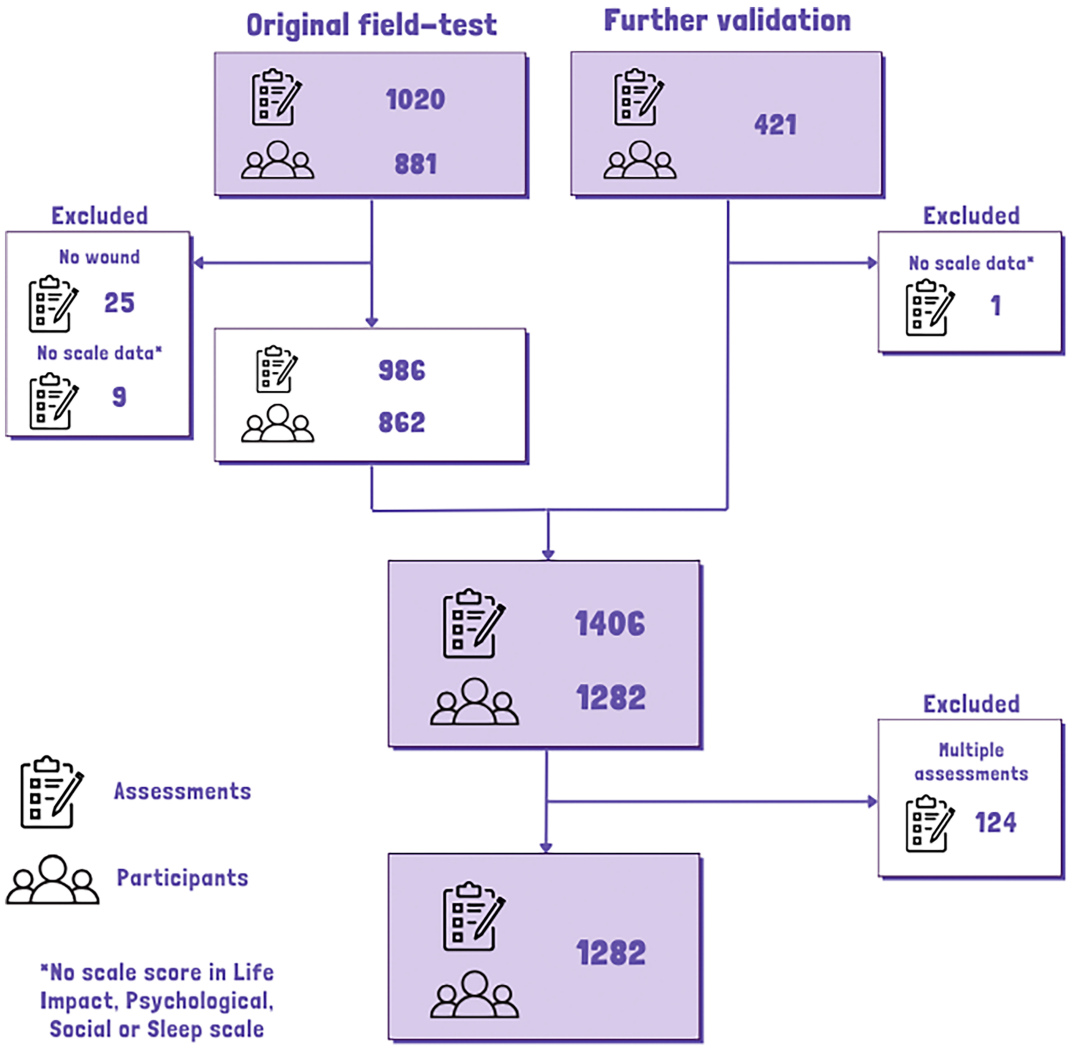

FIGURE 1 Flowchart of assessments and participants.

TABLE 1 The 16 predictors included in the multivariable linear regression of the Life impact, Psychological, Sleep, and Social scale.

Type	Variable
Continuos	Age, years
	BMI
	Wound size (width × length, cm^2)
Binary	Gender Female/male
	Smoking Yes/no
	Drainage (drainage in the past week) Yes/no
	Vacuum (Use of suction device within the past 3–6 months) Yes/no
	Diabetes (DM) Yes/no
	Peripheral vascular disease (PVD) Yes/no
	Comorbidity other than DM or PVD Yes/no
Categorical	*Wound location*
	Face or neck
	Upper extremity (hand, arm, shoulder)
	Truncus (chest, abdomen, back)
	Genitials, buttocks
	Leg
	Foot, toes
	Multiple wound locations
	Wound aetiology
	Arterial
	Venous
	Diabetic foot ulcer
	Hidradenitis
	Pilonidal cyst
	Pressure ulcer
	Surgery
	Radiation
	Trauma/injury
	Don't know
	Other type
	Multiple types
	Wound duration
	3–6 months
	7–9 months
	10–11 months
	1–2 years
	3–4 years
	5–10 years
	More than 10 years
	Wound numbers
	1 wound
	2 wounds
	3 wounds
	4 wounds
	5 or more wounds
	Smell within the past week
	No smell
	Faint
	Moderate
	Strong (other people notice)
	Sleep interference from wound in the past week.
	Never
	Sometimes (1–2 nights a week)
	Often (3–4 nights a week)
	Very often (5–7 nights a week)

the psychological score were having the wound aetiology 'other', Appendix B.

4.3 | Sleep

Of 706 assessments, 544 were included in the multivariable regression. The multivariable regression model explained 46% of the variance in the Sleep score ($R^2 = 0.46$, $^*R^2 = 0.42$, $p < 0.001$). Better Sleep scores were significantly associated with male gender. Worse Sleep scores were significantly associated with having a comorbidity (excluding DM or PVD), having the wound aetiologies trauma, other, or multiple compared to arterial ulcers, having a wound that had lasted 10–11 months compared to 3–6 months, having four wounds compared to one, and having sleep interference three or more times a week compared to one to two nights a week. Having wound-related sleep interference often or very often compared to sometimes were the most important predictors with β^* at -0.34 and -0.57, respectively. In the sensitivity analysis, 27 observations were excluded. None of the variables or indicator variables changed from significant to insignificant in the sensitivity analysis.

4.4 | Social function

Of 1256 assessments, 983 were included in the multivariable regression. The multivariable regression model explained 31% of the variance in the Social score ($R^2 = 0.31$, $^*R^2 = 0.28$, $p < 0.001$). A better Social score was significantly associated with wound location at the

TABLE 2 Participant and wound characteristics.

Participant and wound characteristic	$N = 1282$	%
Gender		
Female	553	43.1
Male	719	56.1
Other	7	0.5
Missing	3	0.2
BMI		
Underweight (≤18.5)	62	4.8
Normal (18.5–24.9)	367	28.6
Overweight (25–29.9)	368	28.7
Obese (≥30)	449	35
Missing	36	2.8
Smoke		
No	1032	80.5
Yes, currently (smoke/vape)	244	19
Missing	6	0.5
Country		
Canada	140	10.9
Denmark	286	22.3
Netherlands	220	17.2
South Africa	81	6.3
United Kingdom	144	11.2
United States	320	25
Other	88	6.9
Missing	3	0.2
Paid/volunteered job within 3 past months		
No	729	56.9
Yes	548	42.7
Missing	5	0.4
None or ≥1 comorbidity		
No comorbidities	292	22.8
At least one comorbidity	990	77.2
Diabetes		
No	851	66.4
Yes	431	33.6
Peripheral vascular disease		
No	1037	80.9
Yes	245	19.1
Marital status[a]		
Single, never married	232	18
Married/living common law	355	27.7
Separated/divorced	65	5.1
Widowed	29	2.3
Not asked[a]	577	45
Missing	24	1.9
Number of wounds		
1	844	65.8
2	240	18.7
3	89	6.9
4	39	3
5 or more	70	5.5
Wound size, cm^2 (width × length) ($n = 1211$)		
	Median 4 cm^2	Range 0.0–1282.1 cm^2
Wound duration		
3–6 months	528	41.2
7–9 months	128	10
10–11 months	84	6.6
1–2 years	246	19.2
3–4 years	127	9.9
5–10 years	89	6.9
>10 years	48	3.7
Prefer not to answer	1	0.1
Missing	31	2.4
Wound location		
Face or neck	19	1.5
Upper extremity (hand, arm, shoulder)	66	5.1
Truncus (chest, abdomen, back)	126	9.8
Genitals, buttock	90	7
Leg	364	28.4
Foot, Toe(s)	398	31
Other	13	1
Multiple	144	11.2
Missing	62	4.8
Wound aetiology		
Arterial ulcer	38	3
Venous ulcer	119	9.3
Diabetic foot ulcer	186	14.5
Hidradenitis suppurativa	44	3.4
Pilonidal cyst/disease	18	1.4
Pressure ulcer	144	11.2
Surgery	207	16.1
Radiation	16	1.2
Trauma/injury	224	17.5
Don't know	111	8.7
Other	83	6.5
Multiple	63	4.9
Cancer	7	0.5

(Continues)

TABLE 2 (Continued)

Participant and wound characteristic	$N = 1282$	%
Infection	9	0.7
Pyoderma gangrenosum	6	0.5
Missing	7	0.5
Smell from the wound in the past week		
No smell	854	66.6
Yes, a faint smell	310	24.2
Yes, a moderately strong smell	79	6.2
Yes, a very strong smell (other people notice)	37	2.9
Missing	2	0.2
Drainage from the wound in the past week		
No	415	32.4
Yes	829	64.7
Not sure	36	2.8
Missing	2	0.2
Amount of drainage from the wound in past week[b]		
No drainage	216	16.8
A little drainage	169	13.2
A moderate amount of drainage	28	2.2
A lot of drainage	7	0.5
Not asked[b]	862	67.2
Wound related sleep interference in the past week		
Never	541	42.2
Sometimes (1–2 nights a week)	416	32.4
Often (3–4 nights a week)	167	13
Very often (5–7 nights a week)	153	11.9
Missing	5	0.4
Treated with negative wound pressure therapy (NWPT) in the past 3–6 months		
No	1039	81
Yes	200	15.6
Not sure	39	3
Missing	4	0.3

[a]Participants from Canada, Netherlands, and the United States in the original field-test sample were not asked.
[b]Participants from the original field-test sample were not asked.

truncus compared to the face or neck. Worse Social scores were significantly associated with having drainage, treatment with NPWT in the past 3–6 months, having a comorbidity (different from PVD or DM), having five or more wounds compared to one, having any degree of smell or sleep interference. The indicator variables with the highest impact on the Social scale score were wound-related sleep interference with β^* ranging from -0.19 to -0.31. In the sensitivity analysis, 49 observations were excluded. No indicator variables changed from being significant to insignificant associated with the social score, Appendix B.

5 | DISCUSSION

This study combined two international surveys to examine the associations between patient demographics and wound characteristics, and their impact on HRQL scores across four WOUND-Q scales: Life impact, Psychological, Sleep, and Social, in people with any type and location of chronic wounds. The most significant finding was that sleep interference and the presence of at least one comorbidity other than DM or PVD, was associated with decreased scores on all four scales of HRQL. Sleep interference was furthermore the factor that imposed the most substantial negative impact on HRQL. In contrast, we did not identify any variables positively associated with all four scales. The results of the current study contribute to the literature by identifying factors associated with differences in life impact, psychological function, wound-related sleep disturbances, and social function. To improve HRQL in patients with chronic wounds, treatment should focus on improving modifiable factors.

Several studies have reported that chronic wounds decrease HRQL.[7–11,24] However, little is known about how patient and wound-related factors affect HRQL when measured using a rigorously developed PROM such as the WOUND-Q. Compared to other studies examining HRQL in the chronic wound population, our sample was around 10 years younger, with a mean age of 55, compared to average ages ranging from 61 to 69 years.[21,24,27,28] This younger wound population is expected when using online surveys[21] and recruiting through Prolific.[13,18] Despite having a younger population, our sample showed nearly equal gender distribution, consistent with a validation study of the Wound-QoL in 599 chronic wound patients with data deriving from the US Wound Registry.[28] Additionally, the second most common chronic wound aetiology was a surgical wound.[28]

5.1 | Patient characteristics

Increasing age was positively associated with psychological well-being ($\beta = 0.18$). However, the coefficient was small, and the 95% CI was close to zero. According to the smallest detectable change (SDC), mean differences in scores between groups must exceed 2.5 on the Psychological scale to be beyond measurement error.[18] To obtain a difference above the SDC, the age difference should theoretically be 14 years. However, the SDC values reported by Simonsen et al. must be interpreted with caution. Large variations (SD) were found in WOUND-Q scores, and wide 95% ICC confidence intervals suggest a need for larger studies.[18] Additionally, SDC values are sample-dependent and may change with further studies.[29] In line with our findings, a survey of 113 community patients with chronic wounds found that younger patients (≤65 years) had significantly lower HRQL compared to older patients (>65 years) measured by the Cardiff Wound Impact Schedule (CWIS).[21] In contrast, a Brazilian study found that age did not affect HRQL when measured by the Freiburg Life Quality Assessment-Wound (FLQA-W) and the Wound-QoL.[27] The protective association between advancing age and better psychological well-being supports the hypothesis that individuals adjust and

TABLE 3 Scale scores.

WOUND-Q scale	No.	Mean score ± SD	No. reporting minimum scale score	No. reporting maximum scale score
Life impact 'Does your wound(s) affect your quality of life'	1273	58.3 ± 23.5	35 (2.7%)	124 (9.7%)
Psychological 'Does your wound(s) affect how you feel?'	1275	64.3 ± 20.3	3 (0.2%)	139 (10.9%)
Sleep 'Does your wound(s) affect your sleep?'	706	48.3 ± 24.1	56 (7.9%)	19 (2.7%)
Social 'Does your wound(s) affect your social life?'	1256	60.2 ± 31.2	73 (5.8%)	306 (24.4%)

Abbreviation: No., numbers.

adapt to changing circumstances despite disease and advanced age.[22] Gender was a significant predictor with the WOUND-Q Psychological and Sleep scales. Males had significantly better psychological well-being and sleep compared to females. Similarly, a German study using the Wound-QoL found that females had lower psychological well-being compared to males.[24] Females were more affected in their sleep than men in our sample and scored 5.6 points lower than men. Sleep disturbances and wound-related pain have been connected in a Swedish leg wound population which found that females with leg ulcers experience more pain than males.[26] It is well established that sex differences in pain exist.[30,31] Higher occurrences of sleep disturbances among females may be explained by higher occurrences of pain or by psychological factors. Hellström et al.[26] were not able to confirm this hypothesis as they did not find an association between the female gender and a higher occurrence of sleep disturbances. We found that females scored lower on the Psychological scale, supporting that psychological well-being may be linked to sleep disturbances.[32] Diabetes is associated with decreased HRQL compared to the general population and is further reduced by diabetes-related complications.[33,34] When controlling for patient demographics, wound symptoms, and wound characteristics, we found that participants with diabetes scored 3.9 points lower on the Life impact scale than participants without diabetes. People with chronic wounds are known to have a high occurrence of comorbidities.[9,35] It has been questioned whether the poor HRQL in chronic wound patients is more affected by comorbidities than by the wound itself.[9] Despite WOUND-Q being a wound-specific PROM, we found that having at least one or more comorbidities, other than DM or PVD, was significantly associated with lower scores on the Life impact, Psychological, Sleep, and Social scale. This supports that comorbidities do indeed have an impact on a wound-specific PROM. More studies are needed to investigate the effect of comorbidities on WOUND-Q scores to enable adjustments for this in future research.

5.2 | Wound characteristics and symptoms

One of the primary outcomes when evaluating wound care is wound size. We did not find a significant association with more extensive wounds leading to decreased scores in any of the four scales, consistent with Zhu et al.[23] who showed that, increased wound size, compared to a wound <2 cm^2, was not associated with decreased HRQL when measured by the EQ-5D-5L. Conversely, wound size >50 cm^2 has been found to be negatively associated with the Social Life domain in CWIS compared to wounds ≤50 cm.[25] Supporting qualitative research,[36–38] we found that wound drainage and smell negatively impacted HRQL. Drainage and smell were significantly associated with decreased scores in the Life impact, Psychological, and Social scale. Treatment with NWPT in the past 3–6 months was associated with reduced scores on the Life impact and Social scale. A meta-analysis of 15 studies has found that NWPT can accelerate chronic wound healing.[39] Still, only a few studies have examined the quantitative impact on patients' HRQL.[40] Current results imply a positive impact on HRQL compared to traditional dressing; however, evidence is still sparse and conflicting.[40] Participants with a chronic wound in the face or neck scored significantly lower on the Psychological scale, approximately 10 points lower compared to wounds in other locations. The visibility of the wound may have caused embarrassment and further psychological distress. Whether wound aetiology significantly impacts HRQL has been examined by Reinboldt-Jockenhöfer et al.[24] and Zhu et al.[23] In the study by Zhu et al., it was observed that people with arterial ulcers had worse scores on all HRQL domains and VAS scores measured by EQ-5D compared to other wound aetiologies. However, when this variable was included in a generalised linear model, it was not a significant predictor for worse HRQL.[23] Similarly, an arterial leg wound was not associated with decreased HRQL measured by the Wound-QoL[24] consistent with our findings. In contrast, we found that participants with the wound aetiology: 'diabetic foot ulcer', 'trauma/injury', 'other', and 'multiple' scored significantly lower on the Psychological or Sleep scale, compared to having an arterial ulcer. These results must be interpreted with caution due to large confidence intervals. Differences in HRQL have been linked to wound duration.[23,25] Zhu et al. found worse EQ-VAS scores associated with a wound duration of 6 weeks to 3 months, compared to 4–6 weeks.[23] Soares et al. reported that wound lasting over 24 weeks negatively impact the CWIS domains of well-being, social life, physical symptoms, and daily living compared to those under 24 weeks.[25] In contrast to Soares

TABLE 4 Multivariable linear regression of the Life impact, Psychological, and Social scale.

Variable	Life impact ($n = 990$)								Psychological ($n = 990$)								Social ($n = 983$)							
	DOES YOUR WOUND(S) AFFECT YOUR QUALITY OF LIFE? In the PAST WEEK, how much has your wound(s) interfered with the following:								DOES YOUR WOUND(S) AFFECT HOW YOU FEEL? With your wound(s) in mind, in the PAST WEEK, how often have you felt:								DOES YOUR WOUND(S) AFFECT YOUR SOCIAL LIFE? With your wound(s) in mind, in the PAST WEEK, how much would you disagree or agree with each statement:							
					95% CI								95% CI								95% CI			
	β	SE	t	p Value	−	+	β^*	VIF	β	SE	t	p Value	−	+	β^*	VIF	β	SE	t	p Value	−	+	β^*	VIF
Age, years	0.04	0.04	0.95	0.34	−0.04	0.12	0.03	1.52	0.18	0.04	5.22	0**	0.12	0.25	0.17	1.51	0.10	0.06	1.71	0.09	−0.01	0.21	0.06	1.51
BMI	0.11	0.08	1.30	0.19	−0.06	0.27	0.04	1.12	0.00	0.07	−0.02	0.99	−0.14	0.14	0.00	1.12	0.13	0.11	1.12	0.26	−0.10	0.35	0.03	1.12
Wound size (width × length, cm^2)	−0.06	0.04	−1.66	0.10	−0.13	0.01	−0.05	1.09	−0.05	0.03	−1.77	0.08	−0.11	0.01	−0.05	1.09	−0.09	0.05	−1.81	0.07	−0.18	0.01	−0.05	1.09
Gender (REF = female)	2.31	1.31	1.77	0.08	−0.25	4.87	0.05	1.12	6.61	1.12	5.92	0**	4.42	8.80	0.16	1.12	3.01	1.78	1.69	0.09	−0.49	6.50	0.05	1.12
Smoking (REF = no)	−0.52	1.64	−0.32	0.75	−3.74	2.70	−0.01	1.12	−0.45	1.41	−0.32	0.75	−3.22	2.32	−0.01	1.12	−0.55	2.24	−0.25	0.81	−4.94	3.83	−0.01	1.12
Drainage (REF = no drainage in the past week)	−5.65	1.47	−3.84	0.00**	−8.53	−2.76	−0.11	1.26	−3.43	1.26	−2.72	0.01*	−5.90	−0.96	−0.08	1.26	−5.50	2.01	−2.73	0.01*	−9.44	−1.55	−0.08	1.26
Vacuum (use of suction device within the past 3–6 months) (REF = no)	−3.79	1.81	−2.10	0.04*	−7.33	−0.24	−0.06	1.14	1.96	1.55	1.27	0.21	−1.07	4.99	0.04	1.14	−7.64	2.48	−3.08	0.00*	−12.51	−2.77	−0.09	1.14
Diabetes (REF = no)	−3.90	1.62	−2.40	0.02*	−7.09	−0.72	−0.08	1.58	0.19	1.39	0.14	0.89	−2.53	2.91	0.00	1.57	−3.89	2.21	−1.76	0.08	−8.23	0.45	−0.06	1.57
Peripheral vascular disease (REF = no)	−2.19	1.74	−1.26	0.21	−5.60	1.22	−0.04	1.27	0.41	1.49	0.28	0.78	−2.52	3.34	0.01	1.27	−2.74	2.39	−1.15	0.25	−7.43	1.94	−0.04	1.27
Comorbidities (REF = none)	−3.61	1.28	−2.82	0.01*	−6.12	−1.09	−0.08	1.09	−3.82	1.10	−3.48	0.00*	−5.97	−1.67	−0.09	1.09	−5.66	1.75	−3.23	0.00*	−9.10	−2.22	−0.09	1.09
Wound location (REF = face or neck)																								
Upper extremity (hand, arm, shoulder)	5.03	5.51	0.91	0.36	−5.77	15.84	0.05	4.56	11.95	4.71	2.53	0.01*	2.69	21.20	0.14	4.56	10.78	7.50	1.44	0.15	−3.94	25.50	0.08	4.56
Truncus (chest,	9.03	5.28	1.71	0.09	−1.33	19.39	0.12	7.27	13.50	4.52	2.99	0.00*	4.63	22.37	0.21	7.27	15.40	7.19	2.14	0.03*	1.29	29.51	0.16	7.26

(Continues)

TABLE 4 (Continued)

Variable	Life impact ($n = 990$)								Psychological ($n = 990$)								Social ($n = 983$)							
	DOES YOUR WOUND(S) AFFECT YOUR QUALITY OF LIFE? In the PAST WEEK, how much has your wound(s) interfered with the following:								DOES YOUR WOUND(S) AFFECT HOW YOU FEEL? With your wound(s) in mind, in the PAST WEEK, how often have you felt:								DOES YOUR WOUND(S) AFFECT YOUR SOCIAL LIFE? With your wound(s) in mind, in the PAST WEEK, how much would you disagree or agree with each statement:							
					95% CI								95% CI								95% CI			
	β	SE	t	p Value	−	+	β^*	VIF	β	SE	t	p Value	−	+	β^*	VIF	β	SE	t	p Value	−	+	β^*	VIF
abdomen, back)																								
Genitials, buttocks	−7.04	5.60	−1.26	0.21	−18.02	3.95	−0.08	5.67	9.59	4.79	2.00	0.05*	0.18	18.99	0.12	5.67	1.43	7.63	0.19	0.85	−13.54	16.40	0.01	5.67
Leg	3.38	5.13	0.66	0.51	−6.68	13.44	0.07	14.57	11.94	4.39	2.72	0.01*	3.34	20.55	0.27	14.58	11.95	6.98	1.71	0.09	−1.75	25.65	0.18	14.44
Foot, toes	0.05	5.13	0.01	0.99	−10.01	10.11	0.00	15.65	10.16	4.39	2.31	0.02*	1.55	18.78	0.24	15.64	9.34	6.98	1.34	0.18	−4.37	23.04	0.14	15.53
Multiple wound locations	−2.90	5.37	−0.54	0.59	−13.44	7.64	−0.04	8.07	10.15	4.60	2.21	0.03*	1.12	19.17	0.16	8.07	2.91	7.32	0.40	0.69	−11.46	17.28	0.03	8.02
Wound aetiology (REF = arterial)																								
Venous	0.95	4.37	0.22	0.83	−7.64	9.53	0.01	4.5	−3.63	3.79	−0.96	0.34	−11.07	3.81	−0.05	4.69	−4.78	5.97	−0.80	0.42	−16.50	6.95	−0.05	4.43
Diabetic foot ulcer	−5.20	4.43	−1.17	0.24	−13.89	3.50	−0.08	7.03	−8.31	3.84	−2.16	0.03*	−15.85	−0.76	−0.15	7.18	−11.08	6.05	−1.83	0.07	−22.95	0.80	−0.13	6.95
Hidradenitis	0.74	5.46	0.14	0.89	−9.97	11.45	0.01	2.5	−6.98	4.71	−1.48	0.14	−16.23	2.26	−0.06	2.54	−1.86	7.44	−0.25	0.80	−16.46	12.74	−0.01	2.5
Pilonidal cyst	8.40	7.05	1.19	0.23	−5.44	22.24	0.04	1.73	−2.39	6.07	−0.39	0.69	−14.30	9.52	−0.01	1.75	8.04	9.62	0.84	0.40	−10.83	26.91	0.03	1.73
Pressure ulcer	−5.65	4.54	−1.24	0.21	−14.56	3.27	−0.08	5.34	−7.63	3.93	−1.94	0.05	−15.34	0.09	−0.12	5.50	−10.57	6.21	−1.70	0.09	−22.75	1.61	−0.11	5.32
Surgery	−6.43	4.33	−1.48	0.14	−14.92	2.07	−0.11	7.35	−5.01	3.75	−1.34	0.18	−12.38	2.36	−0.10	7.54	−11.47	5.90	−1.94	0.05	−23.05	0.11	−0.14	7.35
Radiation	−8.16	7.27	−1.12	0.26	−22.42	6.11	−0.04	1.56	−8.58	6.06	−1.41	0.16	−20.48	3.32	−0.05	1.61	−3.86	9.61	−0.40	0.69	−22.72	14.99	−0.01	1.6
Trauma/ injury	−3.29	4.30	−0.77	0.44	−11.73	5.14	−0.06	7.44	−5.50	3.74	−1.47	0.14	−12.84	1.84	−0.11	7.64	−6.75	5.87	−1.15	0.25	−18.28	4.77	−0.09	7.41
Don't know	−3.31	4.57	−0.72	0.47	−12.27	5.66	−0.04	4.06	−5.88	3.96	−1.48	0.14	−13.65	1.90	−0.08	4.17	−1.82	6.23	−0.29	0.77	−14.04	10.40	−0.02	4.07
Other type	−2.19	4.73	−0.46	0.64	−11.48	7.10	−0.02	3.48	−8.56	4.11	−2.08	0.04*	−16.63	−0.49	−0.10	3.52	−5.53	6.45	−0.86	0.39	−18.19	7.14	−0.04	3.48
Multiple types	−5.53	4.86	−1.14	0.26	−15.07	4.00	−0.05	3.09	−12.82	4.21	−3.04	0.00*	−21.08	−4.55	−0.14	3.17	−9.70	6.62	−1.46	0.14	−22.69	3.30	−0.07	3.1
Wound duration (REF = 3–6 months)																								
7–9 months	−0.68	2.19	−0.31	0.76	−4.98	3.62	−0.01	1.17	−2.35	1.88	−1.25	0.21	−6.03	1.33	−0.04	1.17	−5.45	3.00	−1.82	0.07	−11.33	0.44	−0.05	1.17
10–11 months	−1.51	2.72	−0.55	0.58	−6.85	3.84	−0.02	1.13	−0.36	2.31	−0.16	0.88	−4.90	4.18	0.00	1.13	−3.98	3.73	−1.07	0.29	−11.30	3.35	−0.03	1.13
1–2 years	−0.58	1.71	−0.34	0.74	−3.93	2.78	−0.01	1.28	−2.07	1.47	−1.41	0.16	−4.95	0.80	−0.04	1.29	−0.73	2.34	−0.31	0.75	−5.32	3.85	−0.01	1.28

TABLE 4 (Continued)

Variable	Life impact ($n = 990$)								Psychological ($n = 990$)								Social ($n = 983$)							
	DOES YOUR WOUND(S) AFFECT YOUR QUALITY OF LIFE? In the PAST WEEK, how much has your wound(s) interfered with the following:								DOES YOUR WOUND(S) AFFECT HOW YOU FEEL? With your wound(s) in mind, in the PAST WEEK, how often have you felt:								DOES YOUR WOUND(S) AFFECT YOUR SOCIAL LIFE? With your wound(s) in mind, in the PAST WEEK, how much would you disagree or agree with each statement:							
					95% CI								95% CI								95% CI			
	β	SE	t	p Value	−	+	β^*	VIF	β	SE	t	p Value	−	+	β^*	VIF	β	SE	t	p Value	−	+	β^*	VIF
3–4 years	−4.01	2.21	−1.81	0.07	−8.35	0.33	−0.05	1.22	−0.63	1.90	−0.33	0.74	−4.35	3.09	−0.01	1.23	−4.15	3.03	−1.37	0.17	−10.09	1.79	−0.04	1.22
5–10 years	−0.41	2.52	−0.16	0.87	−5.35	4.53	0.00	1.13	−0.57	2.15	−0.26	0.79	−4.80	3.66	−0.01	1.13	2.68	3.43	0.78	0.44	−4.05	9.41	0.02	1.13
More than 10 years	−1.14	3.47	−0.33	0.74	−7.95	5.68	−0.01	1.13	0.27	2.97	0.09	0.93	−5.57	6.10	0.00	1.13	−3.91	4.74	−0.83	0.41	−13.21	5.38	−0.02	1.14
Wound numbers (REF = one wound)																								
Two wounds	−2.47	1.74	−1.42	0.16	−5.89	0.95	−0.04	1.27	−2.81	1.49	−1.88	0.06	−5.74	0.12	−0.06	1.27	−1.28	2.38	−0.54	0.59	−5.95	3.40	−0.02	1.28
Three wounds	−2.41	2.73	−0.88	0.38	−7.77	2.96	−0.02	1.16	0.48	2.32	0.21	0.84	−4.08	5.04	0.01	1.16	0.26	3.73	0.07	0.94	−7.05	7.58	0.00	1.16
Four wounds	−6.36	4.03	−1.58	0.12	−14.27	1.56	−0.04	1.16	−4.77	3.45	−1.38	0.17	−11.55	2.00	−0.04	1.16	−7.28	5.60	−1.30	0.19	−18.28	3.71	−0.04	1.16
5 or more wounds	−6.78	3.14	−2.16	0.03*	−12.93	−0.63	−0.06	1.26	−4.57	2.68	−1.70	0.09	−9.84	0.69	−0.05	1.26	−9.33	4.31	−2.17	0.03*	−17.78	−0.88	−0.07	1.26
Smell within the past week (REF = no smell)																								
Faint	−3.45	1.55	−2.22	0.03*	−6.50	−0.40	−0.07	1.23	−5.40	1.33	−4.06	0**	−8.00	−2.79	−0.12	1.23	−6.58	2.12	−3.10	0.00*	−10.75	−2.41	−0.09	1.24
Moderate	−7.71	2.64	−2.91	0.00*	−12.90	−2.52	−0.08	1.15	−7.20	2.25	−3.20	0.00*	−11.60	−2.79	−0.09	1.15	−9.36	3.58	−2.62	0.01*	−16.38	−2.34	−0.08	1.15
Strong	−11.32	3.78	−3.00	0.00*	−18.74	−3.91	−0.08	1.13	−11.50	3.24	−3.55	0**	−17.85	−5.15	−0.10	1.13	−11.36	5.15	−2.21	0.03*	−21.47	−1.26	−0.06	1.13
Sleep interference from wound in the past week (REF = never)																								
Sometimes (1–2 nights a week)	−9.95	1.49	−6.69	0.00**	−12.86	−7.03	−0.20	1.32	−9.43	1.27	−7.42	0**	−11.93	−6.94	−0.22	1.32	−12.49	2.03	−6.15	0.00**	−16.48	−8.51	−0.19	1.32
Often (3–4 nights a week)	−22.26	2.05	−10.86	0.00**	−26.28	−18.24	−0.33	1.29	−16.98	1.75	−9.68	0**	−20.43	−13.54	−0.29	1.29	−26.82	2.81	−9.55	0.00**	−32.33	−21.31	−0.30	1.3
Very often (5–7 nights a week)	−23.64	2.16	−10.93	0.00**	−27.88	−19.39	−0.33	1.34	−18.76	1.86	−10.11	0**	−22.41	−15.12	−0.30	1.33	−29.55	2.96	−9.97	0.00**	−35.37	−23.74	−0.31	1.33

Abbreviations: β, coefficient; β^*, standardised coefficient; SE, standard error; VIF, variance inflation factor.

*$p < 0.05$.**$p < 0.001$.

TABLE 5 Multivariable linear regression of the Sleep scale.

	Sleep ($n = 544$)							
	DOES YOUR WOUND(S) AFFECT YOUR SLEEP? With your wound(s) in mind, in the PAST WEEK, how often have you:							
					95% CI			
Variable	β	SE	t	$p > t$	Lower	Upper	β^*	VIF
Age, years	0.09	0.05	1.69	0.09	−0.01	0.20	0.07	1.58
BMI	0.08	0.10	0.76	0.45	−0.12	0.27	0.03	1.13
Wound size (width × length, cm^2)	−0.03	0.04	−0.89	0.37	−0.10	0.04	−0.03	1.12
Gender (REF = female)	5.91	1.67	3.54	0.00**	2.63	9.19	0.12	1.12
Smoking (REF = no)	−2.62	1.94	−1.35	0.18	−6.43	1.19	−0.05	1.12
Drainage (REF = no drainage in the past week)	−3.72	2.08	−1.79	0.08	−7.81	0.37	−0.07	1.38
Vacuum (use of suction device within the past 3–6 months) (REF = no)	−2.70	2.37	−1.14	0.26	−7.36	1.96	−0.04	1.19
Diabetes (REF = no)	−3.46	2.18	−1.59	0.11	−7.74	0.82	−0.07	1.59
Peripheral vascular disease (REF = no)	−1.64	2.20	−0.74	0.46	−5.97	2.69	−0.03	1.32
Comorbidities (REF = none)	−3.98	1.67	−2.39	0.02*	−7.25	−0.70	−0.08	1.10
Wound location (REF = upper extremity) (hand, arm, shoulder)[a]								
Truncus (chest, abdomen, back)	−7.89	4.02	−1.97	0.05	−15.78	0.00	−0.10	2.59
Genitials, buttocks	−1.44	4.62	−0.31	0.76	−10.52	7.65	−0.02	2.24
Leg	−0.75	3.47	−0.22	0.83	−7.56	6.06	−0.01	4.09
Foot, toes	−3.62	3.55	−1.02	0.31	−10.60	3.35	−0.07	4.32
Multiple wound locations	1.46	3.90	0.37	0.71	−6.20	9.12	0.02	2.89
Wound aetiology (REF = arterial)								
Venous	−9.47	5.15	−1.84	0.07	−19.59	0.65	−0.12	4.27
Diabetic foot ulcer	−7.82	5.36	−1.46	0.15	−18.35	2.72	−0.11	5.40
Hidradenitis	−4.37	6.37	−0.69	0.49	−16.89	8.15	−0.04	2.54
Pilonidal cyst	−13.21	8.32	−1.59	0.11	−29.56	3.14	−0.07	1.82
Pressure ulcer	−4.98	5.67	−0.88	0.38	−16.12	6.16	−0.06	3.86
Surgery	−4.67	5.22	−0.89	0.37	−14.92	5.58	−0.07	6.44
Radiation	Not included, only 10 observations							
Trauma/injury	−11.03	5.13	−2.15	0.03*	−21.12	−0.95	−0.18	6.63
Don't know	−9.40	5.53	−1.70	0.09	−20.26	1.46	−0.10	3.44
Other type	−11.88	5.64	−2.10	0.04*	−22.97	−0.79	−0.13	3.42
Multiple types	−14.10	5.74	−2.46	0.01*	−25.38	−2.83	−0.14	3.20
Wound duration (REF = 3–6 months)								
7–9 months	−1.49	2.79	−0.53	0.59	−6.96	3.98	−0.02	1.21
10–11 months	−7.82	3.79	−2.06	0.04*	−15.27	−0.38	−0.07	1.21
1–2 years	0.02	2.25	0.01	1.00	−4.41	4.45	0.00	1.36
3–4 years	−3.60	2.99	−1.21	0.23	−9.47	2.26	−0.05	1.33
5–10 years	1.54	3.13	0.49	0.62	−4.60	7.68	0.02	1.17
More than 10 years	4.58	4.64	0.99	0.32	−4.53	13.69	0.03	1.17
Wound numbers (REF = one wound)								
Two wounds	−1.95	2.30	−0.85	0.40	−6.47	2.56	−0.03	1.39
Three wounds	−2.45	3.28	−0.75	0.46	−8.89	4.00	−0.03	1.21
Four wounds	−15.29	4.55	−3.36	0.00*	−24.22	−6.36	−0.12	1.18
5 or more wounds	−2.55	3.63	−0.70	0.48	−9.68	4.58	−0.03	1.38
Smell within the past week (REF = no smell)								
Faint	−0.41	1.91	−0.22	0.83	−4.16	3.33	−0.01	1.27

TABLE 5 (Continued)

	Sleep ($n = 544$)							
	DOES YOUR WOUND(S) AFFECT YOUR SLEEP? With your wound(s) in mind, in the PAST WEEK, how often have you:							
					95% CI			
Variable	β	SE	t	$p > t$	Lower	Upper	β^*	VIF
Moderate	−2.92	3.20	−0.91	0.36	−9.21	3.37	−0.03	1.26
Strong	−7.39	4.26	−1.73	0.08	−15.75	0.98	−0.06	1.24
Sleep interference from wound in the past week (REF = sometimes) (1–2 nights a week)[b]								
Often (3–4 nights a week)	−19.15	2.05	−9.33	0.00**	−23.18	−15.11	−0.34	1.21
Very often (5–7 nights a week)	−34.29	2.23	−15.39	0.00**	−38.67	−29.91	−0.57	1.30

Abbreviations: β, coefficient; SE, standard error; β^*, standardised coefficient; VIF, variance inflation factor.
[a]Only 10 participants had a wound at the face or neck, recoded into missing.
[b]Participants stating no sleep interference in the past week were not asked to complete the sleep scale.
*$p < 0.05$.**$p < 0.001$.

et al., Zhu et al. provided more detailed categories (4–6 weeks, 6 weeks-3 months, 3 to <6 months, and ≥6 months), yet no consistent trend of decreasing EQ-VAS or other EQ domains was observed. We found no negative impact of increasing wound duration on participants life, psychological function, sleep, or social function, suggesting that participants may adapt over time, though recall bias of wound duration could affect classification. Negative impact on scale scores was observed when participants had four or more wounds. However, the 95% CI were very wide, which is possible due to few observations in these indicator variables.

The most important predictor for all four scales was increasing wound-related sleep interference with β^* ranging from −0.19 to −0.57 (Tables 4 and 5). Over half of the sample (57%) reported having sleep interference in the past week due to their wound, which is similar to that found among older patients with leg wounds.[26] Sleep disturbances could have a severe impact on patients' daily living and HRQL[38] and may delay wound healing.[32,41,42] Even in healthy persons, it has been found that modest sleep disruption over 3 days, with 2 h of sleep per night, delays healing of wounds.[41] Of the four scales, the mean score was lowest for the Sleep scale, with more than 10 points lower than the Life impact, Psychological, and Social scores (Table 3). Relatively to participants having no sleeping interference, scale scores dropped with up to 30 points in participants stating sleep interference as 'very often (5 to 7 nights a week)'.

For all categorical predictors, statistically significant associated with the scale scores, the coefficients were above the smallest detectable change (SDC) at a group level reported in a further psychometric study that reported test–retest results,[18] meaning that the difference between indicator variables is real and not due to the scale's measurement error. However, this was not the case when looking at the 95% CI for significant predictors, indicating some degree of remaining uncertainty. The 95% CI for all indicator variables about sleep interference was kept above the SDC, as seen in Tables 4 and 5.

This study has some methodological considerations. By combining the original field test and further validation samples, we were able to have a large sample and, thereby, statistical power to include multiple variables in our regression. However, differences in data collection and data availability led to some restrictions. We would have wished to include data about pain, financial situation, marital status, and education as these variables have been found associated with HRQL in chronic wound patients,[21,22,25] but these were either not collected or only collected for some of the participants in one of the two surveys. Data were collected differently, with clinician and patient-reported data potentially introducing bias about wound characteristics. Recall bias about wound duration and comorbidities is possible. This was handled using categories for wound duration and coding comorbidities to a binary variable. For a more direct association between NPWT and the scale scores, it would have been preferable if participants were asked if they were treated with NPWT in the past week instead of 3–6 months, as the recall period for each of the four scales is the past week. Due to few observations of patients having wounds due to cancer ($n = 7$), infection ($n = 10$), and pyoderma gangrenosum ($n = 8$), these were excluded from the regression analysis. Limitations about the specific samples have previously been discussed.[13,18] In the regression analysis, we found that wounds located on the leg, foot, and toe(s) had collinearity in the Life impact, Psychological, and Social scale. Location and wound aetiologies are related, and multicollinearity may exist due to this, as it is logical that patients with a diabetic foot ulcer would have a wound on the foot or toe(s). Collinearity may have introduced type II errors, and we could have missed a significant predictor. Even though multiple variables were significantly associated with the scale scores, the 95% CI for the β was below the SDC established in the previous study by Simonsen et al., indicating some remaining uncertainty on the clinical relevance of the effect. The interpretation of the effect on scales scores of significant associated variables should be done cautiously as the precision, i.e. 95% CI of the β was wide for an extensive amount of the variables. Further studies are needed to verify our findings. Lastly, the results of our research can only imply associations.

6 | CONCLUSION

Considerable heterogeneity exists in wound studies regarding recruitment sites, wound aetiologies represented, the definition of a chronic wound, and the use of generic or condition-specific PROMs, making it hard to compare results. This study is the first and largest study examining predictive factors for HRQL measured by the four WOUND-Q scales: Life impact, Psychological, Sleep, and Social. Wound-related sleep disturbances had the greatest impact on quality of life, psychological well-being, sleep, and social function when adjusting for other clinically relevant variables in our multivariable regression model. To provide better care to people with chronic wounds, we need to address predictors impacting outcomes important to patients. Based on our study, more attention should be given to wound-related sleep disturbances in the daily treatment given their significant association with HRQL.

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CONFLICT OF INTEREST STATEMENT

Anne Klassen and Andrea Pusic are developers of the WOUND-Q and may receive a share of any licence revenue on the inventor sharing policies from the institutions that own the WOUND-Q. Anne Klassen is the owner of EVENTUM Research, which provides consulting services to the pharmaceutical industry. The rest of the authors have nothing to disclose.

DATA AVAILABILITY STATEMENT

The corresponding author can provide the supporting data for this study upon request. However, please note that the data cannot be made publicly available due to privacy or ethical restrictions.

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APPENDIX A: UNIVARIABLE REGRESSION

	Scales															
	Life impact				Psychological				Sleep				Social			
			95% CI				95% CI				95% CI				95% CI	
Variable	β	p value	Lower	Upper	β	p value	Lower	Upper	β	p value	Lower	Upper	β	p value	Lower	Upper
Age, years	0.03	0.42	−0.04	0.10	0.26	0.00**	0.20	0.31	−0.01	0.83	−0.11	0.09	0.08	0.11	−0.02	0.17
BMI	0.04	0.65	−0.13	0.21	0.04	0.65	−0.13	0.21	0.00	0.98	−0.22	0.22	0.00	0.98	−0.22	0.22
Wound size (width × length, cm^2)	−0.02	0.16	−0.05	0.01	−0.03	0.012*	−0.05	−0.01	−0.03	0.02*	−0.06	−0.01	−0.04	0.03*	−0.08	0.00
Gender (Reference = female)	4.18	0.002*	1.58	6.78	8.23	0.00**	6.02	10.44	7.21	0.00**	3.66	10.75	5.13	0.00*	1.64	8.62
Smoking (Reference = no)	−2.34	0.16	−5.62	0.93	−5.01	0.00**	−7.83	−2.19	−2.18	0.30	−6.35	1.99	−3.89	0.08	−8.25	0.47
Drainage (Reference = no drainage in the past week)	−11.63	0.00**	−14.34	−8.92	−7.55	0.00**	−9.92	−5.19	−6.88	0.00*	−10.87	−2.90	−13.59	0.00**	−17.24	−9.94
Vacuum (use of suction device within the past 3–6 months) (Reference = no)	−8.16	0.00**	−11.73	−4.59	0.17	0.92	−2.92	3.25	−4.10	0.10	−8.91	0.71	−12.19	0.00**	−16.92	−7.46
Diabetes (Reference = no)	−4.16	0.003*	−6.89	−1.44	2.29	0.06	−0.06	4.64	−1.36	0.50	−5.28	2.55	−3.35	0.07	−7.01	0.31
Peripheral vascular disease (Reference = no)	−5.85	0.00**	−9.12	−2.58	0.75	0.61	−2.09	3.58	−5.29	0.02*	−9.62	−0.96	−5.79	0.01*	−10.18	−1.39
Comorbidities (Reference = none)	−7.28	0.00**	−10.34	−4.22	−1.98	0.14	−4.63	0.67	−8.01	0.001*	−12.19	−3.83	−7.52	0.00**	−11.63	−3.42
Marital status[a] (Reference = single/never married)		0.9				0.05*				0.25				0.31		
Married/living common law	1.40		−2.31	5.10	4.39		1.24	7.54	−1.65		−6.42	3.11	3.82		−1.21	8.85
Separated/divorced	1.12		−5.07	7.32	3.70		−1.52	8.92	−3.62		−11.95	4.70	6.29		−2.06	14.64
Widowed	0.12		−8.52	8.76	4.36		−2.97	11.69	−11.91		−24.09	0.26	6.15		−6.07	18.37
Education[b] (Reference = completed high school or less)		0.51				0.226				0.77				0.44		
Completed college, trade school or university	−1.31		−5.86	3.25	0.88		−3.17	4.92	−0.87		−6.35	4.62	−2.94		−9.12	3.24
Completed master or doctoral degree	2.11		−4.18	8.40	4.80		−0.78	10.38	1.75		−5.85	9.36	1.62		−6.93	10.18
Wound location[c] (Reference = face or neck)		0.00**				0.00**								0.00**		
Upper extremity (hand, arm, shoulder) dummy variable	−0.32		−12.04	11.41	4.73		−5.50	14.96	REF[c]	0.39			4.70		−10.96	20.35

	Scales															
	Life impact				Psychological				Sleep				Social			
			95% CI				95% CI				95% CI				95% CI	
Variable	*β*	*p* value	Lower	Upper	*β*	*p* value	Lower	Upper	*β*	*p* value	Lower	Upper	*β*	*p* value	Lower	Upper
Truncus (chest, abdomen, back) dummy variable	0.49		−10.60	11.58	7.08		−2.59	16.76	−4.18		−12.97	4.60	4.52		−10.29	19.33
Genitials, buttocks	−14.36		−25.74	−2.98	4.20		−5.72	14.12	−2.44		−12.06	7.17	−7.60		−22.79	7.59
Leg	−2.45		−13.05	8.15	9.38		0.13	18.62	−4.77		−12.50	2.95	4.94		−9.22	19.10
Foot, toes	−5.49		−16.07	5.08	9.56		0.33	18.79	−3.14		−10.86	4.58	2.75		−11.38	16.88
Multiple wound locations	−16.44		−27.44	−5.45	1.51		−8.08	11.11	−8.55		−17.05	−0.06	−13.60		−28.29	1.08
Wound aetiology (Reference = arterial)		0.00**				0.00**				0.01*				0.00**		
Venous	7.64		−0.87	16.15	0.18		−7.15	7.52	−4.05		−14.88	6.79	3.36		−7.97	14.69
Diabetic foot ulcer	2.09		−6.02	10.21	−0.90		−7.91	6.11	1.36		−9.28	12.01	−1.48		−12.29	9.32
Hidradenitis	1.12		−8.97	11.22	−13.86		−22.55	−5.18	0.72		−11.72	13.16	−5.13		−18.54	8.28
Pilonidal cyst/disease	3.31		−9.73	16.35	−5.55		−16.74	5.63	0.62		−14.93	16.18	7.07		−10.26	24.40
Pressure ulcer	1.22		−7.10	9.54	−0.92		−8.09	6.26	10.10		−0.94	21.14	−1.38		−12.47	9.70
Surgery	5.87		−2.18	13.91	0.41		−6.54	7.35	Not included as only 10 observations				1.07		−9.62	11.77
Radiation	4.78		−9.11	18.68	−3.65		−15.29	8.00	4.95		−5.21	15.10	3.43		−14.61	21.48
Trauma/injury	9.68		1.68	17.68	−1.12		−8.03	5.79	1.83		−9.41	13.07	7.06		−3.58	17.71
Don't know	9.68		1.11	18.24	1.09		−6.30	8.49	−0.58		−11.99	10.84	13.15		1.71	24.59
Other type	8.30		−0.62	17.23	−4.02		−11.73	3.69	−7.06		−18.68	4.56	4.57		−7.29	16.43
Multiple types	−1.92		−11.28	7.44	−15.40		−23.47	−7.34	4.95		−5.21	15.10	−7.61		−20.09	4.87
Wound duration (Reference = 3–6 months)		0.24				0.22				0.26				0.02*		
7–9 months	−4.94		−9.48	−0.41	−3.84		−7.74	0.06	−4.21		−10.23	1.81	−10.44		−16.50	−4.38
10–11 months	−1.74		−7.20	3.72	−0.11		−4.76	4.54	−9.40		−17.35	−1.44	−5.37		−12.74	2.00
1–2 years	−3.14		−6.70	0.43	−3.24		−6.30	−0.18	−3.98		−8.85	0.89	−4.26		−9.02	0.49
3–4 years	−3.58		−8.13	0.97	−0.46		−4.38	3.45	−4.16		−10.45	2.12	−4.48		−10.56	1.60
5–10 years	−4.40		−9.67	0.87	−3.97		−8.50	0.57	−1.75		−8.48	4.99	−3.87		−10.87	3.13
More than 10 years	−2.92		−9.85	4.02	−2.12		−8.08	3.85	−2.06		−11.54	7.43	−9.20		−18.40	0.01

(Continues)

	Scales															
	Life impact				Psychological				Sleep				Social			
			95% CI				95% CI				95% CI				95% CI	
Variable	*β*	*p* value	Lower	Upper	*β*	*p* value	Lower	Upper	*β*	*p* value	Lower	Upper	*β*	*p* value	Lower	Upper
Wound numbers (Reference = one wound)		0.00**				0.00**				0.00***				0.00**		
Two wounds	−8.976		−12.27	−5.68	−7.59		−10.45	−4.74	−3.86		−8.33	0.61	−11.21		−15.60	−6.82
Three wounds	−9.697		−14.74	−4.66	−6.78		−11.12	−2.45	−11.74		−18.09	−5.38	−10.83		−17.53	−4.14
Four wounds	−13.488		−20.85	−6.12	−7.83		−14.20	−1.46	−16.84		−25.98	−7.69	−17.07		−27.09	−7.04
5 or more wounds	−16.390		−21.98	−10.80	−14.12		−18.96	−9.28	−15.78		−22.44	−9.12	−24.90		−32.37	−17.42
Smell within the past week (Reference = no smell)		0.00**				0.00**				0.01*				0.00**		
Faint smell	−10.76		−13.71	−7.81	−12.52		−15.03	−10.00	−3.48		−7.42	0.45	−15.64		−19.61	−11.68
Moderately strong	−17.26		−22.50	−12.01	−14.20		−18.65	−9.75	−7.50		−14.14	−0.86	−19.41		−26.37	−12.45
Very strong	−22.53		−30.08	−14.98	−17.49		−23.84	−11.14	−13.22		−22.39	−4.05	−24.37		−34.44	−14.31
Sleep Interference from wound in the past week (Reference = never)[d]		0.00**				0.00**								0.00**		
Sometimes (1–2 nights a week)	−12.82		−15.47	−10.16	−13.58		−15.88	−11.28	REF[d]	0.00**			−16.38		−19.95	−12.81
Often (3–4 nights a week)	−26.04		−29.64	−22.45	−22.32		−25.44	−19.20	−21.52		−24.99	−18.04	−33.93		−38.78	−29.07
Very often (5–7 nights a week)	−30.10		−33.83	−26.36	−23.97		−27.21	−20.73	−35.89		−39.49	−32.29	−38.73		−43.78	−33.68

[a] Marital status was only available from Danish participants in the original field-test and the further validation sample.

[b] Data was only available from the further validation participants ($n = 420$) of these 141 had completed high school or less, 214 had finished college, trade school, or university, and 65 had completed a master's or doctoral degree.

[c] Only 10 participants had a wound at the face or neck, recoded into missing.

[d] Participants stating no sleep interference in the past week were not asked to complete the sleep scale.

* $p < 0.05$.** $p < 0.001$.

APPENDIX B: MULTIVARIABLE LINEAR REGRESSION. MAIN AND SENSITIVITY ANALYSIS

Sensitivity analyses were performed by excluding observations with cooks D > 4/n.

Life impact	Main analysis ($n = 990$)						Sensitivity analysis ($n = 934$)						Coherence of significant predictors: main vs. sensitivity analysis
	$p < 0.001$, $R^2 = 0.34$, $^*R^2 = 0.31$				95% CI		$p < 0.001$, $R^2 = 0.41$, $^*R^2 = 0.39$				95% CI		Green = consistent
	β	SE	t	$p > t$	Lower	Upper	β	SE	t	$p > t$	Lower	Upper	Red = inconsistent
Age, years	0.04	0.04	0.95	0.34	−0.04	0.12	0.02	0.04	0.59	0.56	−0.05	0.09	
BMI	0.11	0.08	1.30	0.19	−0.06	0.27	0.07	0.07	0.90	0.37	−0.08	0.21	
Wound size (width × length, cm^2)	−0.06	0.04	−1.66	0.10	−0.13	0.01	0.01	0.05	0.11	0.92	−0.09	0.11	
Gender (Reference = female)	2.31	1.31	1.77	0.08	−0.25	4.87	2.11	1.17	1.80	0.07	−0.19	4.41	
Smoking (Reference = no)	−0.52	1.64	−0.32	0.75	−3.74	2.70	−1.18	1.49	−0.79	0.43	−4.10	1.74	
Drainage (Reference = no drainage in the past week)	−5.65	1.47	−3.84	0.00**	−8.53	−2.76	−5.81	1.30	−4.46	0.00**	−8.37	−3.25	
Vacuum (use of suction device within the past 3–6 months) (Reference = no)	−3.79	1.81	−2.10	0.04*	−7.33	−0.24	−3.62	1.61	−2.25	0.03*	−6.79	−0.46	
Diabetes (Reference = no)	−3.90	1.62	−2.40	0.02*	−7.09	−0.72	−3.84	1.47	−2.61	0.01*	−6.72	−0.96	
Peripheral vascular disease (Reference = no)	−2.19	1.74	−1.26	0.21	−5.60	1.22	−3.28	1.56	−2.10	0.04*	−6.35	−0.21	
Comorbidities (Reference = none)	−3.61	1.28	−2.82	0.01*	−6.12	−1.09	−2.78	1.15	−2.42	0.02*	−5.03	−0.52	
Wound location (Reference = face or neck)													
Upper extremity (hand, arm, shoulder)	5.03	5.51	0.91	0.36	−5.77	15.84	5.73	5.11	1.12	0.26	−4.30	15.76	
Truncus (chest, abdomen, back)	9.03	5.28	1.71	0.09	−1.33	19.39	9.53	4.90	1.94	0.05	−0.09	19.15	
Genitials, buttocks	−7.04	5.60	−1.26	0.21	−18.02	3.95	−8.51	5.20	−1.64	0.10	−18.72	1.70	
Leg	3.38	5.13	0.66	0.51	−6.68	13.44	5.14	4.78	1.07	0.28	−4.25	14.52	
Foot, toes	0.05	5.13	0.01	0.99	−10.01	10.11	0.79	4.78	0.17	0.87	−8.59	10.17	
Multiple wound locations	−2.90	5.37	−0.54	0.59	−13.44	7.64	−1.58	5.00	−0.32	0.75	−11.40	8.23	
Wound aetiology (Reference = arterial)													
Venous	0.95	4.37	0.22	0.83	−7.64	9.53	0.33	4.03	0.08	0.94	−7.58	8.23	
Diabetic foot ulcer	−5.20	4.43	−1.17	0.24	−13.89	3.50	−4.54	4.07	−1.12	0.27	−12.54	3.45	
Hidradenitis	0.74	5.46	0.14	0.89	−9.97	11.45	1.48	4.99	0.30	0.77	−8.32	11.27	
Pilonidal cyst/disease	8.40	7.05	1.19	0.23	−5.44	22.24	9.12	7.41	1.23	0.22	−5.43	23.66	

(Continues)

Life impact	Main analysis ($n = 990$)						Sensitivity analysis ($n = 934$)						Coherence of significant predictors: main vs. sensitivity analysis
	$p < 0.001$, $R^2 = 0.34$, $^*R^2 = 0.31$						$p < 0.001$, $R^2 = 0.41$, $^*R^2 = 0.39$						
					95% CI						95% CI		Green = consistent
	β	SE	t	$p > t$	Lower	Upper	β	SE	t	$p > t$	Lower	Upper	Red = inconsistent
Pressure ulcer	−5.65	4.54	−1.24	0.21	−14.56	3.27	−3.70	4.17	−0.89	0.38	−11.89	4.48	
Surgery	−6.43	4.33	−1.48	0.14	−14.92	2.07	−6.32	3.98	−1.59	0.11	−14.12	1.48	
Radiation	−8.16	7.27	−1.12	0.26	−22.42	6.11	−8.60	6.86	−1.25	0.21	−22.07	4.87	
Trauma/injury	−3.29	4.30	−0.77	0.44	−11.73	5.14	−3.88	3.95	−0.98	0.33	−11.63	3.87	
Don't know	−3.31	4.57	−0.72	0.47	−12.27	5.66	−3.23	4.17	−0.77	0.44	−11.41	4.95	
Other type	−2.19	4.73	−0.46	0.64	−11.48	7.10	−1.58	4.33	−0.36	0.72	−10.08	6.93	
Multiple types	−5.53	4.86	−1.14	0.26	−15.07	4.00	−4.90	4.49	−1.09	0.28	−13.71	3.90	
Wound duration (Reference = 3–6 months)													
7–9 months	−0.68	2.19	−0.31	0.76	−4.98	3.62	−0.70	1.98	−0.36	0.72	−4.59	3.19	
10–11 months	−1.51	2.72	−0.55	0.58	−6.85	3.84	−0.21	2.44	−0.09	0.93	−4.99	4.57	
1–2 years	−0.58	1.71	−0.34	0.74	−3.93	2.78	−0.75	1.53	−0.49	0.63	−3.75	2.26	
3–4 years	−4.01	2.21	−1.81	0.07	−8.35	0.33	−2.10	1.96	−1.07	0.29	−5.95	1.76	
5–10 years	−0.41	2.52	−0.16	0.87	−5.35	4.53	3.19	2.36	1.35	0.18	−1.44	7.81	
More than 10 years	−1.14	3.47	−0.33	0.74	−7.95	5.68	−2.13	3.08	−0.69	0.49	−8.18	3.92	
Wound numbers (Reference = one wound)													
2	−2.47	1.74	−1.42	0.16	−5.89	0.95	−3.84	1.55	−2.47	0.01*	−6.89	−0.79	
3	−2.41	2.73	−0.88	0.38	−7.77	2.96	−5.40	2.49	−2.17	0.03*	−10.29	−0.51	
4	−6.36	4.03	−1.58	0.12	−14.27	1.56	−8.79	3.58	−2.45	0.01*	−15.83	−1.76	
5 or more	−6.78	3.14	−2.16	0.03*	−12.93	−0.63	−5.90	3.04	−1.94	0.05	−11.86	0.07	
Smell within the past week (Reference = no smell)													
Faint smell	−3.45	1.55	−2.22	0.03*	−6.50	−0.40	−2.81	1.39	−2.03	0.04*	−5.53	−0.09	
Moderately strong	−7.71	2.64	−2.91	0.00*	−12.90	−2.52	−7.11	2.38	−2.99	0.00*	−11.78	−2.45	
Very strong	−11.32	3.78	−3.00	0.00*	−18.74	−3.91	−14.51	3.72	−3.90	0.00**	−21.81	−7.21	
Sleep Interference from wound in the past week (Reference = never)													
Sometimes (1–2 nights a week)	−9.95	1.49	−6.69	0.00**	−12.86	−7.03	−10.70	1.33	−8.05	0.00**	−13.31	−8.09	
Often (3–4 nights a week)	−22.26	2.05	−10.86	0.00**	−26.28	−18.24	−22.64	1.84	−12.31	0.00**	−26.25	−19.03	
Very often (5–7 nights a week)	−23.64	2.16	−10.93	0.00**	−27.88	−19.39	−23.42	1.96	−11.95	0.00**	−27.26	−19.57	

Psychological scale	Main analysis ($n = 990$)						Sensitivity analysis ($n = 938$)						Coherence of significant predictors: main vs. sensitivity analysis
	$p < 0.001$, $R^2 = 0.36$, $^*R^2 = 0.33$						$p < 0.001$, $R^2 = 0.43$, $^*R^2 = 0.40$						
					95% CI						95% CI		Green = consistent
	β	SE	t	$p > t$	Lower	Upper	β	SE	t	$p > t$	Lower	Upper	Red = inconsistent
Age, years	0.18	0.04	5.22	0.00**	0.12	0.25	0.20	0.03	6.24	0.00**	0.14	0.26	
BMI	0.00	0.07	−0.02	0.99	−0.14	0.14	0.01	0.06	0.08	0.93	−0.12	0.13	
Wound size (width × length, cm^2)	−0.05	0.03	−1.77	0.08	−0.11	0.01	−0.01	0.04	−0.25	0.80	−0.09	0.07	
Gender (Reference = female)	6.61	1.12	5.92	0.00**	4.42	8.80	6.48	1.00	6.45	0.00**	4.51	8.45	
Smoking (Reference = no)	−0.45	1.41	−0.32	0.75	−3.22	2.32	−0.04	1.27	−0.03	0.98	−2.54	2.46	
Drainage (Reference = no drainage in the past week)	−3.43	1.26	−2.72	0.007*	−5.90	−0.96	−3.99	1.13	−3.53	0.00**	−6.21	−1.78	
Vacuum (use of suction device within the past 3–6 months) (Reference = no)	1.96	1.55	1.27	0.21	−1.07	4.99	2.14	1.39	1.54	0.12	−0.59	4.86	
Diabetes (Reference = no)	0.19	1.39	0.14	0.89	−2.53	2.91	0.07	1.25	0.05	0.96	−2.39	2.52	
Peripheral vascular disease (Reference = no)	0.41	1.49	0.28	0.78	−2.52	3.34	0.46	1.35	0.34	0.73	−2.19	3.11	
Comorbidities (Reference = none)	−3.82	1.10	−3.48	0.001*	−5.97	−1.67	−3.46	0.98	−3.52	0.00**	−5.39	−1.53	
Wound location (Reference = face or neck)													
Upper extremity (hand, arm, shoulder)	11.95	4.71	2.53	0.011*	2.69	21.20	12.82	4.13	3.10	0.002*	4.70	20.93	
Truncus (chest, abdomen, back)	13.50	4.52	2.99	0.003*	4.63	22.37	14.32	3.97	3.61	0.00**	6.53	22.12	
Genitals, buttocks	9.59	4.79	2.00	0.046*	0.18	18.99	8.87	4.22	2.10	0.036*	0.59	17.15	
Leg	11.94	4.39	2.72	0.007*	3.34	20.55	12.46	3.84	3.24	0.001*	4.92	20.00	
Foot, toe(s)	10.16	4.39	2.31	0.021*	1.55	18.78	10.75	3.85	2.79	0.005*	3.19	18.30	
Multiple	10.15	4.60	2.21	0.028*	1.12	19.17	9.81	4.07	2.41	0.016*	1.81	17.80	
Wound aetiology (Reference = arterial)													
Venous ulcer	−3.63	3.79	−0.96	0.34	−11.07	3.81	−3.82	3.56	−1.07	0.28	−10.82	3.18	
Diabetic foot ulcer	−8.31	3.84	−2.16	0.031*	−15.85	−0.76	−7.21	3.62	−1.99	0.047*	−14.32	−0.09	
Hidradenitis	−6.98	4.71	−1.48	0.14	−16.23	2.26	−5.90	4.49	−1.32	0.19	−14.71	2.90	
Pilonidal cyst/disease	−2.39	6.07	−0.39	0.69	−14.30	9.52	−2.08	5.77	−0.36	0.72	−13.39	9.24	
Pressure ulcer	−7.63	3.93	−1.94	0.05	−15.34	0.09	−6.45	3.68	−1.75	0.08	−13.67	0.77	
Surgery	−5.01	3.75	−1.34	0.18	−12.38	2.36	−4.25	3.54	−1.20	0.23	−11.19	2.69	
Radiation	−8.58	6.06	−1.41	0.16	−20.48	3.32	−8.28	5.75	−1.44	0.15	−19.58	3.01	
Trauma/injury	−5.50	3.74	−1.47	0.14	−12.84	1.84	−5.04	3.51	−1.44	0.15	−11.93	1.85	
Don't know	−5.88	3.96	−1.48	0.14	−13.65	1.90	−5.89	3.69	−1.60	0.11	−13.13	1.35	

(Continues)

Psychological scale	Main analysis ($n = 990$)						Sensitivity analysis ($n = 938$)						Coherence of significant predictors: main vs. sensitivity analysis
	$p < 0.001$, $R^2 = 0.36$, $^*R^2 = 0.33$						$p < 0.001$, $R^2 = 0.43$, $^*R^2 = 0.40$						Green = consistent
					95% CI						95% CI		
	β	SE	t	$p > t$	Lower	Upper	β	SE	t	$p > t$	Lower	Upper	Red = inconsistent
Other type	−8.56	4.11	−2.08	0.038*	−16.63	−0.49	−6.96	3.87	−1.80	0.07	−14.55	0.63	
Multiple types	−12.82	4.21	−3.04	0.002*	−21.08	−4.55	−10.96	3.94	−2.78	0.006*	−18.69	−3.23	
Wound duration (Reference = 3–6 months)													
7–9 months	−2.35	1.88	−1.25	0.21	−6.03	1.33	−2.66	1.68	−1.58	0.11	−5.97	0.64	
10–11 months	−0.36	2.31	−0.16	0.88	−4.90	4.18	0.74	2.10	0.36	0.72	−3.37	4.86	
1–2 years	−2.07	1.47	−1.41	0.16	−4.95	0.80	−2.88	1.31	−2.20	0.028*	−5.45	−0.31	
3–4 years	−0.63	1.90	−0.33	0.74	−4.35	3.09	−2.08	1.72	−1.21	0.23	−5.45	1.29	
5–10 years	−0.57	2.15	−0.26	0.79	−4.80	3.66	−0.25	1.95	−0.13	0.90	−4.09	3.58	
More than 10 years	0.27	2.97	0.09	0.93	−5.57	6.10	−0.82	2.65	−0.31	0.76	−6.02	4.38	
Wound numbers (Reference = one wound)													
2	−2.81	1.49	−1.88	0.06	−5.74	0.12	−3.47	1.33	−2.60	0.009*	−6.09	−0.85	
3	0.48	2.32	0.21	0.84	−4.08	5.04	0.36	2.17	0.16	0.87	−3.90	4.62	
4	−4.77	3.45	−1.38	0.17	−11.55	2.00	−3.96	3.30	−1.20	0.23	−10.43	2.52	
5 or more	−4.57	2.68	−1.70	0.09	−9.84	0.69	−1.25	2.53	−0.49	0.62	−6.22	3.72	
Smell within the past week (Reference = no smell)													
Faint smell	−5.40	1.33	−4.06	0.00**	−8.00	−2.79	−4.35	1.20	−3.63	0.00**	−6.70	−2.00	
Moderately strong	−7.20	2.25	−3.20	0.001*	−11.60	−2.79	−6.58	2.02	−3.26	0.001*	−10.54	−2.62	
Very strong	−11.50	3.24	−3.55	0.00**	−17.85	−5.15	−9.23	3.21	−2.88	0.004*	−15.53	−2.94	
Sleep Interference from wound in the past week (Reference = never)													
Sometimes (1–2 nights a week)	−9.43	1.27	−7.42	0.00**	−11.93	−6.94	−10.96	1.14	−9.62	0.00**	−13.20	−8.73	
Often (3–4 nights a week)	−16.98	1.75	−9.68	0.00**	−20.43	−13.54	−18.36	1.58	−11.60	0.00**	−21.47	−15.25	
Very often (5–7 nights a week)	−18.76	1.86	−10.11	0.**	−22.41	−15.12	−20.39	1.70	−12.03	0.**	−23.72	−17.06	

Sleep scale	Main analysis, $n = 544$						Sensitivity analysis, $n = 517$						Coherence of significant predictors: main vs. sensitivity analysis
	$p < 0.001$, $R^2 = 0.46$, $^*R^2 = 0.42$				95% CI		$p < 0.001$, $R^2 = 0.56$, $^*R^2 = 0.52$				95% CI		Green = consistent
	β	SE	t	$p > t$	Lower	Upper	β	SE	t	$p > t$	Lower	Upper	Red = inconsistent
Age, years	0.09	0.05	1.69	0.09	−0.01	0.20	0.09	0.05	1.93	0.05	0.00	0.19	
BMI	0.08	0.10	0.76	0.45	−0.12	0.27	0.17	0.09	1.86	0.06	−0.01	0.34	
Wound size (width × length, cm^2)	−0.03	0.04	−0.89	0.37	−0.10	0.04	−0.02	0.04	−0.58	0.56	−0.10	0.05	
Gender (Reference = female)	5.91	1.67	3.54	0.00**	2.63	9.19	5.03	1.49	3.37	0.00*	2.10	7.95	
Smoking (Reference = no)	−2.62	1.94	−1.35	0.18	−6.43	1.19	−0.90	1.73	−0.52	0.60	−4.30	2.50	
Drainage (Reference = no drainage in the past week)	−3.72	2.08	−1.79	0.08	−7.81	0.37	−3.06	1.84	−1.66	0.10	−6.67	0.55	
Vacuum (use of suction device within the past 3–6 months) (Reference = no)	−2.70	2.37	−1.14	0.26	−7.36	1.96	−2.35	2.10	−1.12	0.26	−6.47	1.77	
Diabetes (Reference = no)	−3.46	2.18	−1.59	0.11	−7.74	0.82	−3.97	1.93	−2.05	0.04*	−7.76	−0.17	
Peripheral vascular disease (Reference = no)	−1.64	2.20	−0.74	0.46	−5.97	2.69	−0.39	1.97	−0.20	0.84	−4.27	3.48	
Comorbidities (Reference = none)	−3.98	1.67	−2.39	0.02*	−7.25	−0.70	−3.34	1.48	−2.27	0.02*	−6.24	−0.44	
Wound location (Reference = upper extremity, face or neck excluded due to only 10 observations)													
Truncus (chest, abdomen, back)	−7.89	4.02	−1.97	0.05	−15.78	0.00	−5.48	3.56	−1.54	0.12	−12.47	1.51	
Genitals, buttock	−1.44	4.62	−0.31	0.76	−10.52	7.65	−3.69	4.22	−0.87	0.38	−11.97	4.60	
Leg	−0.75	3.47	−0.22	0.83	−7.56	6.06	−0.24	3.08	−0.08	0.94	−6.29	5.82	
Foot, toe(s)	−3.62	3.55	−1.02	0.31	−10.60	3.35	−3.69	3.14	−1.18	0.24	−9.85	2.47	
Multiple	1.46	3.90	0.37	0.71	−6.20	9.12	2.77	3.50	0.79	0.43	−4.11	9.66	
Wound aetiology (Reference = arterial)													
Venous ulcer	−9.47	5.15	−1.84	0.07	−19.59	0.65	−10.33	4.47	−2.31	0.02*	−19.12	−1.54	
Diabetic foot ulcer	−7.82	5.36	−1.46	0.15	−18.35	2.72	−9.39	4.66	−2.02	0.04*	−18.55	−0.24	
Hidradenitis suppurativa	−4.37	6.37	−0.69	0.49	−16.89	8.15	−4.78	5.62	−0.85	0.40	−15.82	6.26	
Pilonidal cyst/disease	−13.21	8.32	−1.59	0.11	−29.56	3.14	−7.25	7.57	−0.96	0.34	−22.13	7.63	
Pressure ulcer	−4.98	5.67	−0.88	0.38	−16.12	6.16	−7.20	4.98	−1.45	0.15	−16.99	2.58	
Surgery	−4.67	5.22	−0.89	0.37	−14.92	5.58	−7.31	4.55	−1.61	0.11	−16.26	1.63	
Radiation	Not included						Not included						
Trauma/injury	−11.03	5.13	−2.15	0.03*	−21.12	−0.95	−11.98	4.45	−2.69	0.01*	−20.72	−3.24	
Don't know	−9.40	5.53	−1.70	0.09	−20.26	1.46	−8.17	4.83	−1.69	0.09	−17.66	1.33	
Other	−11.88	5.64	−2.10	0.04*	−22.97	−0.79	−11.71	4.91	−2.39	0.02*	−21.35	−2.06	

(Continues)

Sleep scale	Main analysis, $n = 544$						Sensitivity analysis, $n = 517$						Coherence of significant predictors: main vs. sensitivity analysis
	$p < 0.001$, $R^2 = 0.46$, $^*R^2 = 0.42$						$p < 0.001$, $R^2 = 0.56$, $^*R^2 = 0.52$						
					95% CI						95% CI		Green = consistent
	β	SE	t	$p > t$	Lower	Upper	β	SE	t	$p > t$	Lower	Upper	Red = inconsistent
Multiple	−14.10	5.74	−2.46	0.01*	−25.38	−2.83	−18.88	5.11	−3.69	0.00**	−28.93	−8.83	
Wound duration (Reference = 3–6 months)													
7–9 months	−1.49	2.79	−0.53	0.59	−6.96	3.98	−1.74	2.46	−0.71	0.48	−6.57	3.10	
10–11 months	−7.82	3.79	−2.06	0.04*	−15.27	−0.38	−8.43	3.29	−2.56	0.01*	−14.88	−1.97	
1–2 years	0.02	2.25	0.01	1.00	−4.41	4.45	−0.75	2.02	−0.37	0.71	−4.71	3.21	
3–4 years	−3.60	2.99	−1.21	0.23	−9.47	2.26	−4.55	2.62	−1.73	0.08	−9.70	0.60	
5–10 years	1.54	3.13	0.49	0.62	−4.60	7.68	1.26	2.76	0.46	0.65	−4.16	6.67	
More than 10 years	4.58	4.64	0.99	0.32	−4.53	13.69	2.78	4.08	0.68	0.50	−5.24	10.79	
Wound numbers (Reference = one wound)													
2	−1.95	2.30	−0.85	0.40	−6.47	2.56	−1.73	2.04	−0.85	0.40	−5.73	2.28	
3	−2.45	3.28	−0.75	0.46	−8.89	4.00	−1.08	3.02	−0.36	0.72	−7.02	4.86	
4	−15.29	4.55	−3.36	0.00*	−24.22	−6.36	−19.69	4.11	−4.79	0.00**	−27.77	−11.62	
5 or more	−2.55	3.63	−0.70	0.48	−9.68	4.58	−3.00	3.21	−0.94	0.35	−9.30	3.30	
Smell within the past week (Reference = no smell)													
Faint smell	−0.41	1.91	−0.22	0.83	−4.16	3.33	−0.72	1.68	−0.43	0.67	−4.02	2.59	
Moderately strong	−2.92	3.20	−0.91	0.36	−9.21	3.37	−5.35	2.84	−1.88	0.06	−10.94	0.24	
Very strong	−7.39	4.26	−1.73	0.08	−15.75	0.98	−10.66	3.95	−2.70	0.01*	−18.41	−2.91	
Sleep Interference from wound in the past week (Reference = Sometimes 1–2 nights)													
Often (3–4 nights a week)	−19.15	2.05	−9.33	0.00**	−23.18	−15.11	−19.57	1.81	−10.79	0.00**	−23.14	−16.01	
Very often (5–7 nights a week)	−34.29	2.23	−15.39	0.00**	−38.67	−29.91	−36.98	2.00	−18.48	0.00**	−40.91	−33.04	

Social scale	Main analysis, $n = 983$						Sensitivity analysis, $n = 934$						Coherence of significant predictors: main vs. sensitivity analysis
	$p < 0.001$, $R^2 = 0.31$, $^*R^2 = 0.28$						$p < 0.001$, $R^2 = 0.39$, $^*R^2 = 0.36$						
					95% CI						95% CI		Green = consistent
	β	SE	t	$p > t$	Lower	Upper	β	SE	t	$p > t$	Lower	Upper	Red = inconsistent
Age, years	0.10	0.06	1.71	0.09	−0.01	0.21	0.10	0.05	1.94	0.05	0.00	0.21	
BMI	0.13	0.11	1.12	0.26	−0.10	0.35	0.14	0.11	1.31	0.19	−0.07	0.36	
Wound size (width × length, cm^2)	−0.09	0.05	−1.81	0.07	−0.18	0.01	−0.07	0.05	−1.45	0.15	−0.18	0.03	

Social scale	Main analysis, $n = 983$						Sensitivity analysis, $n = 934$						Coherence of significant predictors: main vs. sensitivity analysis
	$p < 0.001$, $R^2 = 0.31$, $*R^2 = 0.28$						$p < 0.001$, $R^2 = 0.39$, $*R^2 = 0.36$						
					95% CI						95% CI		Green = consistent
	β	SE	t	$p > t$	Lower	Upper	β	SE	t	$p > t$	Lower	Upper	Red = inconsistent
Gender (Reference = female)	3.01	1.78	1.69	0.09	−0.49	6.50	2.73	1.68	1.63	0.10	−0.56	6.02	
Smoking (Reference = no)	−0.55	2.24	−0.25	0.81	−4.94	3.83	−0.54	2.11	−0.26	0.80	−4.68	3.59	
Drainage (Reference = no drainage in the past week)	−5.50	2.01	−2.73	0.01*	−9.44	−1.55	−6.31	1.87	−3.37	0.00*	−9.99	−2.63	
Vacuum (use of suction device within the past 3–6 months) (Reference = no)	−7.64	2.48	−3.08	0.00*	−12.51	−2.77	−9.77	2.31	−4.23	0**	−14.30	−5.24	
Diabetes (Reference = no)	−3.89	2.21	−1.76	0.08	−8.23	0.45	−4.70	2.11	−2.22	0.03*	−8.85	−0.55	
Peripheral vascular disease (Reference = no)	−2.74	2.39	−1.15	0.25	−7.43	1.94	−3.80	2.24	−1.70	0.09	−8.19	0.59	
Comorbidities (Reference = none)	−5.66	1.75	−3.23	0.00*	−9.10	−2.22	−4.93	1.64	−3.00	0.00*	−8.16	−1.71	
Wound location (Reference = face or neck)													
Upper extremity (hand, arm, shoulder)	10.78	7.50	1.44	0.15	−3.94	25.50	12.87	7.24	1.78	0.08	−1.34	27.08	
Truncus (chest, abdomen, back)	15.40	7.19	2.14	0.03*	1.29	29.51	16.41	6.92	2.37	0.02*	2.83	29.99	
Genitals, buttock	1.43	7.63	0.19	0.85	−13.54	16.40	−1.27	7.36	−0.17	0.86	−15.71	13.17	
Leg	11.95	6.98	1.71	0.09	−1.75	25.65	14.37	6.76	2.13	0.03*	1.11	27.63	
Foot, toe(s)	9.34	6.98	1.34	0.18	−4.37	23.04	12.48	6.78	1.84	0.07	−0.82	25.78	
Multiple	2.91	7.32	0.40	0.69	−11.46	17.28	8.09	7.14	1.13	0.26	−5.93	22.11	
Wound aetiology (Reference = arterial)													
Venous ulcer	−4.78	5.97	−0.80	0.42	−16.50	6.95	−7.47	5.66	−1.32	0.19	−18.57	3.63	
Diabetic foot ulcer	−11.08	6.05	−1.83	0.07	−22.95	0.80	−14.68	5.74	−2.56	0.01*	−25.94	−3.42	
Hidradenitis suppurativa	−1.86	7.44	−0.25	0.80	−16.46	12.74	−1.69	7.05	−0.24	0.81	−15.52	12.13	
Pilonidal cyst/disease	8.04	9.62	0.84	0.40	−10.83	26.91	10.56	10.41	1.01	0.31	−9.88	31.00	
Pressure ulcer	−10.57	6.21	−1.70	0.09	−22.75	1.61	−8.84	5.89	−1.50	0.13	−20.41	2.72	
Surgery	−11.47	5.90	−1.94	0.05	−23.05	0.11	−12.12	5.55	−2.18	0.03*	−23.02	−1.22	
Radiation	−3.86	9.61	−0.40	0.69	−22.72	14.99	−5.50	9.39	−0.59	0.56	−23.92	12.93	
Trauma/injury	−6.75	5.87	−1.15	0.25	−18.28	4.77	−9.01	5.52	−1.63	0.10	−19.85	1.84	
Don't know	−1.82	6.23	−0.29	0.77	−14.04	10.40	−2.77	5.85	−0.47	0.64	−14.25	8.72	
Other	−5.53	6.45	−0.86	0.39	−18.19	7.14	−4.33	6.11	−0.71	0.48	−16.33	7.66	
Multiple	−9.70	6.62	−1.46	0.14	−22.69	3.30	−10.69	6.27	−1.70	0.09	−23.00	1.62	
Wound duration (Reference = 3–6 months)													

(Continues)

Social scale	Main analysis, $n = 983$						Sensitivity analysis, $n = 934$						Coherence of significant predictors: main vs. sensitivity analysis
	$p < 0.001$, $R^2 = 0.31$, $*R^2 = 0.28$						$p < 0.001$, $R^2 = 0.39$, $*R^2 = 0.36$						
					95% CI						95% CI		Green = consistent
	β	SE	t	$p > t$	Lower	Upper	β	SE	t	$p > t$	Lower	Upper	Red = inconsistent
7–9 months	−5.45	3.00	−1.82	0.07	−11.33	0.44	−3.75	2.79	−1.34	0.18	−9.23	1.73	
10–11 months	−3.98	3.73	−1.07	0.29	−11.30	3.35	−5.22	3.49	−1.50	0.14	−12.07	1.63	
1–2 years	−0.73	2.34	−0.31	0.75	−5.32	3.85	−0.36	2.17	−0.17	0.87	−4.62	3.90	
3–4 years	−4.15	3.03	−1.37	0.17	−10.09	1.79	0.10	2.86	0.03	0.97	−5.52	5.72	
5–10 years	2.68	3.43	0.78	0.44	−4.05	9.41	4.30	3.29	1.31	0.19	−2.16	10.76	
More than 10 years	−3.91	4.74	−0.83	0.41	−13.21	5.38	−4.98	4.45	−1.12	0.26	−13.70	3.75	
Wound numbers (Reference = one wound)													
2	−1.28	2.38	−0.54	0.59	−5.95	3.40	−1.78	2.23	−0.80	0.42	−6.16	2.59	
3	0.26	3.73	0.07	0.94	−7.05	7.58	−1.30	3.55	−0.37	0.72	−8.27	5.68	
4	−7.28	5.60	−1.30	0.19	−18.28	3.71	−8.79	5.28	−1.66	0.10	−19.16	1.58	
5 or more	−9.33	4.31	−2.17	0.03*	−17.78	−0.88	−10.92	4.20	−2.60	0.01*	−19.17	−2.67	
Smell from the wound in the past week (Reference = no smell)													
Faint smell	−6.58	2.12	−3.10	0.00*	−10.75	−2.41	−6.87	1.97	−3.48	0.00*	−10.74	−2.99	
Moderately strong	−9.36	3.58	−2.62	0.01*	−16.38	−2.34	−7.99	3.41	−2.35	0.02*	−14.68	−1.31	
Very strong	−11.36	5.15	−2.21	0.03*	−21.47	−1.26	−13.14	5.20	−2.52	0.01*	−23.35	−2.92	
Sleep interference from the wound in the past week (Reference = never)													
Sometimes (1–2 nights a week)	−12.49	2.03	−6.15	0.00**	−16.48	−8.51	−13.94	1.90	−7.35	0.00**	−17.65	−10.22	
Often (3–4 nights a week)	−26.82	2.81	−9.55	0.00**	−32.33	−21.31	−30.93	2.63	−11.77	0.00**	−36.08	−25.77	
Very often (5–7 nights a week)	−29.55	2.96	−9.97	0.00**	−35.37	−23.74	−33.43	2.80	−11.95	0.00**	−38.92	−27.94	