






# Characteristics of dyadic care types among patients living with multiple chronic conditions and their informal caregivers

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## Abstract

**Aims:** To examine the distribution of dyadic care types in multiple chronic conditions, compare self-care and caregiver contributions to patients' self-care in each care type and identify the patient and caregiver characteristics associated with each care type.

**Design:** Secondary analysis of a multicentre, cross-sectional study.

**Methods:** Patient-caregiver dyads were enrolled from outpatient clinics and community settings. The Dyadic Symptom Management Type Scale was used to categorize dyads by type. Self-care, self-efficacy, comorbidities and cognitive impairment were measured in patients, whereas caregiver contributions to patient self-care, self-efficacy, caregiver burden and hours of caregiving were measured in caregivers. Sociodemographic characteristics perceived social support and mutuality were measured in both patients and caregivers. Univariate and multivariate analyses were performed.

**Results:** A sample of 541 patient-caregiver dyads was examined. The most frequent dyadic care type was the collaborative-oriented (63%). In the patient-oriented type, patients scored higher on self-care compared with caregivers; in the caregiver-oriented and collaborative types, caregivers scored higher than patients supporting the typology. The patient-oriented type was associated with younger, healthier male patients with better cognitive status, who scored higher for mutuality and whose caregivers scored lower for burden. The caregiver-oriented type was associated with older, less educated patients, with caregivers experiencing higher burden and unemployment. The collaborative type was associated with sicker patients, with the caregiver more probably to be female and employed, with higher perceived social support, mutuality and burden. The incongruent dyadic care type was associated with lower caregiver mutuality.

**Impact:** In the context of multiple chronic conditions, clinicians should consider targeting any educational interventions aimed at improving patient self-care and caregiver contributions to self-care by dyadic care types.

## KEYWORDS

caregiver, chronic conditions, dyadic care types, dyads, nursing, patient, self-care

## 1 | INTRODUCTION

Multiple chronic conditions (MCCs), defined as the coexistence of two or more chronic illnesses, are increasing worldwide (Dattalo et al., 2017), especially in people over 65 years of age (Marengoni et al., 2011). In the US, one in four people have at least two chronic conditions (Lochner et al., 2013), and in Europe, the prevalence of MCCs among older people is about 37% (Palladino et al., 2016). People with MCCs present with poorer health outcomes, worse disease management and higher healthcare service utilization compared with patients affected by a single chronic disease (Palladino et al., 2016). Self-care, defined as the process of maintaining health through health-promoting practices and illness management (Riegel et al., 2012), is of critical importance for improving health, managing diseases and reducing health care service utilization in patients with chronic illness (Allegrante et al., 2019). However, self-care can be particularly challenging in patients with MCCs, especially when they are older, chronic disease symptoms overlap, treatments are complex and patients tend to focus on the management of one disease to the detriment of the others (Boyd et al., 2014; De Maria, Vellone, et al., 2019). In these situations, informal caregivers—those people inside or outside the family who provide care to patients without financial compensation—can contribute enormously to patient self-care by supporting patients in daily self-care behaviours and in decision-making (Buck et al., 2015; Vellone, 2017). For this reason, examining patients and caregivers' interactions in managing the chronic conditions are critical.

## 2 | BACKGROUND

Previous studies have shown that caregivers' contributions to patient self-care improve medication adherence in patients with diabetes mellitus (DM; Bouldin et al., 2017), reduce hospital readmissions and length of hospital stay, depressive symptoms and improve health-related quality of life in patients with chronic obstructive pulmonary disease (COPD; Bryant et al., 2016). Considering the results of these studies and others, self-care can be considered as a dyadic phenomenon in which patients and caregivers interact in managing the chronic condition, influencing patient outcomes (Berg & Upchurch, 2007). This chronic condition process has been modelled in the Theory of Dyadic Illness Management (Lyons & Lee, 2018), which posits that agreement between patient and caregiver in managing chronic illnesses improves outcomes for both individuals. How patient self-care is managed in the patient and caregiver dyad and interdependence in self-care have been studied previously (Bidwell et al., 2015; Iovino et al., 2020), and several typologies of patient and caregiver dyads have been described, especially in heart failure (HF; Riegel et al., 2007). Buck et al. (2019) proposed a classification system that integrated the Interdependence Theory, that postulates that when two individuals interact they influence each other (Rusbult & Van Lange, 2003),

I. Patient takes the lead on self-care  A > P	II. Caregiver takes the lead on self-care  A < P
III. Patient and caregiver collaborate on self-care  A = P	IV. Patient and caregiver disagree on how to handle self-care  A ≠ P

**FIGURE 1** Conceptualization of the dyadic care types. Note. I: patient-oriented care dyadic types; II: caregiver-oriented care dyadic types; III: collaborative oriented care dyadic types; IV: incongruent dyadic care type. A: actor/patient; P: partner/caregiver

and the actor-partner interdependence model (APIM), that distinguishes two different effects in the interaction between two individuals: an actor effect (A) occurring when an independent variable of an individual influences his/her own dependent variable (i.e. his/her anxiety influences his/her own quality of life); and a partner effect (P) when an independent variable of an individual influences a dependent variable of the other individual (i.e. the anxiety of an individual influences the quality of life of the other individual; Cook & Kenny, 2005). This classification system posits that actor (in our case the patient) can interact with the partner (informal caregiver) in one of four potential ways: patient-oriented ( $A > P$ ), caregiver-oriented ( $A < P$ ), collaborative-oriented ( $A = P$ ) and incongruent ( $A \neq P$ ) dyadic care types (Figure 1). In the patient-oriented dyadic care type I, patients engage in their own self-care without any support from their caregivers; in the caregiver-oriented type II, caregivers manage patients' care, with the patient assuming a less active role; in the collaborative-oriented type III, both members of the dyad are engaged in patient self-care, sharing the decisions and actions related to self-care or negotiating different spheres of responsibilities about patient self-care; finally, in the incongruent type IV, patients and caregivers disagree on who is responsible for patient self-care (Buck et al., 2019). Research shows that incongruent types perform lower on self-care behaviours compared with the other types in which there is agreement about the primary responsibility for patient self-care (Bugajski et al., 2021). Despite this earlier work in HF and COPD (Ivziku et al., 2018), dyadic typologies have never been studied in MCCs. Moreover, little is known about the level of self-care and caregiver contributions to patient self-care that characterise each dyadic care type in MCC dyads; finally, no study has described the sociodemographic, clinical and psychosocial characteristics of patients and caregivers in each dyadic care type. Knowing the type of dyadic care arrangement in MCC dyads, the level of self-care performed, and the specific patient and caregiver characteristics of each dyadic care type will be useful for tailoring interventions aimed at improving patient self-care and caregiver contributions to self-care.

### 3 | THE STUDY

#### 3.1 | Aims

The aims of the study were to: (1) examine the distribution of the four dyadic care types in MCCs, (2) compare patients' self-care and caregiver contributions to patients' self-care in each dyadic care type, and (3) identify patient and caregiver characteristics associated with each dyadic care type.

#### 3.2 | Design

We performed a secondary analysis of baseline, cross-sectional data from an ongoing study called self-care of patient and caregiver dyads in multiple chronic conditions: A longitudinal study (SODALITY), whose aim is to describe patient self-care and caregiver contributions to patient self-care in MCCs (De Maria, Vellone, et al., 2019).

#### 3.3 | Participants

A convenience sample of patient and caregiver dyads was recruited into the parent study across a variety of outpatients clinics and community settings in Southern and Central Italy. Patients and respective caregivers who presented at the clinical settings on the days established for data collection and met eligibility criteria were recruited. Patients were eligible if they were 65 years of age and older, and diagnosed with at least two chronic diseases. Patients were excluded if they reported diagnoses of dementia and/or cancer at any stage. Cancer patients were excluded from the parent study given the effect of cancer-specific medical (chemotherapy and radiotherapy) and surgical treatments on health-related quality of life, the primary outcome of the SODALITY study. Caregivers were eligible if they were 18 years of age and older, and identified by the patient as the principal, unpaid and informal caregiver. If one member of the patient-caregiver dyad was not eligible or did not give written consent to participate in the study, the dyad was excluded. All dyads enrolled in the parent study at the time of the analysis were used.

#### 3.4 | Data collection

After an assessment of eligibility criteria, nurse research assistants approached the participants, explained the purposes of the study and invited them to consent to participate. The instruments were administered to the dyads via face-to-face interviews or were completed by the dyad members when they were able to do so. Patients and caregivers independently completed the battery of instruments given to them. The data were collected from April 2017 to January 2020.

### 3.5 | Instruments

#### 3.5.1 | Dyadic care type measurement

To identify the dyadic care types, we used the one-item dyadic symptom management type (DSMT) scale (Buck et al., 2013). Patients and caregivers were independently asked to indicate who provides most of the daily self-care from four mutually exclusive options: the respondent, the other member of the dyad, both members of the dyad in collaboration or both members of the dyad complementing each other. Dyads were categorized by comparing the responses of both members of the dyad. If both identified and agreed that they were a patient-oriented (patient responsible for self-care), a caregiver-oriented (caregiver responsible) or a collaborative (both responsible) type, then they were categorized into that type, and considered congruent. If patient and caregiver disagreed in their responses, the dyad was classified as incongruent (Buck et al., 2019). The scale also asked the dyad to report how satisfied they were with the self-care arrangement by completing a five-point Likert scale ranging from (1) extremely unsatisfied to (5) extremely satisfied.

#### 3.5.2 | Self-care measurements in patients and caregivers

To measure self-care, we used the following instruments: the 19-item Self-Care of Chronic Illness Inventory (SC-CII; Riegel et al., 2018), which measures, via three separate scales, patient self-care maintenance (i.e. behaviours performed to maintain the stability of chronic conditions), self-care monitoring (i.e. monitoring signs and symptoms) and self-care management (i.e. behaviours aimed at responding to signs and symptoms); the Caregiver Contribution to Self-Care of Chronic Illness Index (CC-SC-CII, Vellone et al., 2020), which is the caregiver version of the SC-CII and measures, via similar scales and items, the extent to which caregivers recommend to or support the patients with self-care maintenance, monitoring and management behaviours; the Self-Care-Self-Efficacy Scale (SCSES; Yu et al., 2020) and the Caregiver Self-Efficacy in Contributing to Self-Care Scale (CSE-CSC; De Maria et al., 2020), which were used to measure patient self-efficacy and caregiver self-efficacy in contributing to patient self-care, respectively. All four self-care instruments use a five-point Likert scale for responses and result in a standardized score from 0 to 100, with a higher score indicating better self-care and contributions to patient self-care for the first two instruments, and better patient and caregiver self-care self-efficacy for the second two.

#### 3.5.3 | Patient and caregiver variables measurements

The following instruments were used to measure the patient and caregiver variables associated with dyadic care types.

The Charlson Comorbidity Index (CCI; Charlson et al., 1987) was used to measure comorbidity. To calculate CCI scores, the presence of 19 common diseases (e.g. diabetes and kidney failure) is weighted and then summed; higher CCI scores indicate higher comorbidity.

The Montreal Cognitive Assessment (MoCA; Nasreddine et al., 2005) is a 16-item instrument that assesses cognitive function. Its score ranges from 0 to 30, with scores  $\leq 17$  considered diagnostic of cognitive impairment (Conti et al., 2015).

The 12-item Multidimensional Scale of Perceived Social Support (MSPSS; Zimet et al., 1988) measures perceived social support from friends, family and significant others with a score computed as the mean of items, ranging from 1 to 7; higher scores mean better social support.

The 15-item Mutuality Scale (MS; Archbold et al., 1990) was originally developed to measure caregivers' perceptions of the quality of the relationship with care receivers across four dimensions: love and affection (three items), shared pleasurable activities (four items), shared values (two items) and reciprocity (six items); since then it has been used to measure the quality of the relationship between patients with chronic diseases with their caregivers (Karlstedt et al., 2017). The scores for each dimension and for the total scale, calculated as the means of the items, range from 0 (not at all) to 4 (a great deal); higher scores indicate greater mutuality.

The 24-item Caregiver Burden Inventory (CBI; Novak & Guest, 1989) measures caregiver burden across five dimensions: time-dependence (stress caused by the restriction of personal time), developmental (sense of failure towards personal hopes and goals), physical (somatic consequences of caregiving), social (impact on interpersonal and social relationships) and emotional (shame and embarrassment caused by the patient) burden; the score of each dimension ranges from 0 to 20, and the total scale score ranges from 0 to 100, with higher scores indicating worse burden (Novak & Guest, 1989).

In addition, we collected sociodemographic variables for patients and caregivers (e.g. age, sex, level of education and income) and patients' clinical variables, including type of disease and number of hospitalizations during the previous year, via a self-report questionnaire.

### 3.6 | Ethical considerations

The SODALITY study received the approval of the ethical committee of a regional healthcare system (ComEt ASReM #128-07/25/17). Participation in the study was voluntary, and participants provided written informed consent. Dyads can withdraw from the study at any time without giving a reason. All data were treated with strict confidentiality. The participants were identified by numeric codes to guarantee privacy, and the data were stored securely, with access limited to only the researchers.

### 3.7 | Data analysis

First, descriptive statistics were employed to illustrate the sociodemographic and clinical characteristics of the dyads and to describe the distribution of the four dyadic care types in MCC dyads.

Second, we used a paired *t*-test to compare the scores of the three scales of patient self-care and caregiver contributions to patient self-care, as well as patient self-efficacy and contributions to patient self-care self-efficacy, in each dyadic care type (e.g. comparison between patient self-care maintenance and caregiver contributions to patient self-care maintenance in patient-oriented dyads).

Third, comparative analyses (ANOVA with Bonferroni-adjusted post hoc tests or nonparametric Kruskal-Wallis with Dunn's post hoc test, and Chi-square test) and a series of binary logistic regressions were performed to identify patient and caregiver characteristics associated with each dyadic care type. In the binary logistic regressions, we considered the dyadic care type (e.g. patient-oriented dyad) as the dependent variable and the characteristics that were significantly associated with dyadic care types in comparative analyses test as independent variables. At the binary logistic regression, odds ratio (OR) and 95% confidence intervals (CI) were computed.

The sample size used for this secondary analysis included all data collected on dyads for the parent study at the time of the analysis ( $n = 541$ ). A post hoc estimation conducted with G-Power (v. 3.1.9.4) indicated that the sample size was sufficient to provide 100% statistical power to detect a small effect size, with an alpha error of 0.05 (two-tailed) and 29 independent variables.

We used SPSS 26.0 software (IBM Corp) to analyse the data. A *p*-value  $< 0.05$  was set as statistically significant.

### 3.8 | Validity, reliability and rigour

All the instruments used in the study were validated in Italian samples of chronically ill patients and caregivers. The DSMT scale was translated into Italian following the forward-backward translation method (Wild et al., 2005) and adapted for use in MCCs, replacing references to HF with the term 'chronic conditions', after asking permission from the authors. In the current study, convergent validity was assessed and supported by testing the hypothesis of the presence of a positive correlation between the collaborative-oriented dyad type and mutuality. Similarly, divergent validity was assessed and supported by testing the hypothesis of a negative relationship between the incongruent type and mutuality. Finally, the stability of the instrument was evaluated through test-retest reliability by re-administering the instrument 10 days after the first administration on a subsample of 63 dyads. The agreement between the first and the second administrations resulted in an intraclass coefficient of 0.91.

The SC-CII, SCSES and CSE-CSC were translated into Italian following the forward-backward translation method and validated in an Italian sample showing to be valid and reliable instruments (De Maria et al., 2020; De Maria, Matarese, et al., 2019; Yu et al., 2020). The

CC-SC-CII was developed by Italian researchers and showed good psychometric properties (Vellone et al., 2020).

The CCI validity in the Italian chronically ill sample is supported by previous studies (Di Bari et al., 2006). The MoCA Italian version was used (Pirani et al., 2006), validated on Italian population (Conti et al., 2015). The MSPSS has been validated on Italian chronically ill patients and their caregivers (De Maria et al., 2018) as well as the MS (Dellafiore et al., 2018), showing good psychometric properties. The CBI has been validated on Italian caregivers of patients with chronic conditions (Greco et al., 2017).

## 4 | RESULTS

### 4.1 | Sample characteristics

The data from a total of 541 dyads enrolled in the parent study were used. Caregivers were more probably to be female (71.3%), with a mean age of 52.71 years (*SD* 15.06) and a high level of education (62.5%); they were mainly adult children of the patients (56%) and living with them (51.8%). Patients were generally female (55.8%), with a mean age of 76.54 years (*SD* 7.23) and a low level of education (82.4%; Table 1). They reported primarily hypertension (79.7%), DM (72.1%), HF (34.6%), chronic kidney failure (15.5%) and COPD (15.0%; Table 2). The most frequent associations between chronic conditions were DM and hypertension (59.0%), HF and hypertension (25.5%) and DM and HF (13.7%).

### 4.2 | Dyadic care types in MCC dyads

On the DSMT scale, the most frequent dyadic care type was the collaborative-oriented (63.03%), with patient-oriented (14.23%), caregiver-oriented (11.65%) and incongruent (11.09%) types accounting for the remaining 36.97%. For the most part, dyads were congruent in identifying their illness management arrangements (89.91%; Table 3).

### 4.3 | Patient self-care and caregiver contribution to patient self-care in each dyadic care type

Within and between type differences between patient self-care and caregiver contributions to patient self-care, scale scores were found (Table 3). In the patient-oriented type, patients presented significantly higher scores in all self-care scales: maintenance ( $p < 0.001$ ), monitoring ( $p < 0.001$ ), management ( $p = 0.040$ ) and self-efficacy compared with caregivers' contributions to patients' self-care. In caregiver-oriented and collaborative types, caregivers presented higher scores in contribution to patients' self-care maintenance, monitoring, management and self-efficacy compared with patient self-care scales. In incongruent dyads, patients and caregivers reported similar levels of self-care and contributions to patient

**TABLE 1** Sociodemographic characteristics of MCC patient-caregiver dyads ( $N = 541$ )

	Patient	Caregiver
Age (mean, <i>SD</i> )	76.54 (7.23)	52.71 (15.06)
	<i>n</i> (%)	<i>n</i> (%)
Sex		
Male	239 (44.2)	155 (28.7)
Female	302 (55.8)	386 (71.3)
Marital status		
Single	10 (1.8)	117 (21.6)
Married/partnered	345 (63.8)	385 (71.2)
Divorced	14 (2.6)	27 (5.0)
Widowed	172 (31.8)	12 (2.2)
Level of education		
0–8 years	446 (82.4)	203 (37.5)
≥9 years	95 (17.6)	338 (62.5)
Employment status		
Employed	28 (5.0)	312 (55.7)
Unemployed/retired	532 (95.0)	248 (44.3)
Perceived income adequacy		
Less/Enough for living	459 (84.8)	440 (81.3)
More than needed	82 (15.2)	101 (18.7)
Relationship with patient		
Spouse/Partner	—	144 (26.6)
Non-spouse		
Children	—	303 (56.0)
Other family members	—	94 (17.4)
Living condition		
Living alone	91 (16.8)	—
Living with others	450 (83.2)	—
Living with patient		
Yes	—	280 (51.8)
No	—	261 (48.2)

Abbreviation: *SD*, standard deviation.

self-care with the exception of caregiver contributions to patient self-care management, which was significantly higher than patients' self-care management ( $p = 0.019$ ).

### 4.4 | Patient and caregiver characteristics associated with dyadic care types

We found several characteristics that significantly differed between the four dyadic care types described in Table 4. In the patient-oriented type, patients were the youngest and had the highest cognitive status, fewest number of comorbidities and lower reciprocity (subscale of mutuality) scores compared with the other types. They also presented with fewer hospital admissions compared with the

TABLE 2 Clinical and caregiving characteristics of MCC patient-caregiver dyads (N = 541)

	Patient	Caregiver
	Mean (SD)	Mean (SD)
CCI	2.07 (1.26)	—
Patient chronic conditions		
Hypertension	431 (79.7)	—
Diabetes	390 (72.1)	—
Heart failure	187 (34.6)	—
Chronic kidney failure	84 (15.5)	—
COPD	81 (15.0)	—
MoCA	22.89 (4.38)	—
Years of caregiving	—	9.14 (6.99)
Hours of caregiving per week	—	23.28 (30.46)
Number of admissions in the last year	0.32 (0.77)	—
MSPSS	4.65 (1.19)	4.96 (1.17)
MS		
Love	3.64 (0.50)	3.61 (0.56)
Shared pleasurable activities	3.16 (0.71)	3.07 (0.78)
Shared values	3.06 (0.75)	3.01 (0.78)
Reciprocity	3.20 (0.71)	2.97 (0.81)
CBI		
Time-dependence	—	4.45 (4.94)
Developmental burden	—	1.53 (3.23)
Physical burden	—	2.31 (3.86)
Social burden	—	1.30 (2.60)
Emotional burden	—	0.68 (1.85)
DSMT satisfaction with care arrangement	4.31 (0.71)	4.17 (0.73)

Abbreviations: CBI, Caregiver Burden Inventory; CCI, Charlson Comorbidity Index; COPD, chronic obstructive pulmonary disease; DSMT, Dyadic Symptom Management Type; MoCA, Montreal Cognitive Assessment Scale; MS, Mutuality Scale; MSPSS, Multidimensional Scale of Perceived Social Support; SD, standard deviation.

caregiver-oriented type, lower shared pleasurable activities and values scores compared with the caregiver-oriented and collaborative types and lower satisfaction with the care arrangement compared with the collaborative type. Caregivers in this type were mainly male, reporting the lowest scores in time and development burden compared with the other types; moreover, they were mainly employed when compared with the caregiver-oriented type, provided fewer caregiving hours compared with the caregiver-oriented and collaborative types and showed less development and physical burden compared with the caregiver-oriented and incongruent types. All this suggests that these patients were healthier and better able to manage their self-care alone, and caregivers devoted less time and efforts in caring for the patients.

In the caregiver-oriented type, patients were the oldest and least educated and had the worst cognitive status compared with the other types; they also scored higher on reciprocity compared with patient-oriented and incongruent types, had a higher number of hospital admissions compared with patient-oriented and collaborative types and had a greater number of comorbidities compared with the patient-oriented type. Caregivers in this type were mainly female compared with the patient-oriented type and unemployed compared with patient-oriented and incongruent types; moreover, they presented the greatest number of caregiving hours as well as the greatest amount of time, developmental and physical burden compared with the other dyadic types. All this suggests that these patients were sicker and in greater need of self-care support and received it from their caregivers, at some cost to the caregiver.

In the collaborative-oriented dyadic type, the patients were older, unemployed and less educated and had more comorbidities and hospital admissions, lower cognitive status, greater mutuality and satisfaction for the care arrangement compared with the patient-oriented type. However, the patients were younger and had fewer hospital admissions and better cognitive status than the caregiver-oriented type. Caregivers in this type were mainly female, providing a greater number of caregiving hours with a higher time-dependence burden compared with the patient-oriented type. Collaborative-oriented type entailed fewer caregiving hours and less time, development and physical burden compared with the caregiver-oriented type. This suggests that these patients depend more on their caregivers' contributions than in the patient-oriented types but less than in the caregiver-oriented types.

In the incongruent dyadic care type, patients were older, largely unemployed, had lower levels of education and cognitive status, a greater number of comorbidities, greater reciprocity (i.e. mutuality) and lower self-efficacy compared with the patient-oriented type, while patients were younger and had better cognitive status and lower reciprocity than those in the caregiver-oriented type. Caregivers showed lower scores in total mutuality and perceived social support, less satisfaction with care arrangements and higher time-dependence and physical burden compared with the collaborative type. This suggests that like with the collaborative type, patients are potentially more dependent on caregivers, but relational issues (low reciprocity, mutuality, perceived social support or satisfaction) impact the dyads' engagement in self-care as shown by their scoring at or above 70 (i.e. adequate) on only three out of eight self-care scales.

The characteristics that significantly differed between the four dyad types were considered in the logistic regression analysis, and the results are shown in Table 5. The patient-oriented type was significantly associated with younger patients with better cognitive status, with fewer comorbidities and lower reciprocity in the mutuality scale, as well as with caregivers who were mainly males and with less burden derived from time spent in caregiving. This model explains 41.7% of the variance. The caregiver-oriented type was associated with patients who were less educated and older and with caregivers with higher time-dependence but lower developmental burden and



TABLE 3 Comparisons of patients' self-care and caregivers' contributions to self-care in each of the care dyad types (N = 541)

SC-CII/ CC-SC-CII	Patient-oriented type (n = 77, 14.23%)			Caregiver-oriented type (n = 63, 11.64%)			Collaborative-oriented type (n = 341, 63.03%)			Incongruent type (n = 60, 11.09%)		
	Patient		p	Caregiver		p	Patient		p	Caregiver		p
	Mean (SD)	Mean (SD)		Mean (SD)	Mean (SD)		Mean (SD)	Mean (SD)				
Self-care maintenance	67.29 (14.72)	47.63 (25.33)	<0.001	61.84 (15.19)	72.21 (15.37)	<0.001	67.40 (14.43)	70.38 (20.38)	<0.001	64.05 (12.30)	62.14 (22.10)	0.598
Self-care monitoring	74.74 (20.72)	53.57 (24.2)	<0.001	66.27 (24.08)	86.51 (15.57)	<0.001	75.78 (18.66)	79.02 (19.75)	<0.001	72.33 (19.34)	74.83 (24.18)	0.355
Self-care management	63.92 (16.01)	58.16 (18.36)	0.040	53.77 (19.46)	73.10 (17.11)	<0.001	65.46 (16.18)	70.82 (17.39)	<0.001	60.29 (17.54)	70.72 (17.00)	0.019
Self-care self-efficacy	75.68 (17.77)	56.49 (20.38)	<0.001	57.34 (23.02)	79.25 (19.94)	<0.001	70.31 (17.38)	73.45 (18.67)	<0.001	63.83 (17.87)	69.54 (17.91)	0.714

Note: Significant p-values are in bold. Paired t-test was used to test differences between patients' self-care and caregivers' contributions to self-care in each of the care dyad types. Abbreviations: CC-SC-CII, Caregiver Contributions to Self-care of Chronic Illness Inventory; SC-CII, Self-care of Chronic Illness Inventory; SD, standard deviation.

who were mainly unemployed or retired. This model explains 43.1% of the variance. The collaborative type was characterized by patients with a high number of comorbidities and caregivers who reported higher reciprocity with patients, were mainly females and experienced lower time-dependence burden. This model explains 7.0% of the variance. Finally, the incongruent type was only associated with caregivers perceiving lower reciprocity with patients. This model explains 3.3% of the variance.

## 5 | DISCUSSION

To the best of our knowledge, this is the first study that examines a dyadic care typology in MCC dyads, determines the level of patient self-care and caregiver contribution to patient self-care by dyadic care types and identifies patient and caregiver characteristics associated with each type. For the most part, the collaborative dyadic care type is the most highly endorsed group. Important demographics and social determinants of health such as age, level of education, cognitive status and number of comorbidities of the patients and sex, caregiving burden, mutuality, hours of caregiving and employment status of caregivers are associated with different dyadic care types. These findings support earlier studies theorizing that context, or how impaired the patient is, varies across dyadic care types (Buck et al., 2013, 2019). As a first study, there are certain findings that will be discussed in more depth.

First, we found that the majority of dyads were collaborative-oriented, indicating that the management of MCCs required the involvement of both patients and their family members, which is in accordance with prior studies conducted on HF dyads (Buck et al., 2019). Interestingly, in these collaborative type dyads, caregivers scored similarly on contributions to self-care as they did in caregiver-oriented dyads. This is consistent with other HF studies (Buck et al., 2015; Durante et al., 2019), and could mean that even when patients and caregivers collaborate in the disease management, caregivers might play the main role. We also found more caregiver-oriented dyads (11.64%) than those reported in two US studies (0.02% and 0.04%) but fewer than those identified in a Spanish study (47%; Buck et al., 2019). Cultural differences, such as a more family-oriented culture and a greater sense of duty of children towards their parents (Luciano et al., 2012), could explain different results in Italy and Spain compared with the US. Moreover, most of our dyadic care types are congruent (89%) demonstrating a higher level of agreement between patients and caregivers about the responsibility for patient care, unlike what was found in the US (51% and 49%) and Spain (73%; Buck et al., 2019). Working together for the benefit of family members could be another characteristic of family-oriented cultures. Further studies should confirm such differences while teasing apart specific generational or cultural aspects.

Second, the differences in patient self-care and caregiver contribution to patient self-care in each dyadic care type support the original typology in their defining features and context. We found that patients in the patient-oriented type scored higher on self-care

TABLE 4 Patient and caregiver characteristics and their comparisons (N = 541)

n (%)	1. Patient-oriented type (n = 77, 14.23%)		2. Caregiver-oriented type (n = 63, 11.64%)		3. Collaborative-oriented type (n = 341, 63.03%)		4. Incongruent type (n = 60, 11.09%)		ANOVA/Chi square test	
	Patient	Caregiver	Patient	Caregiver	Patient	Caregiver	Patient	Caregiver	p	Post hoc
Sex										
Male (1)	35 (45.5)	42 (55.5)	22 (34.9)	12 (19.0)	154 (45.2)	88 (25.8)	28 (46.7)	13 (21.7)	0.471	—
Female (0)	42 (54.5)	35 (45.5)	41 (65.1)	51 (81.0)	187 (54.8)	253 (74.2)	32 (53.3)	47 (78.3)	<0.001	1 ≠ 2, 3, 4+
Level of education									0.012	2 ≠ 1, 3, 4+
0–8 years (0)	57 (74.0)	31 (40.3)	60 (95.2)	23 (36.5)	280 (82.1)	128 (37.5)	49 (81.7)	21 (35.0)	0.002	1 ≠ 2, 3, 4+
≥9 years (1)	20 (26.0)	46 (59.7)	3 (4.8)	40 (63.5)	61 (17.9)	213 (62.5)	11 (18.3)	39 (65.0)	0.025	1 ≠ 2; 2 ≠ 4+
Employment status										
Employed (0)	8 (10.4)	49 (63.6)	—	26 (41.3)	9 (2.7)	192 (56.3)	1 (1.7)	39 (65.0)	0.924	—
Unemployed/ retired (1)	68 (88.3)	28 (36.4)	63 (100)	37 (58.7)	325 (97.3)	149 (43.7)	57 (98.3)	21 (35.0)	0.280	—
Perceived income adequacy										
Less than needed/ Enough (0)	64 (83.1)	58 (75.3)	55 (87.3)	52 (82.5)	289 (84.8)	277 (81.2)	51 (85.0)	53 (88.3)	0.253	—
More than needed (1)	13 (16.9)	19 (24.7)	8 (12.7)	11 (17.5)	52 (15.2)	64 (18.8)	8 (15.0)	7 (11.7)	0.459	—
Living condition										
Living alone (0)	19 (24.7)	—	9 (14.3)	—	53 (15.5)	—	10 (16.7)	—	0.613	—
Living with other (1)	58 (75.3)	—	54 (85.7)	—	288 (84.5)	—	50 (83.3)	—	0.459	—
Living with patient										
Yes (1)	—	34 (44.2)	—	34 (54.0)	—	180 (52.8)	—	30 (50.0)	0.459	—
No (0)	—	43 (55.8)	—	29 (46.0)	—	161 (47.2)	—	30 (50.0)	0.459	—
Relationship with patient										
Spouse/partner (0)	23 (29.9)	—	13 (20.6)	—	95 (27.9)	—	13 (21.7)	—	0.459	—

(Continues)



TABLE 4 (Continued)

n (%)	1. Patient-oriented type (n = 77, 14.23%)		2. Caregiver-oriented type (n = 63, 11.64%)		3. Collaborative-oriented type (n = 341, 63.03%)		4. Incongruent type (n = 60, 11.09%)		ANOVA/Chi square test			
	Patient	Caregiver	Patient	Caregiver	Patient	Caregiver	Patient	Caregiver	Patient	Caregiver		
Non-spouse (1)	54 (70.1)		50 (79.4)		246 (72.1)		47 (78.3)					
<b>Mean (SD)</b>												
Age	72.23 (5.86)	50.21 (17.67)	81.54 (6.53)	55.62 (12.90)	76.71 (6.96)	52.88 (15.22)	75.87 (7.68)	51.92 (12.12)	<0.001	1 # 2, 3, 4; 2 # 3, 4	0.196	—
CCI	1.43 (0.79)		2.49 (1.53)		2.11 (1.20)		2.17 (1.50)		<0.001	1 # 2, 3, 4	—	—
N. hospital admissions	0.13 (0.47)		0.59 (0.93)		0.29 (0.73)		0.42 (0.98)		0.003	1 # 2; 2 # 3	—	—
MoCA	25.29 (2.76)		19.52 (4.87)		22.97 (4.12)		22.76 (4.88)		<0.001	1 # 2, 3, 4; 2 # 3, 4	—	—
Years of caregiving		7.87 (5.67)		9.37 (6.66)		9.20 (7.07)		10.20 (8.26)	—	—	0.262	—
Caregiving hours per week <sup>b</sup>		11.87 (20.03)		42.05 (44.87)		23.45 (28.55)		17.27 (23.99)	—	—	<0.001 <sup>a</sup>	1 # 2, 3; 2 # 3, 4
MSPSS	4.64 (1.11)		4.36 (1.27)		4.76 (1.18)		4.33 (1.18)		0.010	NS	0.005	3 # 4
MS												
Love	3.52 (0.54)		3.70 (0.46)		3.67 (0.46)		3.57 (0.64)		0.059	—	0.008	3 # 4
Shared pleasurable activities	2.92 (0.75)		3.27 (0.74)		3.22 (0.67)		3.03 (0.75)		0.002	1 # 2, 3	0.018	3 # 4
Shared values	2.82 (0.73)		3.21 (0.80)		3.11 (0.73)		2.91 (0.80)		0.003	1 # 2; 3	0.016	3 # 4
Reciprocity	2.82 (0.81)		3.47 (0.57)		3.24 (0.67)		3.14 (0.72)		<0.001	1 # 2, 3, 4; 2 # 4	0.003	3 # 4
CBI												
Time dependence <sup>b</sup>		0.84 (1.72)		10.97 (5.49)		4.02 (4.19)		4.70 (4.83)			<0.001 <sup>a</sup>	1 # 2, 3, 4; 2 # 3, 4
Developmental burden <sup>b</sup>		0.48 (1.48)		3.19 (4.93)		1.30 (2.86)		2.43 (3.84)			<0.001 <sup>a</sup>	1 # 2, 4; 2 # 3
Physical burden <sup>b</sup>		0.87 (2.46)		4.9 (5.24)		1.58 (2.81)		2.68 (3.31)			<0.001 <sup>a</sup>	1 # 2, 4; 2 # 3; 3 # 4

(Continues)

TABLE 4 (Continued)

n (%)	1. Patient-oriented type (n = 77, 14.23%)		2. Caregiver-oriented type (n = 63, 11.64%)		3. Collaborative-oriented type (n = 341, 63.03%)		4. Incongruent type (n = 60, 11.09%)		ANOVA/Chi square test			
	Patient	Caregiver	Patient	Caregiver	Patient	Caregiver	Patient	Caregiver	Patient		Caregiver	
									p	Post hoc	p	Post hoc
Social burden <sup>b</sup>	0.95 (2.57)	1.37 (2.57)	1.26 (2.50)	1.88 (3.13)	0.110	0.110	1.88 (3.13)	1.00 (2.43)	0.051	0.051	0.110	—
Emotional burden <sup>b</sup>	0.34 (1.26)	0.86 (1.37)	0.67 (1.92)	1.00 (2.43)	0.051	0.051	1.00 (2.43)	1.00 (2.43)	0.051	0.051	0.051	—
DSMT satisfaction care arrangement	4.12 (0.76)	4.03 (0.84)	4.32 (0.76)	4.06 (0.80)	4.38 (0.66)	4.26 (0.64)	4.18 (-0.83)	3.93 (0.86)	0.014	1 ≠ 3	0.001	3 ≠ 4

Note: Comparisons between dyads were performed per patients and per caregivers.

Significant *p*-values are reported in bold. ANOVA or Kruskal–Wallis and Chi square tests were used to test differences between patients and caregivers per dyadic care types for continuous and categorical variables, respectively. Bonferroni post hoc test and Dunn's post hoc test were used for ANOVA and Kruskal–Wallis, respectively. Chi square test with standardised residuals were considered for categorical variables.

Abbreviations: CBI, Caregiver Burden Inventory; CCI, Charlson Comorbidity Index; DSMT, Dyadic Symptom Management Type; MoCA, Montreal Cognitive Assessment; MS, Mutuality Scale; MSPSS, Multidimensional Scale of Perceived Social Support; NS, no statistical difference between groups; *p*, *p*-value; SD, standard deviation.

<sup>a</sup>Dunn's post hoc test + Chi square test with standardised residuals.

<sup>b</sup>Kruskal–Wallis test.

suggesting that the DSMT Type I and SC-CII provide information from the same domain (supporting the defining feature of the patient-oriented type). Similarly patients in the patient-oriented type were younger, had the fewest number of comorbidities and fewest hospitalizations suggesting that they were earlier in the MCC trajectory (supporting the context of the patient-oriented type; Buck et al., 2013). The other dyadic types (caregiver-oriented, collaborative and incongruent) are similarly supported. This is the first study which has provided this degree of support for the theoretical underpinnings of the typology. Our findings also provide evidence for the utility of using the DSMT, SC-CII and CC-SC-CII measures together to cross validate any findings since all instruments showed congruence or coherence in their scores (e.g. when the DSMT scale identified a patient-oriented dyad, the SC-CII scale showed higher scores while the CC-SC-CII scale showed lower scores).

Third, we found a few novel characteristics were significantly associated with specific dyadic care type. In one example, the patient-oriented type was characterized by male caregivers reporting less reciprocity. It is possible that male caregivers are more likely to accept the caregiver role when patients are less complex and caring for them requires less effort (Kramer & Thompson, 2002), or the lower levels of reciprocity might be due to patients performing all the self-care and therefore not needing much assistance from the caregivers. This is supported by the low self-care scores reported by caregivers in this dyadic care type. On the other hand, the low degree of reciprocity could have led patients to assume the total responsibility for self-care even when they may have needed more assistance. In the caregiver-oriented type, the caregiving burden was caused from the time dedicated to the patients' care and not by the caregivers' perception to sacrifice their personal life to care for the patients. This could be explained as in our sample most of caregivers were patients' children and caring for the parents can be considered a natural and rewarding step in every child's life (Razani et al., 2007). In the collaborative-oriented dyadic care type, the collaboration between patient and caregiver characterizing this type was expressed by the higher reciprocity perceived by caregivers, higher satisfaction and lower caregiver burden as found in previous studies (Tough et al., 2017). In the incongruent, the disagreement between patient and caregiver about the arrangement for disease management could be influenced by the less-than-optimal quality of the relationship between caregiver and patient (Tough et al., 2017). This hypothesis needs to be verified in further studies.

Finally, and unexpectedly we found that in the individually oriented types (patient- and caregiver-oriented types), a larger proportion of the variance was explained by the variables we measured while in the relationally oriented types (collaborative-oriented and incongruent types), the measured variables explained a very low proportion of variance. We are unsure what this means, but it is possible that other dyadic relational characteristics, not considered in our study, are more important in determining the collaborative and incongruent dyadic types. It is also possible, since the majority of previous research has been conducted in either patients or caregivers that variables commonly measured in chronic illness self-care

TABLE 5 Logistic regression analysis in care dyadic types (N = 541)

Self-care dyadic type	Patient-oriented type (n = 77, 14.23%)			Caregiver-oriented type (n = 63, 11.64%)			Collaborative-oriented type (n = 341, 63.03%)			Incongruent type (n = 60, 11.09%)		
	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p
Patient variables												
Age	0.948	0.903–0.995	0.030	1.057	1.003–1.113	0.038	–	–	–	–	–	–
Level of education	–	–	–	6.415	1.428–28.810	0.015	–	–	–	–	–	–
CCI	0.671	0.473–0.954	0.026	–	–	–	1.210	1.032–1.419	0.019	–	–	–
MoCA	1.106	1.005–1.217	0.039	–	–	–	–	–	–	–	–	–
Shared activities (MS)	–	–	–	–	–	–	–	–	–	–	–	–
Shared values (MS)	–	–	–	–	–	–	–	–	–	–	–	–
Reciprocity (MS)	0.530	0.356–0.789	0.002	–	–	–	–	–	–	–	–	–
Caregiver variables												
Sex <sup>a</sup>	0.264	0.146–0.477	<0.001	–	–	–	1.210	1.032–1.419	0.011	–	–	–
Employment status <sup>b</sup>	–	–	–	0.416	0.211–0.818	0.011	–	–	–	–	–	–
Reciprocity (MS)	–	–	–	–	–	–	1.456	1.164–1.820	0.001	0.621	0.455–0.847	0.003
Time dependence (CBI)	0.688	0.577–0.820	<0.001	1.356	1.248–1.473	<0.001	0.938	0.902–0.976	0.002	–	–	–
Developmental burden (CBI)	–	–	–	0.876	0.793–0.968	0.009	–	–	–	–	–	–
Physical burden (CBI)	–	–	–	–	–	–	–	–	–	–	–	–
Hours of caregiving per week	–	–	–	–	–	–	–	–	–	–	–	–
Nagelkerke R <sup>2</sup>	–	0.417	–	–	0.431	–	–	0.070	–	–	0.033	–
Not significant variables of the model												
				Patient: n. hospital admissions, employment status, CCI, MoCA, shared activities (MS), shared values (MS), reciprocity (MS)			Patient: n. hospital admissions, age, employment status, education, MoCA, shared values (MS), reciprocity (MS)			Patients: n. hospital admissions, age, employment status, education, CCI, MoCA, shared activities (MS), shared values (MS), reciprocity (MS)		
				Caregiver: employment status, developmental burden (CBI), physical burden (CBI), caregiving hours per week, social support, love (MS), shared activities (MS), shared values (MS), reciprocity (MS)			Caregiver: sex, physical burden (CBI), caregiving hours per week, social support, love (MS), shared activities (MS), shared values (MS), reciprocity (MS)			Caregiver: sex, employment status, time dependence burden (CBI), developmental burden (CBI), physical burden (CBI), caregiving hours per week, social support, love (MS), shared activities (MS), shared values (MS)		

Abbreviations: CBI, Caregiver Burden Inventory; CCI, Charlson Comorbidity Index; CI, confidence interval; MoCA, Montreal Cognitive Assessment Scale; MS, Mutuality Scale; OR, odds ratio.

<sup>a</sup>Compared to female.

<sup>b</sup>Compared to being employed.

research (and so are measured here) are missing key dyadic nuances. Additional psychological and social factors should be considered in future studies.

Based on these results, healthcare professionals should consider the MCC patient and informal caregiver as a unit of care since the patient and the caregiver's contributions to patient self-care have been shown to be complementary and compensatory (Lee et al., 2015). Healthcare professionals should regularly assess and identify dyadic care types in the dyads they are caring for to tailor educational interventions to each dyadic care type and to promote effective disease management. For example, interventions should be directed towards the member of the dyad who is more involved in the chronic disease management (patients for the patient-oriented type or caregivers for the caregiver-oriented type) or to both members of the dyads in collaborative types. Additionally, they should modify the target of their interventions when they notice any changes in the dyadic care type, such as during disease exacerbation. Moreover, the incongruent care dyadic type should be identified early as the dyads' ability to perform adequate self-care could be impaired affecting the patients' health outcomes.

Further longitudinal research is needed to examine the stability of the dyadic care types over time and factors that impact their stability. It is likely that a particular dyad begins as a patient-oriented type and, when a patient's health conditions deteriorate, becomes collaborative. When the patient is no longer able to perform self-care, the dyad can shift to a caregiver-oriented type (Buck et al., 2013, 2019).

## 5.1 | Limitations

Our study has some limitations. First, as a secondary analysis, this study suffers from any limitations in the parent study related to sampling or instrumentation. Furthermore, our study was conducted only in Italy, a family-oriented country, which could have affected our results. Therefore, our findings should be generalized with caution to MCC dyads in other countries.

## 6 | CONCLUSIONS

Our study confirms the validity and applicability of a dyadic care typology in MCC dyads. We found that in these MCC dyads, the most prevalent dyadic care type was collaborative and most of the dyads were congruent in their responses about the responsibility for the care. In a day and time when the social fabric of families and countries seems to be fraying, patients and caregivers in this sample were working together in caring for the patient's MCCs. These findings are important because they inform clinicians on how and, more importantly, who, is performing self-care in MCC patient and caregiver dyads.

### AUTHOR CONTRIBUTIONS

All authors have agreed on the final version and meet at least one of the following criteria:

- substantial contributions to conception and design, acquisition of data or analysis and interpretation of data
- drafting the article or revising it critically for important intellectual content.

### PEER REVIEW

The peer review history for this article is available at <https://publons.com/publon/10.1111/jan.15033>.

### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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