

Factors Associated With Quality of Life Among People Living With a Stoma in Nonmetropolitan Areas

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Background: Interruption of gastrointestinal continuity through surgical formation of a stoma can be lifesaving. However, it is also typically associated with reduced quality of life (QoL). Although past research has investigated QoL among people living with a stoma, no known studies have investigated stoma-related QoL, specifically among nonmetropolitan residents who may experience distinct health issues compared with their metropolitan counterparts.

Objectives: The aim of the study was to investigate the level of and factors associated with QoL among people living with a stoma in nonmetropolitan Australia.

Methods: In a cross-sectional survey, 678 adults with colostomy, ileostomy, and/or urostomy and with membership in a regional Victorian stoma association were given the City of Hope Quality of Life Questionnaire for a Patient With an Ostomy (QOL-O). Total QoL score was calculated and described before categorization into quintiles. Patient factors associated with quintiles of QoL were assessed using univariable and multivariable proportional odds ordinal logistic regression, with a 95% confidence interval excluding 1.00 denoting statistical significance.

Results: Overall, 311 regional ostomy association members (46%) responded to any QOL-O questions; 285 members responded to >80% of QOL-O questions and contributed data to the study. Their median age was 73 years, and 60% were male. The median total QoL score was 6.9 on a scale of 0–10, where a higher number indicates better QoL. Factors independently associated with better QoL in the multivariable model were working full/part time, no poststoma clothing change, poststoma sexual activity, and older age. Factors independently associated with worse QoL were poststoma depression and a stoma location issue.

Discussion: People living with a stoma in nonmetropolitan Australia reported moderate-to-high QoL. Better QoL was identified in those who worked, had no poststoma clothing change, were sexually active poststoma, and were older. Worse QoL was seen in those who had poststoma depression and stoma location issues. Healthcare providers could influence stoma-related QoL by identifying risk factors and tailoring interventions toward individuals in nonmetropolitan settings.

Key Words: nonmetropolitan • ostomates • quality of life • regional • rural • stoma

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Surgical creation of stoma can be a lifesaving and a life-changing procedure. Despite significant advancements in stoma care, the creation of an ostomy profoundly affects health and well-being and thus quality of life (QoL). Research investigating QoL has identified a range

of clinical, sociodemographic, and psychosocial factors important to outcomes for patients. Clinical factors negatively affecting QoL among ostomates included poor stoma placement (Anaraki et al., 2012; Vonk-Klaassen et al., 2016), peristomal medical complications (Karadağ et al., 2015; Simmons et al., 2007), length of time since stoma formation (N. M. Silva et al., 2017; Thorpe et al., 2016), and poststoma sexual function (Anaraki et al., 2012; Dhamnaskar et al., 2019; Gemmill et al., 2010). There are also patient characteristics known to promote QoL, including older age (Scarpa et al., 2004; Wong et al., 2013) and being partnered (Pittman et al., 2008). Other factors further diminish QoL, such as the inability to maintain employment (Dabirian et al., 2011; Nichols & Riemer, 2008) and presence of depressive or anxiety symptoms (Anaraki et al., 2012; Knowles et al., 2014).

Those living in rural communities may be particularly vulnerable to adverse consequences of stoma formation because

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of the nature of rural and regional communities as well as the characteristics of rural populations. Rural communities have reduced access to both medical specialists and allied health services (Australian Institute of Health and Welfare [AIHW], 2019). This may increase the likelihood of suboptimal stoma placement, leading to the onset of early complications and difficulties (Watson et al., 2013). These challenges may be compounded by the lack of specialized treatment, leading to chronic problems for patients. In a small clinical report by Norman (2017), people living with a stoma in rural areas had inadequate access to stoma therapy nurses and experienced long-term complications that were not treated. Ongoing stoma complications can lead to self-isolation and the undermining of an individual's sense of self-efficacy, which are central to positive adjustment to a stoma (Simmons et al., 2007). For those living in rural and regional areas, challenges may also be amplified by increased visibility in the community, reduced sense of confidentiality, loneliness and limited opportunity for peer support, and poor access to mental health services (Hoolahan, 2002).

Sociodemographic and health characteristics of rural and regional communities may also exacerbate inequalities in outcomes for those living with a stoma. Rural and regional Australians have higher rates of health-compromising behaviors, such as high-risk alcohol consumption, smoking, and inactivity (AIHW, 2019). These factors increase risk of developing bowel cancer, the most common reason for stoma formation (Vonk-Klaassen et al., 2016), and stoma complications (Watson et al., 2013). Rural and regional communities also have lower levels of education and income and higher rates of unemployment, which may further impair postoperative recovery because of increased likelihood of poor health behaviors, reduced health literacy, and limited opportunity to maintain employment after surgery (AIHW, 2020).

Despite the distinct challenges and characteristics of rural and regional communities, little is known about QoL outcomes for this group. Limited understanding of the specific factors that influence rural and regional residents' QoL post stoma formation may hinder the development of appropriate interventions tailored to the needs of rural and regional health services, people, and communities. Thus, the purpose of this study was to gain greater insight into the level of and factors associated with QoL among those living with a stoma in nonmetropolitan Australia, with a view to inform the development of interventions and enhancement of clinical service delivery for these communities.

METHODS

Design and Sample

A cross-sectional survey was conducted among current members of a regional Victorian ostomy association. The association is located in an inner regional area and services members in both inner and outer regional areas, as defined by the Australian

Statistical Geographical Classification System—Remoteness Areas (Australian Bureau of Statistics [ABS], 2018). The survey population included those who had a permanent or temporary colostomy, ileostomy, and/or urostomy (i.e., met the criteria for the association membership) at the time of receiving the questionnaire. Those who were under the age of 18 years and/or needed an interpreter were excluded from the study.

Measures

QoL, along with relevant sociodemographic and medical characteristics, were assessed using the City of Hope Quality of Life Questionnaire for a Patient With an Ostomy (QOL-O; Grant et al., 2012). The two-part, 90-question QOL-O has been shown to be a valid, reliable, and reducible tool in the U.S., Croatian, and Iranian settings (Anaraki et al., 2014; Grant et al., 2004; Konjevoda et al., 2020). The first section of the QOL-O contains 47 closed- or open-ended questions related to socio-demographic characteristics, employment, sexual activity, psychological support, clothing, diet, and daily ostomy care. Modifications were made to the current survey to reflect the ethnicity of participants in our cohort. Seven questions concerning health insurance and device accessibility were removed from this section as they are not relevant in the Australian population because of fully subsidized access to stoma appliances. This left 40 questions in the first section. The second section of the tool includes 43 QoL questions across the following four domains: physical, psychological, social, and spiritual well-being. The QoL question about religious activities was excluded, as this is covered by a broader question about spiritual activities, leaving 42 questions. The response to each question is measured using a Likert scale ranging from 0 to 10. The questionnaire was estimated to take participants 15–30 minutes to complete.

Questionnaire Administration

Between September and December 2019, 678 printed QOL-O questionnaires were disseminated by the volunteers of the regional Victorian ostomy association to the members of the Victorian ostomy association who met the inclusion criteria. Volunteers distributed the questionnaires (via mail or in person) to ensure anonymity of participants and to prevent potential bias from the research team. Questionnaires were disseminated with an information sheet and prepaid return envelope. Two months post initial questionnaire distribution, a reminder letter, information sheet, questionnaire, and prepaid envelope were sent to all 678 members again as responses were anonymous. Following the return of surveys, data were entered into a password-protected Microsoft Excel spreadsheet by the research team.

QoL Score

In the absence of QOL-O guidance around handling missing responses, the minimum cutoff of 80% of items specified for

another health-related QoL tool (the Functional Assessment of Cancer-General) was applied to the QOL-O surveys (Webster et al., 2003). Respondents' total QoL scores across all domains were calculated by reverse-coding select items so that higher scores reflect better QoL for each question, before summing the scores across all items and dividing by the number of items with responses (i.e., a maximum of 42; Grant et al., 2012). The total QoL score ranged from 0 to 10, with a higher number denoting better QoL.

Sociodemographic and Clinical Covariates

Age at time of questionnaire completion and stoma duration (i.e., time since surgery) were treated as continuous variables, whereas all other variables were treated as categorical. Binary categorical variables included gender (male/female) and 10 "yes/no" variables: ethnicity other than Australian, currently unmarried, working full or part time (a composite variable), bowel cancer as the reason for the stoma, temporary stoma, obesity post stoma (a composite variable), sexually active post stoma, depressed post stoma, stoma location issue, and clothing change post stoma. Obesity was determined by calculating body mass index from patient-reported height and weight post stoma before categorizing those with a body mass index of ≥ 30 as obese (World Health Organization, n.d.). The variable "time for daily stoma care" was treated as a three-category variable with the following categories: 1-10 minutes, 11-25 minutes, and 26+ minutes.

Data Analysis

Sociodemographic and clinical characteristics measured as continuous variables were described using the median, Q1 (lower quartile), and Q3 (upper quartile), whereas categorical variables were described by number and proportion (percentage) in each category. Respondents who were sexually active post stoma were stratified by gender to allow for comparisons with past studies (Anaraki et al., 2012; Cotrim & Pereira, 2008). The total QoL scores of participants were summarized by calculating the mean (standard deviation = *SD*) as well as minimum, Q1, median, Q3, and maximum.

As the distribution of QoL scores was not normally distributed based on a Shapiro-Wilk test of normality, the QoL score variable was divided into quintiles for use as an outcome in regression modeling. Although all sociodemographic and clinical variables from the QOL-O were assessed descriptively, only 14 were selected as candidate covariates for regression modeling based on significant associations in past studies (Anaraki et al., 2012; Liao & Qin, 2014; Mahjoubi et al., 2010; J. O. Silva et al., 2019; Yilmaz et al., 2017). Associations between sociodemographic/clinical characteristics and quintiles of the total QoL score were assessed using proportional odds ordinal logistic regression. The purposeful selection method developed by Hosmer et al. (2008) was employed to develop a parsimonious multivariable model whereby each covariate

effect estimate was adjusted for effects of all other covariates. The theoretical confounding factors age and gender were retained in the multivariable model irrespective of statistical results and effect on other covariate effect estimates. Fitting the univariable and multivariable models involved calculating odds ratios (*ORs*) and 95% confidence intervals (*CI*s) for all covariates. An *OR* with a 95% *CI* excluding 1.00 was considered indicative of a significant association at $p = .05$ between the particular covariate and QoL. In the univariable and multivariable models, missing data were handled through an available-case approach. The proportional odds assumption was assessed using the chi-square test of parallel lines, with a $p < .05$ denoting a significant violation of this assumption. All statistical analyses were conducted in IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., Armonk, NY).

Ethical Considerations

The study, including the Australian-modified QOL-O tool, was approved by two research ethics committees (Approval No. LNR/19/BHCG/57062 and Project No. 23566). No identifying details were collected on the questionnaire. Members of the regional ostomy association were not offered any incentive or reward to complete the questionnaire.

RESULTS

Three hundred eleven members of the regional Victorian ostomy association (46% of the total membership) returned a completed or partially completed QOL-O questionnaire. Those who answered more than 80% of the QOL-O ($n = 285$) were included in the study.

Sociodemographic and Clinical Characteristics

The sociodemographic and clinical characteristics of the 285 respondents are shown in Tables 1 and 2, respectively. The median age of the participants was 73 years, and 60% were male. Colostomy was the most common type of stoma reported (66%), followed by ileostomy (22%), urostomy (8%), and dual ostomy (4%). Ninety percent of respondents indicated their stoma was permanent, whereas 53% identified bowel cancer as the reason for needing a stoma. Forty percent of participants reported poststoma depression, whereas 9% reported suicidal ideation with or without depression. Sixty-five percent of respondents reported being sexually active before stoma, whereas 26% reported sexual activity after stoma. For those with data on both sexual activity and gender, poststoma sexual activity was identified among 23% of 163 men and 33% of 104 women.

Level of QoL

The mean QoL score was 6.8 ($SD = 1.6$), whereas the minimum, Q1, median, Q3, and maximum were 2.5, 5.7, 6.9, 8.1, and 10, respectively. The distribution of total QoL scores was

TABLE 1. Sociodemographic and Clinical Characteristics of Regional Victorian Ostomy Association Members

| Patient factor (n) | Number | Percent |
|---|--------|---------|
| Gender (n = 283) | | |
| Male | 170 | 60 |
| Female | 113 | 40 |
| Age (years), median (Q1–Q3) [n = 283] | 73 | 65.5–80 |
| Ethnicity other than Australian (n = 282) | | |
| Australian | 246 | 87 |
| Other than Australian | 36 | 13 |
| Marital status prior to stoma surgery (n = 281) | | |
| Married | 194 | 69 |
| Unmarried | 87 | 31 |
| Marital status after stoma surgery (n = 279) | | |
| Married | 169 | 61 |
| Unmarried | 110 | 39 |
| Working full or part time (n = 270) | | |
| No | 210 | 78 |
| Yes | 60 | 22 |

Note. n = number of respondents with data available; Q1 = lower quartile (25th percentile); Q3 = upper quartile (75th percentile).

not normal but, rather, negatively skewed toward higher scores (data not shown).

Factors Associated With QoL

When the total QoL scores for the 285 respondents were divided into quintiles, an ordinal variable was obtained with the following categories: highest (>8.32), higher (7.30–8.32, inclusive), middle (6.44–7.29, inclusive), lower (5.38–6.43, inclusive), and lowest (<5.38). Table 3 shows the results of the ordinal regression modeling of patient factors associated with QoL in the univariable and multivariable settings. Six sociodemographic and clinical factors were associated with quintiles of total QoL in the multivariable model. This was a valid model for which the proportional odds assumption was met ($p = .863$). The odds of better QoL in a given quintile category, compared with all preceding quintile categories, were increased twofold (multivariable OR [MOR] = 2.01, 95% CI [1.08, 3.74]) for those who worked, by 89% (MOR = 1.89, 95% CI [1.13, 3.16]) for those without a clothing change relative to those with a clothing change, by 83% (MOR = 1.83, 95% CI [1.05, 3.18]) for those who were sexually active post stoma relative to sexually inactive individuals, and by 3% (MOR = 1.03, 95% CI [1.01, 1.06]) for each 1-year increase in age. Conversely, the odds of better QoL were reduced by 76% (MOR = 0.24, 95% CI [0.14, 0.40]) for those who were depressed post stoma relative to those who were not and by 62% (MOR = 0.38, 95% CI [0.22, 0.66]) for those who had a stoma location issue relative to those who did not.

DISCUSSION

The overall level of QoL reported by this sample of people living with a stoma in nonmetropolitan Australia was moderate to

high. This result is comparable to the levels of stoma-related QoL reported in studies conducted internationally (Anaraki et al., 2012; Cotrim & Pereira, 2008; Dhamnaskar et al., 2019; Konjevoda et al., 2020; Yilmaz et al., 2017). Two studies that also used the QOL-O reported similar findings for the overall QoL score (Anaraki et al., 2012; Konjevoda et al., 2020). There are several characteristics of our sample that may have contributed to the unanticipated finding of moderate-to-high QoL, along with a number of patient characteristics that were independently associated with QoL.

First, our study sample was considerably older than those in other studies of stoma-related QoL (Anaraki et al., 2012; Cotrim & Pereira, 2008; Dhamnaskar et al., 2019; Konjevoda et al., 2020; Liao & Qin, 2014; Yilmaz et al., 2017), and our modeling showed that older age was independently associated with better QoL. The older median age of our sample likely reflects the demographic characteristics of the study setting, as there is a higher proportion of people aged 65 years and older living in inner and outer regional areas of Australia (AIHW, 2019). Age is an important contributor to self-reported measures of QoL and life satisfaction, with past research identifying that life satisfaction increases sharply after 60 years of age and does not decline until later in life (Kunzmann et al., 2000). This finding is also reflected in past studies reporting better QoL in older than younger people living with a stoma (Scarpa et al., 2004; Wong et al., 2013).

As well as being older, our participants had their stomas for considerably longer, and a higher proportion had permanent stomas (Anaraki et al., 2012; Liao & Qin, 2014). These factors appear to lead to higher QoL over time as individuals adjust to stoma-related changes and typically gain greater confidence and competence in stoma care (Thorpe et al., 2016). Although duration of stoma was associated with QoL in the univariable setting, it was not independently associated with QoL following adjustment for all other factors in the multivariable model.

Those who worked full or part time after stoma surgery had twofold better QoL scores than those who did not work or who were retired. Previous studies have shown stability in occupation can sustain positive life relationships and self-worth, whereas those unable to maintain usual work habits report significantly worse life satisfaction scores (Nichols & Riemer, 2008). The economic hardship arising from loss of employment for individuals and their families is also likely to contribute to reduced QoL (Dabirian et al., 2011).

Our results also showed that nearly two-thirds of respondents identified as being sexually active prior to their ostomy formation, with only approximately one-quarter reporting postsurgical sexual activity. This is consistent with findings of past studies reporting that the presence of a stoma adversely affected one's ability to engage in intimacy, negatively affecting overall QoL (Anaraki et al., 2012; Dhamnaskar et al., 2019; Gemmill et al., 2010). Lower overall and gender-specific

TABLE 2. Clinical Characteristics of Regional Victorian Ostomy Association Members

| Patient factor (n) | Number | Percent |
|--|--------|---------|
| Stoma duration (weeks), median (Q1–Q3) [n = 281] | 72 | 24–168 |
| Bowel cancer (n = 279) | | |
| No | 132 | 47 |
| Yes | 147 | 53 |
| Type of stoma (n = 285) | | |
| Colostomy | 189 | 66 |
| Ileostomy | 62 | 22 |
| Urinary diversion | 22 | 8 |
| Dual stoma | 12 | 4 |
| Temporary stoma (n = 281) | | |
| No | 253 | 90 |
| Yes | 28 | 10 |
| Obesity post stoma (n = 263) | | |
| No | 167 | 63 |
| Yes | 96 | 37 |
| Sexually active pre stoma (n = 274) | | |
| Not sexually active | 95 | 35 |
| Sexually active | 179 | 65 |
| Sexually active post stoma (n = 269) | | |
| Not sexually active | 198 | 74 |
| Sexually active | 71 | 26 |
| Depressed post stoma (n = 280) | | |
| No | 167 | 60 |
| Yes | 113 | 40 |
| Considered suicide post stoma (n = 280) | | |
| No | 256 | 91 |
| Yes | 24 | 9 |
| Stoma support group member (n = 280) | | |
| No | 238 | 85 |
| Yes | 42 | 15 |
| Other support group member (n = 283) | | |
| No | 269 | 95 |
| Yes | 14 | 5 |
| Talked with other ostomates (n = 282) | | |
| No | 187 | 66 |
| Yes | 95 | 34 |
| Stoma location issue (n = 281) | | |
| No | 182 | 65 |
| Yes | 99 | 35 |
| Dietary change post stoma (n = 284) | | |
| No | 150 | 53 |
| Yes | 134 | 47 |
| Dietary change to avoid gas (n = 281) | | |
| No | 200 | 71 |
| Yes | 81 | 29 |
| Avoid carbonated drinks (n = 280) | | |
| No | 199 | 71 |
| Yes | 81 | 29 |
| Avoid dairy (n = 282) | | |
| No | 257 | 91 |
| Yes | 25 | 9 |

(continues)

TABLE 2. Clinical Characteristics of Regional Victorian Ostomy Association Members, Continued

| Patient factor (n) | Number | Percent |
|--|--------|---------|
| Avoid fruits (n = 281) | | |
| No | 242 | 86 |
| Yes | 39 | 14 |
| Avoid snacks (n = 281) | | |
| No | 241 | 86 |
| Yes | 40 | 14 |
| Avoid vegetables (n = 282) | | |
| No | 258 | 91 |
| Yes | 24 | 9 |
| No clothing changed post stoma (n = 280) | | |
| Change | 158 | 56 |
| No change | 122 | 44 |
| Time to acceptance of daily stoma care (n = 279) | | |
| Months | 196 | 70 |
| Years | 44 | 16 |
| Never | 39 | 14 |
| Time for daily stoma care (n = 258) | | |
| 1–10 minutes | 130 | 50 |
| 11–25 minutes | 62 | 24 |
| 26+ minutes | 66 | 26 |

Note. n = number of respondents with data available; Q1 = lower quartile (25th percentile); Q3 = upper quartile (75th percentile).

proportions of poststoma sexual activity were reported in an Iranian study (Anaraki et al., 2012). Our study did not investigate if these results were related to surgery type, neoadjuvantive treatment/s, or psychological well-being. However, this finding has underscored the need to discuss and assess pre- and postoperative concerns around sexual function (Gemmill et al., 2010).

Forty percent of participants reported depression, compared to 6% among all Australians (ABS, 2008). Nine percent of our participants also indicated that they had considered suicide, a rate three times higher than the national average (ABS, 2008). Although these rates are high compared to the general population, they are consistent with other study populations of people living with a stoma (Anaraki et al., 2012; Dhamnaskar et al., 2019). The similar rates of depression between our non-metropolitan sample and international samples that were not restricted to nonmetropolitan areas are unexpected. Regional, rural, and remote residents generally have higher rates of mental and behavioral problems (AIHW, 2020). Our sample's older age and longer duration since stoma surgery may have contributed to greater acceptance of their stoma and buffered against depression. Nevertheless, our study found poststoma depression to be associated with significantly reduced QoL. This underscores the need to offer additional support to ostomates because depressive symptoms, suicidal ideation, and poor mental health can amplify negative experiences and increase the need for stoma care and reintegration (Krouse et al., 2009; Salomé et al., 2014; N. M. Silva et al., 2017). Our study did not

TABLE 3. Associations Between Patient Factors and QoL Among Regional Victorian Ostomy Association Members

| Patient factor | Number (row percentage) | | | | | UOR (95% CI) | MOR (95% CI) ^b |
|--|-------------------------|------------------------|-------------------------|-------------------------|--------------------------|----------------------|---------------------------|
| | Lowest QoL ^a | Lower QoL ^a | Middle QoL ^a | Higher QoL ^a | Highest QoL ^a | | |
| Gender | | | | | | | |
| Male (<i>n</i> = 170) | 32 (19%) | 37 (22%) | 36 (21%) | 34 (20%) | 31 (18%) | 1 | 1 |
| Female (<i>n</i> = 113) | 25 (22%) | 21 (19%) | 20 (18%) | 22 (19%) | 25 (22%) | 1.05 [0.69, 1.60] | 1.18 [0.73, 1.91] |
| Age (years), median (Q1–Q3) [<i>n</i> = 283] | 70 (62–78) | 73 (67–81) | 75 (68–81) | 74 (68–80) | 72 (65–81) | 1.02 [0.998, 1.04] | 1.03 [1.01, 1.06] |
| Stoma duration (weeks), median (Q1–Q3) [<i>n</i> = 281] | 63 (34–156) | 72 (22–120) | 60 (24–144) | 84 (35–183) | 127 (29–204) | 1.001 [1.001, 1.003] | — |
| Ethnicity other than Australian | | | | | | | |
| Australian (<i>n</i> = 246) | 53 (22%) | 49 (20%) | 48 (20%) | 46 (19%) | 50 (20%) | 1 | — |
| Other than Australian (<i>n</i> = 36) | 5 (14%) | 9 (25%) | 6 (17%) | 9 (25%) | 7 (19%) | 1.19 [0.64, 2.22] | — |
| Marital status after stoma surgery | | | | | | | |
| Married (<i>n</i> = 169) | 26 (15%) | 37 (22%) | 34 (20%) | 35 (21%) | 37 (22%) | 1 | — |
| Unmarried (<i>n</i> = 110) | 31 (28%) | 20 (18%) | 21 (19%) | 20 (18%) | 18 (16%) | 0.64 [0.41, 0.98] | — |
| Working full or part time | | | | | | | |
| No (<i>n</i> = 210) | 44 (21%) | 47 (22%) | 40 (19%) | 42 (20%) | 37 (18%) | 1 | 1 |
| Yes (<i>n</i> = 60) | 11 (18%) | 9 (15%) | 13 (22%) | 9 (15%) | 18 (30%) | 1.00 [0.60, 1.66] | 2.01 [1.08, 3.74] |
| Bowel cancer | | | | | | | |
| No (<i>n</i> = 132) | 33 (25%) | 23 (17%) | 24 (18%) | 25 (19%) | 27 (21%) | 1 | — |
| Yes (<i>n</i> = 147) | 24 (16%) | 33 (22%) | 29 (20%) | 31 (21%) | 30 (20%) | 1.20 [0.79, 1.82] | — |
| Temporary stoma | | | | | | | |
| No (<i>n</i> = 253) | 50 (20%) | 49 (19%) | 50 (20%) | 53 (21%) | 51 (20%) | 1 | — |
| Yes (<i>n</i> = 28) | 8 (29%) | 8 (29%) | 4 (14%) | 3 (11%) | 5 (18%) | 0.58 [0.29, 1.17] | — |
| Obesity post stoma | | | | | | | |
| No (<i>n</i> = 167) | 26 (16%) | 36 (22%) | 31 (19%) | 36 (22%) | 38 (23%) | 1 | — |
| Yes (<i>n</i> = 96) | 28 (29%) | 17 (18%) | 17 (18%) | 18 (19%) | 16 (17%) | 0.61 [0.39, 0.96] | — |
| Sexually active post stoma | | | | | | | |
| Not sexually active (<i>n</i> = 198) | 50 (25%) | 43 (22%) | 34 (17%) | 37 (19%) | 34 (17%) | 1 | 1 |
| Sexually active (<i>n</i> = 71) | 8 (11%) | 11 (15%) | 17 (24%) | 15 (21%) | 20 (28%) | 2.05 [1.26, 3.34] | 1.83 [1.05, 3.18] |
| Depressed post stoma | | | | | | | |
| No (<i>n</i> = 167) | 13 (8%) | 31 (19%) | 36 (22%) | 39 (23%) | 48 (29%) | 1 | 1 |
| Yes (<i>n</i> = 113) | 43 (38%) | 27 (24%) | 19 (17%) | 16 (14%) | 8 (7%) | 0.20 [0.13, 0.32] | 0.24 [0.14, 0.40] |
| Stoma location issue | | | | | | | |
| No (<i>n</i> = 182) | 18 (10%) | 35 (19%) | 36 (20%) | 42 (23%) | 51 (28%) | 1 | 1 |
| Yes (<i>n</i> = 99) | 40 (40%) | 22 (22%) | 19 (19%) | 13 (13%) | 5 (5%) | 0.20 [0.13, 0.32] | 0.38 [0.22, 0.66] |
| No clothing changed post stoma | | | | | | | |
| Change (<i>n</i> = 158) | 46 (29%) | 37 (23%) | 34 (22%) | 23 (15%) | 18 (11%) | 1 | 1 |
| No change (<i>n</i> = 122) | 11 (9%) | 20 (16%) | 21 (17%) | 33 (27%) | 37 (30%) | 3.59 [2.31, 5.58] | 1.89 [1.13, 3.16] |
| Time for daily stoma care ^c | | | | | | | |
| 1–10 minutes (<i>n</i> = 130) | 24 (18%) | 23 (18%) | 22 (17%) | 22 (17%) | 39 (30%) | 1 | — |
| 11–25 minutes (<i>n</i> = 62) | 12 (19%) | 11 (18%) | 12 (19%) | 22 (35%) | 5 (8%) | 0.70 [0.41, 1.20] | — |
| 26+ minutes (<i>n</i> = 66) | 17 (26%) | 20 (30%) | 15 (23%) | 6 (9%) | 8 (12%) | 0.41 [0.24, 0.70] | — |

Note. QoL = quality of life; UOR = univariable odds ratio; MOR = multivariable odds ratio; CI = confidence interval; Q1 = lower quartile (25th percentile); Q3 = upper quartile (75th percentile).

^aThe total QoL score from the City of Hope Quality of Life Questionnaire for a Patient With an Ostomy was divided into quintiles: highest (>8.32), higher (7.30–8.32, inclusive), middle (6.44–7.29, inclusive), lower (5.38–6.43, inclusive), and lowest (<5.38).

^bEffect estimates adjusted for all other variables in the model. The *n* for the multivariable model is 246.

^cCompared with a reference group of “1–10 minutes.”

investigate the association between suicidal ideation and QoL through regression modeling because of the relatively low number of people who experienced this.

We also found that QoL was significantly higher in persons who did not have to change clothing styles post stoma compared to those who did, consistent with a finding by Anaraki

et al. (2012). Poststoma clothing change is a potentially modifiable factor, as it can be dependent on preoperative stoma siting. Preoperative assessment of body habitus and clothing style by a trained stomal therapy consultant or specialist nurse is imperative in optimizing stoma placement (Burke, 2017; Dhannaskar et al., 2019) and reducing the likelihood

of clothing change and complications such as hernia (Anaraki et al., 2012). Issues with stoma location were reported by 35% of our participants and, more specifically, among 40% of those with a QoL score in the lowest quintile. Poor stoma placement can affect sexual intimacy, physical function, weight loss, fatigue, pain, and insomnia (Mahjoubi et al., 2010), further burdening an individual who may face other issues of living with a stoma (Vonk-Klaassen et al., 2016).

The survey response rate in our study was high relative to other studies (Anaraki et al., 2012; Cotrim & Pereira, 2008; J. O. Silva et al., 2019) and may have helped to minimize nonresponse bias. Furthermore, we identified factors independently associated with QoL, an improvement over some past stoma-related QoL studies that only conducted univariable statistical tests (Mahjoubi et al., 2010; J. O. Silva et al., 2019; Yilmaz et al., 2017).

Nevertheless, unmeasured factors, such as peristomal medical complications, hernia development, and remoteness areas, may have confounded associations between covariates and QoL. As the directionality of associations is unknown in a cross-sectional study, respondents' QoL may have influenced exposure variables (e.g., working full or part time) rather than vice versa. Given the lack of previously published population data on the characteristics of Australian stoma patients, we are unable to determine if our sample is representative. Further research is required to confirm our findings and to assess other potential correlates of stoma-related QoL (e.g., residential location) that were not included in our study. For some of the cross-tabulations between QoL quintiles and covariates (e.g., temporary stoma), there were small cell sizes and correspondingly wide 95% CIs.

CONCLUSION

We found that people living with a stoma in nonmetropolitan Australia had moderate-to-high QoL, consistent with past international studies. Better QoL was found among those who worked, had no post stoma clothing change, were sexually active post stoma, and were older. Worse QoL was found in those who had post stoma depression and a stoma location issue. Further research that guides the development of interventions that can support healthcare professionals to address these challenges has the potential to enhance QoL for those living with a stoma in nonmetropolitan areas.

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The authors have no conflicts of interest to report.

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