

BMJ Open Cross-sectional study evaluating the association between integrated care and health-related quality of life (HRQOL) in Dutch primary care

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ABSTRACT

Objectives The aim of this study was to evaluate the association between integrated care and health-related quality of life (HRQOL) in a primary care practice population.

Design A cross-sectional survey study.

Setting Primary care practice population.

Participants A sample (n=5562) of patients in two general practitioner practices in the Netherlands.

Primary outcome measures The Rainbow Model of Integrated Care Measurement Tool patient version and EQ-5D was used to assess integrated service delivery and HRQOL. The association between integrated care and HRQOL groups was analysed using multivariate logistic regression.

Results Overall, 933 respondents with a mean age of 62 participated (20% response rate) in this study. The multivariate analysis revealed that positive organisational coordination experiences were linked to better HRQOL (OR=1.87, 95% CI 1.18 to 2.95), and less anxiety and depression problems (OR=0.36, 95% CI 0.20 to 0.63). Unemployment was associated with a poor HRQOL (OR=0.15, 95% CI 0.08 to 0.28). Ageing was associated with more mobility (OR=1.06, 95% CI 1.04 to 1.09), self-care (OR=1.06, 95% CI 1.02 to 1.11), usual activity (OR=1.03, 95% CI 1.01 to 1.05) and pain problems (OR=1.02, 95% CI 1.01 to 1.04). Being married improved the overall HRQOL (OR=1.60, 95% CI 1.13 to 2.26) and decreased anxiety and depression (OR=0.47, 95% CI 0.31 to 0.72). Finally, females had a poor overall HRQOL (OR=1.67, 95% CI 0.48 to 0.93) and more pain and discomfort problems (OR=1.47, 95% CI 1.11 to 1.95).

Conclusion This study shows for the first time that organisational coordination activities are positively associated with HROQL of adult patients in a primary care context, adding to the evidence of an association between integrated care and HRQOL. Also, unemployment, ageing and being female are accumulating risk factors that should be considered when designing integrated primary care programmes. Further research is needed to explore how various integration types relate to HRQOL for people in local communities.

INTRODUCTION

Primary care is considered the cornerstone for integrating health and social services for

Strengths and limitations of this study

- This is the first study to assess the relationship between integrated care and health-related quality of life (HRQOL) in Dutch primary care.
- The Rainbow Model of Integrated Care Measurement Tool and EQ-5D was sent to 4624 patients; a sample of 20% participated.
- Due to the cross-sectional study design, the causal relationship between integrated care and HRQOL could not be established.

people in local communities.¹ It is also the first level of care where health is promoted and disease prevented. In countries with a strong primary care system, such as the Netherlands, general practitioners (GPs) provide person-centred continuous care to people in local communities. GPs often collaborate with practice nurses, community pharmacists, medical specialists and home care teams to deliver integrated care (ie, in care groups, community health centres, bundled payments, subsidies programmes). Yet, the coordination of care between these providers is considered to be insufficient in the Netherlands, leading to fragmented care delivery.² There is a growing concern about the lack of a coherent long-term policy to enhance the organisation of integrated primary care services that ensure all citizens quality of and access to care.^{3–5}

For this study, we used the Rainbow Model of Integrated Care (RMIC) to analyse the extent of care integration.⁶ The RMIC provides a theoretical framework for describing the four types of integration aimed at coordinating care at the clinical (eg, self-management, case management), professional (eg, multi-disciplinary care, continuity of care), organisational (eg, disease management, managed care programmes) or system (eg, healthcare policies and regulations) levels.⁷ The enablers



describe the functional (eg, IT, financial incentives) and normative (eg, cultural values) integration mechanisms necessary to integrate care at various levels. The RMIC provides a theoretical basis to understand the multilayered relationships of various types of integration and enables empirical approaches to assess integrated care. Furthermore, the RMIC provides theoretically informed hypotheses on how various integration types may or may not lead to improved health outcomes of the 'Triple Aim' of patient care experience, and efficiency and costs.^{6 8} The underlying assumption is that a significant impact on clinical, quality of care and economic outcomes requires various interacting interventions targeted at the clinical, professional, organisational and system levels.⁹ Based on the RMIC, we define integrated care as a coordinated way of working across multiple professionals, organisations and sectors in order to improve the health, quality of care and economic outcomes for a targeted (sub)population.

However, firm conclusions regarding the effects of integrated primary care on Triple Aim outcomes cannot be made, due to the lack of rigorous long-term evaluation programmes.^{9 10} In addition, empirical evidence on whether the impact on these outcomes might differ between these integrated care levels is lacking.^{10 11} Most existing studies focus on integrated primary care interventions at the clinical level, while interventions targeted at meso organisational integration and macro system levels are scarce. As a result, few integrated primary care models are widely implemented (eg, patient-centred medical homes, accountable care organisations, community care groups), and the current net benefit of integrated primary care and how outcomes are achieved remains partly unknown.^{5 12–14}

There is a need to determine if integrated care approaches produce better health status outcomes within primary care contexts. In this context, health-related quality of life (HRQOL) can be considered as an indicator by which patients express their views and perceptions about their health status, which measures the effect integrated primary care has on them. Several reviews have shown positive effects of integrated care on HRQOL of people with chronic diseases like diabetes,^{15 16} heart failure,¹⁷ depression¹⁸ and chronic obstructive pulmonary disease (COPD).^{19 20} Although this knowledge is valuable, a disease-focused approach is considered dysfunctional in primary care, given that GPs' practices consists of a wide range of patients with vastly different sociodemographics and health problems.^{7 21} Specifically, the essence of primary care is to provide person-focused rather than disease-focused care.^{7 21} Yet, published studies describing the content and impact of integrated care models on HRQOL in a general primary care patient population are lacking. Patient-level HRQOL is essential for monitoring integrated primary care and designing improvement programmes. In order to design effective integrated primary care programmes for (sub)populations, information on the relationship between integrated care, HRQOL and sociodemographic characteristics is needed. Factors

like ageing,^{22 23} unemployment,^{24 25} marital status,²⁶ gender^{23 27} and comorbidities^{22 23 26} have been found to affect HRQOL within a primary care context. Thus, these sociodemographic factors should be taken into account when developing integrated care programmes to understand which patients are most likely to respond to different types of integrated care interventions.

In view of the above, this study aimed to assess the relation between integrated care and HRQOL of patients in primary care practices in a community setting. Based on the RMIC we hypothesise that an improved overall integrated care experience is positively associated with a better HRQOL. The following research objectives were posed:

1. To examine the association between integrated care and HRQOL in a primary care practice population.
2. To examine the association between sociodemographic (gender, age, employment and marital status) characteristics and HRQOL in a primary care practice population.

METHODS

The present study used a cross-sectional survey design exploring the relationship between integrated care and HRQOL in 4624 individuals registered in two primary care centres in an urban region in the Netherlands, between June and July 2019.

Participants

Participants in this study were registered in two primary care centres in Brummen (n=1,854) and Eerbeek (n=2,770). Since 2006, approximately 80% of all primary care practices in the Netherlands have delivered integrated care programmes for several chronic conditions (eg, diabetes, cardiovascular risk, COPD, depression, frail elderly, etc).²⁸ Both primary care centres included in this study delivered these integrated care programmes.

Participants were eligible to participate when they were 18 years or older. Participants that were unable or unwilling to provide informed consent were excluded from the study. The sample size method for an unknown population was used to calculate the sample size, which was estimated to be 963 respondents (481 from each primary care centre) according to a standardised medium effect size of 0.3,²⁹ α error probability of 0.05, power (1– β error probability) of 0.95% and 30% response rate³⁰ using the GPower V.3.1.9.2.³¹

Procedure

Participating primary care centres received a written information package consisting of an introduction letter and patient information sheet to inform care providers and patients about the study's purpose and data collection methods. Participants were asked to complete digital informed consent before enrolment in the study. A hyperlink to a web-based survey platform was sent by email, and two reminders were sent to the participants by email. A forced answering procedure (ie, respondents

had to answer each question before they were allowed to proceed to the next question) was used to prevent missing answers.¹¹ Patient-specific codes were assigned to each survey, and the response rate per primary care centre was checked and reported back to each centre once a week during the data collection period.

Measures

Sociodemographic data: Several sociodemographic information was collected through the online survey (gender, age, marital status and work status).

HRQOL: HRQOL was assessed using the EQ-5D-3L, which is a validated instrument consisting of five subscales (mobility, self-care, usual activities, pain discomfort, anxiety depression) with three response levels and a Visual Analogue Scale that evaluates health status between 0 (worst imaginable health) and 100 (best imaginable health). We used the Dutch time trade-off (TTO) value set³² to calculate the TTO score. The EQ-5D-3L Dutch TTO preference value ranged from -0.33 to 1.00.³²

Integrated care: The RMIC-Measurement Tool (RMIC-MT) patient version measures the extent to which patients experience the integration of care.^{11,33} The 16-item survey consists of four subscales representing domains of the RMIC from a patient perspective: person-centredness (two items, eg, needs assessment), clinical coordination (six items, eg, personal care plan), professional coordination (four items, eg, multidisciplinary team) and organisational coordination (four items, eg, interorganisational partnership). Patients rate each item on a 5-point Likert scale indicating how they experience the coordination, ranging from poor (1) to very good (5). Ratings are averaged to yield subscale scores and an overall summary score. The RMIC-MT is a validated questionnaire used in previous primary care studies.^{34–39}

Statistical analysis

Descriptive statistics were used to summarise the patients' characteristics, HRQOL, TTO and RMIC-MT scales. The mean and SD were reported for continuous variables such as age, utility, HRQOL and RMIC-MT scales. Frequencies and percentages were used for categorical variables. Cronbach's alpha was calculated for the RMIC-MT subscales to assess internal consistency. The χ^2 test was used to evaluate proportional difference in categorical variables. The Mann-Whitney non-parametric test was used for between group differences. Both bivariate and multivariate logistic regression analyses were used to assess the association between the four independent continuous subscales of the RMIC-MT and the dependent ordinal HRQOL variables. The dimensions of the EQ-5D-3L were dichotomised by grouping severity levels 2 (some problems) and 3 (extreme problems) as poor HRQOL and assigning severity level 1 (no problem) as good HRQOL.²⁷ In addition, the TTO score was dichotomised as good (ie, $\geq \mu$) and poor (ie, $< \mu$, reference category) HRQOL groups based on the mean TTO score. All variables with $p \leq 0.2$ in the bivariate analysis were included in the multivariate

analysis because of the explorative nature of this study. Significance of the variables was assessed by the p values (< 0.05), ORs and 95% CIs for associations between RMIC-MT subscale scores and HRQOL. The Hosmer-Lemeshow goodness-of-fit statistic with $p > 0.05$ was considered a well-fitting regression model, and the percentage of the variability predicted by the model is explained by the Nagelkerke R^2 .⁴⁰ No adjustments for multiple testing were made given the explorative nature of this study,⁴¹ and to avoid potential interpretation errors (ie, type 2 errors).⁴² Data analyses were performed using SPSS V.23.0 (IBM) and the statistical software package R (<http://www.R-project.org>, The R Foundation).

Participation in this study was on a voluntary basis. Participants signed a written informed consent form that included providing permission to record data for research and publication purposes in an anonymised manner.

Patient and public involvement

Patients and the public were not involved in the design of the study, or in the recruitment of the study. Results were disseminated through a local focus group and the website of participating GP practices.

RESULTS

Study sample

A total of 933 respondents participated (20.2% response rate) in this study. The mean age of the participants was 62.1 (14.4) years, and 54.7% of the sample were female. The majority of the participants were married (70.3 %) and almost half (49 %) were retired. Of the participants, 449 were categorised in the high HRQOL group (58.3 %) and the remaining 321 were in the low HRQOL group (41.7%). There was a statistically significant difference in gender ($p < 0.0001$) marital status ($p = 0.001$) and work status ($p < 0.0001$) between HRQOL groups. Unemployment (20.7 %) was especially high in the low HRQOL group compared with those in the high HRQOL group (4.6 %). Furthermore, respondents in the high HRQOL group experienced a better overall care coordination ($p = 0.011$) and were more satisfied with the professional ($p = 0.039$) and organisational ($p = 0.002$) coordination activities compared with those in the low HRQOL group. The respondents' characteristics in the low and high HRQOL group are listed in [table 1](#).

Health-related quality of life

The proportion of respondents reporting a problem in one of the five dimensions of the EQ-5D is shown in [table 2](#). The majority of health problems (47 %) were experienced within the 'pain/discomfort' dimension, where 44.1% of the respondents had moderate problems and 2.9% severe problems. The second highest problems (22.6 %) were experienced within the 'usual activity' domain, where 21 % indicated a moderate health problem and 1.6% a severe health problem. The least referred dimension (3.6 %) was 'self-care', with 3.5% moderate

**Table 1** Respondents' characteristics in the low and high HRQOL group

Variable	Low HRQOL group *	High HRQOL group †	Total	P value
Sample size, n (%)	321 (41.7)	449 (58.3)	770 (100)	NS
Gender, n (%)‡				
Male	121 (37.7)	228 (50.8)	349 (45.3)	<0.0001
Female	200 (62.3)	221 (49.2)	421 (54.7)	
Age (years), mean (SD)§	62.55 (15.64)	62.83 (13.43)	62.1 (14.4)	0.255
Marital status, n (%)‡				
Married	204 (63.6)	334 (75.2)	538 (70.3)	0.001
Single	117 (36.4)	110 (24.8)	227 (29.7)	
Work status, n (%)‡				
Employed	89 (30.3)	200 (46.4)	289 (39.9)	<0.0001
Unemployed	61 (20.7)	20 (4.6)	81 (11.2)	
Retired	144 (49)	211 (49)	355 (49)	
Integrated care, mean (SD)§				
Integrated care (RMIC-MT total)	3.68 (0.46)	3.77 (0.41)	3.73 (0.44)	0.011
Person-centredness	3.23 (0.79)	3.30 (0.67)	3.27 (0.73)	0.329
Clinical coordination	4.05 (0.62)	4.11 (0.59)	4.09 (0.61)	0.201
Professional coordination	3.29 (0.57)	3.40 (0.49)	3.35 (0.54)	0.039
Organisational coordination	3.83 (0.46)	3.94 (0.44)	3.90 (0.46)	0.002
HRQOL, mean (SD)§				
TTO	0.70 (0.18)	0.99 (0.19)	0.86 (0.19)	<0.0001
EQ-VAS	64.29 (19.89)	85.94 (13.62)	76.91 (19.66)	<0.0001

*TTO score <0.86

†TTO score ≥0.86

‡ χ^2 test.

§Mann-Whitney test.

EQ, EuroQol; HRQOL, Health related Quality of Life; NS, not stated; RMIC-MT, Rainbow Model of Integrated Care Measurement Tool; TTO, time trade-off; VAS, Visual Analogue Scale.

and 0.1% severe health problems being reported. When comparing the low and high HRQOL groups, 85.7% in the low HRQOL group reported moderate to severe health problems in the 'pain/discomfort' dimension, 59.8% in the 'usual activity' dimension and 54.2% in the 'mobility' dimension (see table 2).

Integrated service delivery and HRQOL

Table 3 shows the results of the bivariate and multivariate logistic regression analysis of the integrated care variables with the five HRQOL dimensions and group scores. The bivariate analysis demonstrated that age and unemployment were associated with statistically significant increases in the odds of reporting any problem in the HRQOL dimensions. No relation occurred between age and overall HRQOL group score (OR=1.0, 95% CI 0.99 to 1.01, p=0.49). Married people were more likely to report any problem in the dimensions of anxiety/depression (OR=2.27, 95% CI 1.58 to 3.26, p<0.0001) and usual activity (OR=1.26, 95% CI 0.90 to 1.75, p=0.18) and overall low HRQOL (OR=0.57, 95% CI 0.42 to 0.79, p<0.001).

An improved organisational care coordination experience increased the odds of a better HRQOL (OR=1.72, 95% CI 1.24 to 2.39, p=0.001), and reporting no health problems in the anxiety/depression (OR=0.43, 95% CI 0.29 to 0.64, p<0.0001), pain discomfort (OR=0.71, 95% CI 0.53 to 0.94, p=0.019) and usual activities (OR=0.58, 95% CI 0.41 to 0.82, p=0.002) dimensions. Similar findings were observed for a better professional coordination experience where the odds increased for reporting a higher overall HRQOL (OR=1.48, 95% CI 1.13 to 1.96, p=0.005) and fewer health problems in the anxiety/depression (OR=0.64, 95% CI 0.46 to 0.89, p=0.007) and pain discomfort (OR=0.69, 95% CI 0.54 to 0.89, p=0.003) domain. Finally, people who experienced better clinical care coordination had increased odds of reporting fewer problems in the usual activity dimension (OR=0.76, 95% CI 0.59 to 0.97, p<0.026).

The multivariate logistic regression analysis confirmed that the odds of reporting any HRQOL problem were significantly higher for those unemployed (see figure 1, table 3). People who were married were less likely to report any problem of anxiety/depression (OR=0.47,

Table 2 Distribution of responses among the HRQOL dimensions split for the low and high HRQOL groups

Dimension	Level*	Low HRQOL group †	High HRQOL group ‡	Total	P value
Mobility, n (%)§	1	147 (45.8)	427 (95.1)	735 (78.8)	<0.001
	2	171 (53.3)	22 (4.9)	195 (20.9)	
	3	3 (0.9)	0 (0.0)	3 (0.3)	
Self-care, n (%)§	1	289 (90)	449 (100)	899 (96.4)	<0.001
	2	31 (9.7)	0 (0.0)	33 (3.5)	
	3	1 (0.3)	0 (0.0)	1 (0.1)	
Usual activity, n (%)§	1	129 (40.2)	432 (96.2)	722 (77.4)	<0.001
	2	179 (55.8)	17 (3.8)	196 (21)	
	3	13 (4.0)	0 (0.0)	15 (1.6)	
Pain/discomfort, n (%)§	1	46 (14.3)	449 (100)	495 (53.1)	<0.001
	2	250 (77.9)	0 (0.0)	411 (44.1)	
	3	25 (7.8)	0 (0.0)	27 (2.9)	
Anxiety/depression, n (%)§	1	173 (2.2)	449 (100)	783 (83.9)	<0.001
	2	141 (43.9)	0 (0.0)	141 (15.1)	
	3	7 (2.2)	0 (0.0)	9 (1)	

*Level definitions (one no problem, two some/moderate problem and three extreme problem).

†TTO score <0.86.

‡TTO score ≥0.86.

§ χ^2 test.

HRQOL, health-related quality of life; TTO, time trade-off.

95% CI 0.31 to 0.72, $p < 0.0001$) and had a better overall HRQOL (OR=1.60, 95% CI 1.13 to 2.26, $p = 0.008$). Ageing increased the odds of reporting problems in the mobility (OR=1.06, 95% CI 1.04 to 1.09, $p < 0.0001$), self-care (OR=1.06, 95% CI 1.02 to 1.11, $p = 0.004$), usual activities (OR=1.03, 95% CI 1.01 to 1.05, $p = 0.001$) and pain and discomfort (OR=1.02, 95% CI 1.01 to 1.04, $p = 0.007$) domains. Being female increased the odds of reporting problems in the pain and discomfort domain (OR=1.47, 95% CI 1.11 to 1.95, $p = 0.008$).

A better organisational coordination experience increased the odds of a higher overall HRQOL (OR=1.87, 95% CI 1.18 to 2.95, $p = 0.007$) and reporting fewer health problems in the anxiety/ depression domain (OR=0.36, 95% CI 0.20 to 0.63, $p < 0.0001$). No significant relation with HRQOL was found for person-centredness, clinical coordination or professional coordination. The Hosmer-Lemeshow goodness-of-fit test p values ranged between 0.35 and 0.81, suggestive of well-fitting models. The variability ranged from 6% for the pain/discomfort model (Nagelkerke $R^2 = 0.06$) to 16% for the mobility, self-care and anxiety/ depression models (Nagelkerke $R^2 = 0.16$) (see figure 1, table 3).

DISCUSSION

Principal findings

This study showed that patients who experienced good healthcare organisational coordination were more likely to report a higher overall HRQOL and fewer anxiety and depression problems. No association between

person-centred, clinical and professional coordination experiences and HRQOL in a general primary care practice population was found. Unemployment was associated with poorer overall HRQOL, and ageing was associated with mobility, self-care, usual activity and pain problems. Also, female patients were more likely to report pain and discomfort problems. On the other hand, patients who were married reported less anxiety and depression.

Comparison with other studies

To our knowledge, this is the first study to evaluate the association between integrated care and HRQOL in a general primary care practice population. Previous studies on integrated care and HRQOL have mainly focused on patient groups with specific chronic diseases,⁴³ older populations⁴⁴ or on multimorbidity populations.⁴⁵ Furthermore, existing studies tend to lack a coherent theory and solid psychometric measurement tools to compare integrated care programmes.

The results of the current study show a relationship between organisational coordination activities and HRQOL among adult patients in a general primary care practice context in the Netherlands. In contrast, earlier studies focused mainly on interventions aimed at coordinating care at clinical (eg, self-management) and professional (eg, multidisciplinary care) levels.^{10 11 44} As such, it is possible to infer that patients in a primary care context may have a potential to gain in HRQOL if GPs devise efforts to improve the interorganisational aspects of their integrated care programmes. Previous research has indicated the lack of organisational capacity of Dutch

Table 3 Bivariate and multivariate logistic regression analysis of integrated care and sociodemographic characteristics with HRQOL

Variable	Mobility			Self-care			Usual activities			Pain/discomfort			Anxiety/depression			TTO groups						
	Multivariate analysis			Multivariate analysis			Multivariate analysis			Multivariate analysis			Multivariate analysis			Multivariate analysis						
	OR (95%CI)	P value	OR (95%CI)	P value	OR (95%CI)	P value	OR (95%CI)	P value	OR (95%CI)	P value	OR (95%CI)	P value	OR (95%CI)	P value	OR (95%CI)	P value	OR (95%CI)	P value				
Gender																						
Male	1	NA	1	NA	1	NA	1	NA	1	NA	1	1	1	1	1	1	1	1				
Female	0.997 (0.79 to 1.37)	0.983	NA	NA	1.573 (0.89 to 3.14)	1.198	NA	NA	0.840 (0.52 to 1.15)	0.272	NA	NA	0.679 (0.52 to 0.88)	0.008	0.619 (0.43 to 0.89)	0.010	1.227 (0.83 to 1.87)	0.339	1.705 (1.27 to 2.28)	<0.0001	0.67 (0.48 to 0.93)	
Age (years)	1.056 (1.04 to 1.07)	<0.0001	1.062 (1.04 to 1.09)	0.002	1.047 (1.02 to 1.08)	0.004	1.061 (1.02 to 1.11)	0.004	1.014 (1.00 to 1.03)	0.014	1.034 (1.01 to 1.05)	0.001	1.008 (1.00 to 1.02)	0.007	0.980 (0.97 to 0.99)	0.001	1.002 (0.98 to 1.02)	0.829	0.987 (0.99 to 1.01)	0.493	NA	
Marital status																						
Single	1	NA	1	NA	1	NA	1	NA	1	NA	1	NA	1	NA	1	NA	1	1	1	1	1	1
Married	1.175 (0.837 to 1.65)	0.363	NA	NA	1.198 (0.58 to 2.49)	0.628	NA	NA	1.258 (0.90 to 1.75)	0.176	1.31 (0.90 to 1.90)	0.157	1.195 (0.90 to 1.90)	0.219	2.271 (1.58 to 3.26)	<0.0001	0.472 (0.31 to 0.72)	<0.0001	0.574 (0.42 to 0.79)	0.001	1.598 (1.13 to 2.26)	
Work status																						
Employed	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Unemployed	4.102 (2.30 to 7.33)	<0.0001	4.311 (2.35 to 7.96)	<0.0001	25.314 (5.60 to 116.49)	<0.0001	24.849 (5.33 to 115.87)	<0.0001	7.858 (4.67 to 13.22)	<0.0001	8.426 (4.88 to 14.54)	<0.0001	2.998 (1.84 to 4.88)	<0.0001	5.998 (3.24 to 10.10)	<0.0001	5.625 (3.24 to 9.76)	<0.0001	0.146 (0.08 to 0.26)	<0.0001	0.152 (0.08 to 0.28)	<0.0001
Retired	4.236 (2.80 to 6.41)	<0.0001	1.325 (0.74 to 2.36)	0.346	7.939 (1.53 to 34.45)	0.006	2.44 (0.46 to 12.83)	0.291	2.218 (1.51 to 3.25)	<0.0002	1.13 (0.66 to 1.93)	0.656	1.355 (1.02 to 1.80)	0.036	0.716 (0.51 to 1.44)	0.764	0.905 (0.49 to 1.67)	0.750	0.652 (0.47 to 0.91)	0.010	0.580 (0.42 to 0.89)	
Integrated care																						
Person-centredness	0.939 (0.76 to 1.17)	0.568	NA	NA	1.210 (0.75 to 1.95)	0.431	NA	NA	0.844 (0.58 to 1.04)	0.114	0.979 (0.73 to 1.31)	0.884	0.862 (0.72 to 1.03)	0.100	0.98 (0.78 to 1.24)	0.90	1.236 (0.89 to 1.72)	0.209	1.153 (1.13 to 1.41)	0.16	0.913 (0.70 to 1.20)	
Clinical coordination	0.831 (0.64 to 1.07)	0.154	1.021 (0.72 to 1.45)	0.908	0.749 (0.44 to 1.28)	0.290	NA	NA	0.764 (0.59 to 0.97)	0.026	1.007 (0.71 to 1.43)	0.968	0.845 (0.68 to 1.05)	0.122	1.010 (0.76 to 1.34)	0.94	1.326 (0.88 to 1.97)	0.176	1.188 (0.94 to 1.51)	0.154	0.850 (0.61 to 1.19)	
Professional coordination	1.004 (0.75 to 1.34)	0.976	NA	NA	1.242 (0.66 to 2.34)	0.501	NA	NA	0.772 (0.58 to 1.03)	0.077	0.982 (0.66 to 1.45)	0.927	0.694 (0.54 to 0.89)	0.003	0.82 (0.61 to 1.13)	0.225	0.854 (0.54 to 1.35)	0.498	1.484 (1.13 to 1.96)	0.005	1.173 (0.81 to 1.71)	
Organisational coordination	0.722 (0.51 to 1.02)	0.064	0.777 (0.49 to 1.23)	0.278	0.703 (0.34 to 1.47)	0.35	NA	NA	0.58 (0.41 to 0.82)	0.002	0.643 (0.40 to 1.05)	0.076	0.710 (0.53 to 0.94)	0.019	0.792 (0.54 to 1.17)	0.243	0.356 (0.20 to 0.63)	<0.0001	1.720 (1.24 to 2.39)	0.001	1.869 (1.18 to 2.95)	
Hosmer and Lemeshow R ²	NA	NA	0.49	NA	NA	0.66	0.62	NA	NA	NA	0.62	NA	NA	NA	0.81	NA	0.76	NA	NA	NA	0.35	NA
Cox and Snell's R ²	NA	NA	0.10	NA	NA	0.04	0.09	NA	NA	NA	0.05	NA	NA	NA	0.10	NA	0.10	NA	NA	NA	0.11	NA
Nagelkerke R ²	NA	NA	0.16	NA	NA	0.16	0.14	NA	NA	NA	0.06	NA	NA	NA	0.16	NA	0.16	NA	NA	NA	0.14	NA

HRQOL, health-related quality of life; NA, not available; TTO, time trade-off.

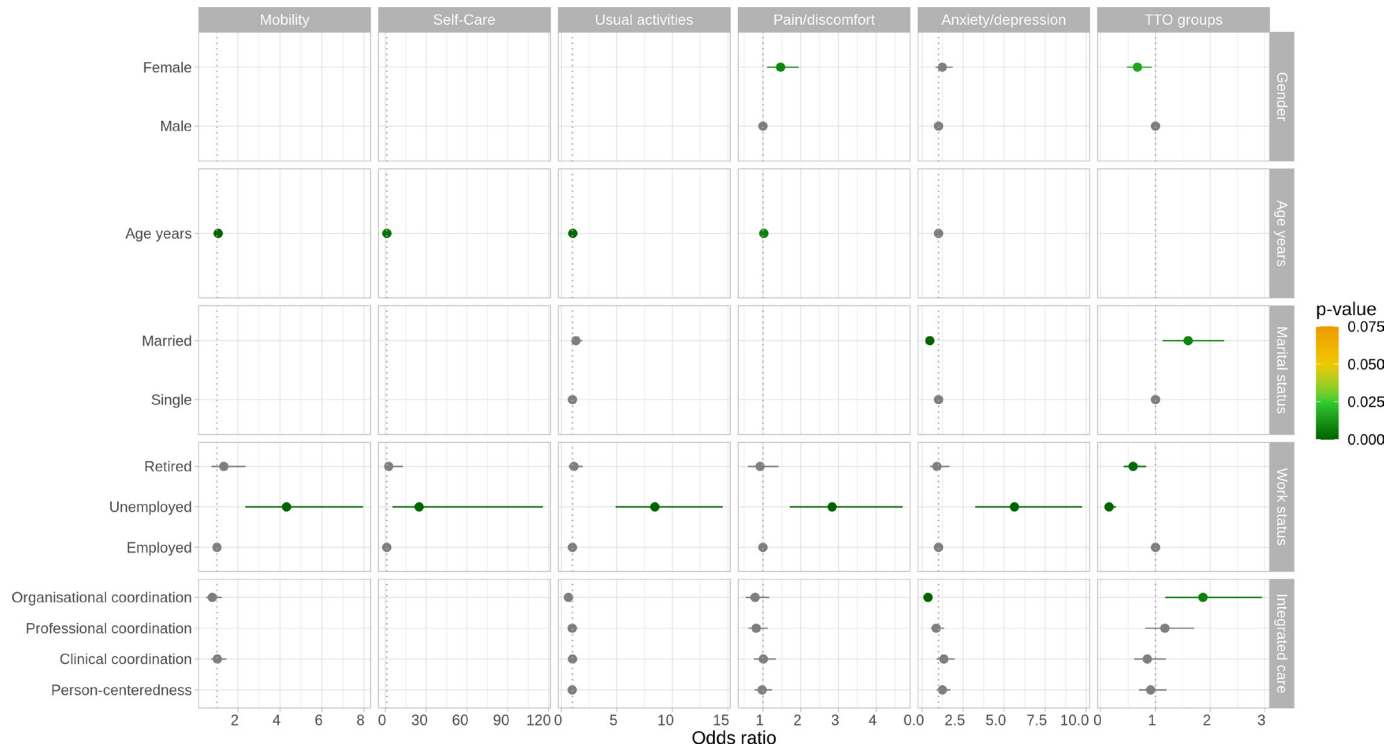


Figure 1 Association of integrated care and sociodemographic characteristics with health-related quality of life.

primary care practices.⁵ No relation between clinical and professional coordination and HRQOL was observed in the present study, which seems to be inconsistent with previous studies.^{15 18 19 45 46} This discrepancy may be due to the fact that clinical and professional coordination have more influence on the perceived HRQOL of people with a chronic disease whereas the entire primary care practice population was included here. Therefore, information linking organisation coordination to improved HRQOL is hypothesis generating and requires confirmation in further studies. Similarly, a person-centred care approach was not associated with HRQOL in this study, while aspects related to knowing and addressing patients' physical, psychological and social needs are considered an essential aspect of primary care service delivery.^{7 21} This could be explained by the complexity of patient needs in previous studies with (multiple) chronic conditions that require more tailored person-centred approaches in clinical encounters as compared with the general population, which was included in this study. Therefore, further work is still required to explore the association between person-centred care experiences and HRQOL in different patient groups.

As could be expected from previous studies,^{24–27} unemployment was associated with a poorer HRQOL. This implicates that integrated care programmes have to take into account that social aspects like loneliness and financial constraints have an impact on the quality of life of people in local communities. Ageing was also associated with less mobility, reduced self-care, usual activities and pain and discomfort problems, which is consistent with previous research.^{22 23} However, no effect of ageing was

observed on overall HRQOL. This inconsistency could be related to the sample composition whereby the entire primary practice population was included while previous studies were limited to chronic disease populations. The present study also corroborates that being female heightened the chance of a lower HRQOL,^{23 27} especially when evaluating pain and discomfort problems. The current results showed that married participants had a higher overall HRQOL and reported fewer anxiety and depression problems compared with singles, which is in accordance with a previous primary care study.²⁶ As such, GPs participating in integrated care programmes should be aware of a possible accumulation of these risk factors, notably for women living alone and who are unemployed. To further understand the relationship between integrated care and HRQOL and these sociodemographic determinants, more research is needed.

Strengths and limitations of this study

The strength of the present study is that it was grounded theoretically on the RMIC. The explored association between integrated care and HRQOL was based on preliminary evidence also grounded on the RMIC.^{5 7 11 34–39} Since thorough research into the effects of integrated care at organisational levels is scarce,¹¹ this study provides a unique and valuable contribution to the existing knowledge of integrated primary care. Potentially boosting the external validity of our findings was the use of a cross-sectional design in a general primary care practice population. With regard to the used measures, first HRQOL was measured using the EQ-5D, which is a generic measure applicable in a general practice population. The



EQ-5D has a good construct validity and is simpler to use and briefer than other HRQOL measures.⁴⁷ Second, the RMIC-MT patient version is considered a brief, reliable and validated measurement tool to measure integrated care in routine practice.¹¹ The RMIC-MT patient version is also considered to be the most comprehensive patient experience measure that assesses all essential aspects of integrated care.³⁹

However, this study also has several limitations. First, due to the cross-sectional nature of our study, the direction of the association between integrated care and HRQOL cannot be established. It is unclear if differences in integrated care scores reflect actual differences in care delivery or differences in the perception of care.¹⁰ Moreover, the relatively small effect sizes found in this study also suggest that the larger study samples are needed to further explore the association between integrated care and HRQOL. A follow-up study with a more controlled design (eg, realist RCT's) with a larger sample will be beneficial to further explore and deepen our understanding of the associations between integrated care and HRQOL. In future studies, it would also be recommendable to independently assess the degree of integrated care from various stakeholder perspectives (eg, patient, care provider, manager, policy-maker). In addition to increasing external validity, the risk of confounders can be reduced by assessing multiple perspectives. A second limitation is caused by the unavailability of routine health data. As such, it was not possible to account for other factors (eg, number of chronic diseases) that might be associated with perceptions of care delivery and quality of life. Our study was conducted among the general primary care practice population, so the logical next step would be to replicate these analyses by exploring in depth the sociodemographic, care integration and health data of people with a low HRQOL. Accordingly, future studies should consider other outcome measures (eg, service use, satisfaction, quality of care) as well as potential effect modifiers of integrated care to explore the peculiarities of their relationship with HRQOL. A third limitation of this study is the use of the EQ-5D-3L. Recent studies have indicated that the EQ-5D-5L leads to more accurate measurement properties due to fewer ceiling effects, especially in relation to mild health problems.⁴⁸ In addition, we dichotomised the TTO score to explore differences in integrated care experiences between people with a good and poor HRQOL. This might have led to an underestimation or overestimation, thus the current results should be considered as hypothesis generating for further longitudinal studies (eg, realist RCTs) exploring the relationship between integrated care and HRQOL. Fourth, our findings are limited by selection bias inherent to the convenient sample of patients that participated in this study. The participating primary care practices are restricted to a narrow geographical region in the Netherlands. Moreover, the response rate of the present study is relatively low compared with other patient survey studies in the Netherlands,³⁰ which might have resulted in an

underestimation or overestimation of our results. Nevertheless, the results generated from this relatively small sample will be useful to validate studies with a larger sample.

Implications for practice

The association between organisational integration and perceived quality of life found in this study could be considered a first step forward to improving the inter-organisational capacity of primary care practices. These findings reinforce the necessity of long-term policies and incentives to enhance integrated primary care teams to meet the care needs of people in local communities in the Netherlands. Further studies with a longitudinal design are needed to evaluate the effect of integrated care activities within primary care services on HRQOL measures. Moreover, future studies on the effectiveness of integrated care interventions must consider local contextual characteristics of the studied population by uniting realist with reductionist evaluation designs (eg, realist RCTs).¹⁰ Often the context in which integrated care interventions are implemented is overlooked. These studies are crucial as it will allow policy-makers to tailor the choice of interventions to the desired outcome, available resources and local healthcare context.

CONCLUSION

This is the first study to explore the association between integrated care and HRQOL from the perspective of patients from a primary care practice population. The present study showed that patients with a better organisational care coordination experience were more likely to have a higher HRQOL. Unemployment and ageing were associated with lower HRQOL, and people who were married reported less anxiety and depression. Our findings underscore the importance of enhancing the inter-organisational capacity of primary care practice when planning interventions to improve the HRQOL of people in local communities.

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Data availability statement All data relevant to the study are included in the article or uploaded as online supplemental information. No additional data are available.

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