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**Dyadic Associations between Perceived Social Support and Psychological Wellbeing in
Caregivers and Older Care Recipients**

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DYADIC ASSOCIATIONS IN CAREGIVING DYADS

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Abstract

Caregiving can be burdensome for both family caregivers and older care recipients (i.e., adults 75 years or older with care needs). This study aimed to determine dyadic associations between caregivers' and care recipients' perceived social support from others (e.g., family and friends) and psychological wellbeing as a dyad. Caregivers and care recipients ($N = 215$ dyads) in this cross-sectional study were recruited by pension trade unions in Italy. Both members of the dyad completed the World Health Organization-Five Well-Being Index. Social support was measured with the COPE Index for caregivers and the Oslo-3 Scale for care recipients. Dyadic data were analyzed with the Actor Partner Interdependence Model. Caregivers' and care recipients' wellbeing was moderately correlated ($r = 0.41, p < 0.01$), with care recipients reporting significant lower wellbeing ($M_{CR} = 30.95$ versus $M_{CG} = 46.45$). Social support perceived by the caregivers was positively associated with their own wellbeing (actor effect; $\beta = 3.31, p < 0.001$) and with the care recipients' wellbeing (partner effect; $\beta = 0.58, p < 0.001$). No significant care recipient actor and partner effects were detected. This study provided evidence on crossover effects between social support and wellbeing in caregiving dyads. Findings have implications for research and clinical practice in familial aged care. Family interventions targeted at the caregivers' broader social environment might enhance both dyad members' wellbeing.

Keywords: caregiving; dyads; crossover; social support; actor-partner interdependence model

Dyadic Associations between Perceived Social Support and Psychological Wellbeing in Caregivers and Older Care Recipients

Older adults with long term care needs often rely on their family caregivers (e.g., spouses, adult children, or other relatives) to receive help in their daily activities, and to manage their health conditions, frailty and psychological distress (Baumstarck et al., 2018). Together, the family caregiver and the older care recipient constitute a dyad in which behavioural, emotional, and interpersonal characteristics of one member of the dyad can affect the wellbeing of the other (Cook & Kenny, 2005). Furthermore, while providing and receiving care, caregivers and care recipients do not exist in social isolation. The caregiving dyad's social environment may also impact both members' wellbeing, for example through the provision of support (Revenson et al., 2016). Specifically, social support from others (e.g., family, friends, neighbours and health care services), perceived by the caregiver and/or the care recipient, may be considered as a psychosocial resource that the dyad can draw upon when needed (Helgeson, 2003; Meyer et al., 2020). The existing literature suggests that individuals (including caregivers and older adults) who perceive more social support experience higher levels of wellbeing (Cohen & Wills, 1985; Fekete et al., 2006; Zhang et al., 2017). However, research about potential *crossover effects* of perceived social support –that is, whether support perceived by one member of the caregiving dyad is positively associated also with the wellbeing of the other member in the dyad– is rare. Understanding the broader social environment in which caregiving dyad is embedded, and the potential crossover effects of support perceptions of both members of the dyad, would help in grasping the complexity of the relational nature of caregiving.

There is a growing consensus that the benefits of support to one member may cross over to the other member of the dyad. Indeed, providing effective support to family caregivers was

found to prevent them from negative personal outcomes (e.g., burnout and depression), but it also increased the quality of the care that the caregiver is able to provide to the care recipient, which in turn lead to higher wellbeing also for the care recipient (Litzelman et al., 2016).

Similarly, older care recipients were found to benefit from broader sources of support themselves, but when they do not rely exclusively on their primary caregivers, this possibly also diminishes caregivers' costs of care (e.g., burden, feelings of conflict, embarrassment, or anxiety) and thereby increases caregivers' wellbeing (Raschick & Ingersoll-Dayton, 2004).

However, only few studies have investigated crossover effects of support from the broader social network within caregiving dyads. One longitudinal study in the cancer context reported crossover effects of support from others on self-reported health, for both spousal caregivers and lung cancer patients (Kelley et al. 2019). In other studies, spousal caregivers' perceptions of support from their social environment were found to be associated with cancer patients' depression and anxiety, but not vice versa (Bodschwinna et al., 2021; Hasson-Ohayon et al., 2010). Similar associations were found between family caregivers' perceptions of support from their respective families and the mental and physical health of care recipients with multiple chronic conditions (De Maria et al. 2020). Also, individuals with heart failure reported higher levels of family health and better functioning within their family, if their caregiving relatives perceived greater support from the patients' nurses (Shamali et al. 2019). On the other hand, Thomson et al. (2012) observed a positive association between cardiac patients' informational/emotional support and their spousal caregivers' mental health, and not vice versa. Finally, one study did not show crossover effects (Jang & Jeong, 2021).

The empirical support seems to be stronger for caregiver crossover effects (i.e., associations between perceptions of support of the caregiver and wellbeing of the care recipient).

However, the literature is still limited and mainly focuses on spousal caregivers, especially in the context of cancer. Crossover effects of perceived social support on wellbeing remain largely unexplored among older adults who often present disabilities, multiple chronic conditions, poor health related quality of life, and require intensive care from their caregivers. Further insights into positive crossover processes between caregivers and older care recipients may offer some prospects to identify dyad members at greater risk for lack of support, and tailor dyadic psychosocial interventions aimed at improving their mutual wellbeing. Moreover, expanding dyadic perspectives to the caregiving literature might broaden our knowledge on older people with disabilities who are in need of care. It is evident that including both family caregivers and people in need of care will help us to better understand caregiving patterns (Verbakel, 2018). Most research on caregiving for ageing adults included the caregivers only, as the majority of older adults are often difficult to reach and may present advanced cognitive impairments, which limit their ability to participate in research (Cotrell & Schulz, 1993). Neglecting one of the two dyad members and their social environment might produce an incomplete view of the situation, and consequently, caregiving cannot be understood in full (Revenson et al., 2016).

The aim of this study is to explore crossover effects of social support between members of caregiving dyads in an understudied group of ageing adults together with their primary family caregivers. The potential crossover effects of perceived social support on wellbeing are assessed for the caregivers as well as their older care recipients, taking into account the associations between perceptions of support and one's own wellbeing. Specifically, using the actor-partner interdependence model, we examine the associations of intrapersonal (i.e., actor) and crossover (i.e., partner) effects while accounting for the non-independence of dyadic data (Cook & Kenny, 2005). We hypothesize that the quality of social support from others (e.g., family or friends)

perceived by one person is related to the psychological wellbeing of both the members of the dyad.

Method

Study design and participants

The present article is based on the baseline survey (i.e., cross-sectional data) from a larger longitudinal study “the perspective of older people with long term care needs and their family caregivers in the Marche region” (Piccinini et al., 2020). Additional findings from the same dataset, but different subsamples, about migrant care were published in another article (Fisher et al., 2021). Data collection for the baseline was conducted between November 2019 and March 2020. Participants were identified and recruited through the pensioner trade unions SPI–CGIL (Sindacato Pensionati Italiani–Generale Italiana del Lavoro), FNP–CISL (La Federazione Nazionale Pensionati–Confederazione Italiana Sindacati Lavoratori), and UILP (L’Unione Italiana Lavoratori Pensionati) in the Marche region of Italy. Staff members of the trade unions received training on how to administer the data collection tool and visited the respondents at their homes to collect the data. Both caregivers and care recipients completed the questionnaire.

To determine eligibility of care recipients for the larger study, they were asked (1) if they were 75 years or older, and (2) a set of pre-screening questions. The first question asked if they received cash for care allowance provided by the National Institute of Social Security (INPS). Thereafter, participants were asked a series of questions aimed at determining their ability to carry out Activities of Daily Living (ADL) (Galeoto et al., 2019) and Instrumental Activities of Daily Living (IADL) (Fillenbaum, 1985). Those receiving the allowance automatically met the inclusion criteria because they are identified as dependent and frail older people with severe

disabilities (e.g., recognition of total and permanent disability, inability to walk independently, impossibility to carry out daily activities independently). Those who did not receive the cash allowance were still eligible to take part if they scored lower than 9 on the ADL/IADL scales (range 0-12); lower scores mean moderate or severe functional impairment. Eligible participants were then asked to identify their primary caregiver, defined as a “family member who is mostly involved in providing care to the older person”, to also take part in the study. In a few instances, where the care recipient either did not have or did not identify a family caregiver, a paid home care worker was included as the second participant of the dyad.

For the purpose of the present study, we selected all dyads consisting of family caregivers and care recipients who were able to complete questionnaires unassisted. Of the 441 care recipients participating in the larger study, 12 did not have a family caregiver. We excluded dyads if a paid home care worker was included as the second participant ($n = 18$ dyads) because we see them as formal caregivers rather than informal or family caregivers. Moreover, 168 dyads were excluded because care recipient was not able to fill in the survey unassisted. The staff member administering the questionnaire determined if the person in need of care was able to complete the questions independently. Another 28 dyads were excluded because of missing values on the outcome measures either from the caregiver or the care recipient perspective. Given the low rate of missing data in our sample (i.e., less than 10%), complete case analyses were performed (Graham, 2009). In total, we analyzed data of 215 dyads.

Sample size calculations were carried out for the primary research question of the larger project. Using the actor-partner interdependence model power analysis APIMPowerR (available at <https://robert-a-ackerman.shinyapps.io/APIMPowerRdis/>), we calculated the power we have to detect actor and partner effects (i.e., small-moderate effect sizes) with distinguishable dyads.

With a sample size of 215 dyads and $\alpha = .05$, we estimated a power of .82 to detect small effects and .99 to detect moderate effects. This is above or equal to .80, which is considered sufficient power for the main objective of this study.

The study was submitted for ethical approval at the National Institute of Health and Science on Ageing (INRCA), Italy. However, since the investigation did not include the involvement of clinical patients, this committee deemed clearance in this regard as not necessary. Participants signed an informed consent form before participation. Materials and analysis code for this study are available by emailing the corresponding author. This study was not preregistered. The entire questionnaire of the larger study is available as supplemental material. The baseline measures used in the current analyses are described below.

Measures

Demographic and socio-contextual variables

Age, gender, relationship status, education, current/past occupation, type of relationship between caregiver and care recipient and living arrangements were assessed based on self-reports of both members of the dyad. Specific care-related variables such as number of hours per week spent on informal care were asked only to the caregivers; level of cognitive impairment of the care recipient was assessed by means of the *Short Portable Mental State Questionnaire* (Pfeiffer, 1975) and the ability to perform Activities of Daily Living (ADL) independently was asked only to the care recipients using the Italian validation of the *Barthel Index Scale* (BI) (Galeoto et al., 2019). BI is a 10-item validated and widely used scale to assess an individual's ability to perform several basic activities of daily living, such as feeding, bathing, grooming, dressing, personal hygiene and mobility. Participants were asked whether they could perform each task independently, with assistance or were totally dependent (scored as 2, 1 or 0). The total score

was calculated by adding up the individual scores; a higher overall score shows a higher degree of self-sufficiency. In the current sample, Cronbach's α was .85.

Perceived social support

Caregivers perceived social support was measured using the 4-item quality of support subscale from the *Carers of Older People in Europe Index* (COPE Index) (McKee et al., 2003; Moholt et al., 2018). Caregivers were asked to rate the quality of social support they received from their family, social network or health and care services on a scale of 1 (*never*) to 4 (*always*). Example items are: “*Do you feel well supported by your friends and/or neighbours?*” and “*Do you feel well supported in your role of caregiver?*”. The four items were summed into one indicator with higher scores indicating greater perceived social support (Cronbach's $\alpha = .66$). The COPE Index evaluates both the positive and negative aspects of caregiving and it has been developed as a screening tool to detect family caregivers in need of support. The COPE Index demonstrated good reliability and validity in several studies assessing family caregivers of older care recipients living at home and caregivers of disabled people in different care contexts (Balducci et al., 2008; McKee et al., 2003). For the aim of this study, we decided to focus only on the quality of support subscale because this is theoretically comparable with the measure used to assess care recipients' perceived social support.

Care recipients were asked about the social support they perceive from their social environment (i.e., family and friends, including their primary caregivers) using the *Oslo-3 Social Support Scale* (OSS-3) (Bøen et al., 2012). OSS-3 is a 3-item validated scale that measures three dimensions of social support on a Likert scale ranging from 0 (*none/not all*) to 5 (*a lot/very easy*) about (1) the availability of a primary support group such as family, friends and neighbours (“*How many people are so close to you that you can count on them if you have great personal*

problems?”), (2) interest and concern shown by them (“*How much interest and concern do people show in what you do?*”) and (3) ease of obtaining their practical help (“*How easy is it to get practical help from them if you should need it?*”). A higher sum score indicated stronger and higher quality of perceived social support (Cronbach’s $\alpha = .72$).

Psychological wellbeing

Both caregivers’ and care recipients’ psychological wellbeing (i.e., *feeling in a good mood, calm and relaxed, rested and energetic*) was measured with the *World Health Organization Well-Being Index* (WHO-5) a 5-item validated scale by the World Health Organization (Bonsignore et al., 2001; Topp et al., 2015). Participants were asked to focus on the past two weeks and report how often they had experienced each feeling on a Likert scale from 0 (*never*) to 5 (*always*). The sum score was multiplied by five, resulting in a wellbeing score that can then range from 0 (lowest wellbeing) to 100 (highest wellbeing). The WHO-5 is a highly useful tool that can be applied in both clinical practice, to screen for depressive symptoms, and in research studies to assess the subjective psychological wellbeing of the respondents (Topp et al., 2015). For the current sample, the internal consistency of the WHO-5 was excellent for both caregivers (Cronbach’s $\alpha = .92$) and care recipients ($\alpha = .87$).

Data analysis

Descriptive analyses were performed separately for caregivers and care recipients (i.e., means and standard deviations for continuous variables, and frequencies and percentages for categorical variables). Before computing the APIM model, the independent variables OSS-3 (scale 0-5) and COPE Index (scale 0-4) were standardized to make them comparable. To compare dyad members’ perceived social support and psychological wellbeing, paired *t*-tests for continuous variables were performed. To better describe the sample, both caregivers’ and care

recipients' psychological wellbeing scores were categorized in three clusters according to these cut-off scores: low ($x < 28$) medium ($28 \leq x \leq 50$) and high wellbeing ($x > 50$) (Topp et al., 2015).

Several demographic and socio-contextual variables were explored in preliminary analyses as potential covariates of psychological wellbeing. Covariates collected from both caregivers and care recipients were: age, gender, type of caregiving relationship and marital status. Additional care recipient information included ADL scores; caregivers indicated hours spent providing care per week.

The *Actor Partner Interdependence Model* (APIM; Kenny, et al., 2006) served as the general data analytic strategy to determine dyadic associations between social support caregivers and care recipients perceive from their environment (i.e., *independent variable*) and their psychological wellbeing (i.e., *outcome variable*). Interdependence means that responses from the two individuals are linked. APIM analysis allows researchers to model the non-independence in the two dyad members' responses by measuring the associations between the scores of the two members of the dyad and their intrapersonal (i.e., actor) and interpersonal (i.e., partner) effects (Cook & Kenny, 2005). Thus, caregiver and care recipient psychological wellbeing scores were regressed on their own perceived social support (i.e., actor effect) as well as on their counterpart's perceived social support (i.e., partner effect). The model controlled for significant caregiver and care recipient covariates. Moreover, path-tracing techniques were applied using unstandardized estimates from the APIM model to determine the percent of interdependence in psychological wellbeing that was accounted for by actor and partner effects of perceived support (i.e., caregiver-driven effects, care recipient-driven effects, actor-driven effects and partner-driven effects) (Dwyer et al., 2017). Calculations to arrive at these percentages are in the

Appendix (see Appendix 1). The model parameters were estimated using structural equation modeling approach (SEM) with full information maximum likelihood estimation in Statistical Package for the Social Sciences (SPSS) Amos version 26. Indicators of adequate model fit were: a non-significant chi-square statistic, a root mean squared error of approximation (*RMSEA*) of less or equal to 0.08, a comparative fit index (*CFI*) and Tucker-Lewis index (*TLI*) of greater than 0.90.

Results

Sample characteristics

Caregivers ($N = 215$) had an average age of 62.8 years (range 25-89), while care recipients ($N = 215$) had an average age of 86.0 years (range 72-100). Both caregivers and care recipients were mostly female (respectively: $n = 138$; 64.2%; $n = 159$; 74.0%). In most cases, caregivers were the adult children of the care recipients (63.7%; $n = 137$) or spouses (20.0%; $n = 43$); the remaining caregiver-care recipient relationships varied as follows: 7.4% ($n = 16$) were daughters/sons in law, 3.3% ($n = 7$) were nephews, 2.8% ($n = 6$) were siblings, and 0.5% ($n = 1$) were cousins. Caregivers received higher education than their care recipients; 62.3% of the care recipients reached only primary education, while 72.5% of the caregivers had received high-school education or post-secondary education. Only 32.5% of the caregivers were currently employed. Most care recipients (60.8%) had a severe level of dependence, 21.8% were totally dependent and 16.6% moderately dependent. Moreover, 50% had low or no cognitive impairment, 39% high and 11% moderate cognitive impairment. Further characteristics of the sample can be found in Table 1.

On average, participants reported relatively high levels of quality of perceived social support, but they scored differently on psychological wellbeing: 48.8% of the caregivers reported

high wellbeing, 20.0% medium and 31.2% low; while only 20.5% of the care recipients reported high wellbeing levels, 26.0% medium and 53.5% low wellbeing, indicating possible depressive symptoms. On average, care recipients reported both lower perceived social support ($M = 9.53$) than their caregivers ($M = 10.82$), $t(214) = -5.43$, $p < 0.01$ and lower psychological wellbeing ($M = 30.95$) than their caregivers ($M = 46.45$), $t(214) = 8.60$, $p < 0.01$.

Preliminary analyses

Preliminary analyses were conducted to examine associations between socio-demographic characteristics and outcome variables (i.e., psychological wellbeing) to assess the need for including covariates in the APIM analysis (see Appendix 2). Caregivers' and care recipients' gender ($t_{CG} = 2.20$ and $t_{CR} = 2.25$, $p < 0.01$) and caregivers' age ($r = -0.15$, $p < 0.01$) were significantly associated with their own psychological wellbeing. Moreover, a higher number of hours per week spent on providing care was correlated with lower psychological wellbeing in caregivers ($r = -0.35$, $p < 0.01$), while a higher degree of self-sufficiency of the care recipients in carrying out ADL was positively correlated with their own wellbeing ($r = 0.17$, $p < 0.01$). All other socio-demographic variables were not significantly associated with the dyad members' psychological wellbeing (for more details, see Appendix 2).

Correlations between main variables and covariates are reported in Table 2. Most variables were significantly correlated with each other: caregivers' wellbeing was positively correlated with care recipients' wellbeing ($r = 0.41$, $p < 0.01$) and also perceived social support of caregivers and care recipients were positively, albeit weakly, correlated ($r = 0.24$, $p < 0.01$).

Dyadic associations between perceived social support and psychological wellbeing

Figure 1 presents the results of the APIM analysis conducted to establish any dyadic association between perceived social support and psychological wellbeing in caregiving dyads.

The model revealed a significant actor effect of perceived social support on psychological wellbeing for caregivers only ($\beta = 3.31, p < 0.001$), showing that caregivers' perceived social support was positively associated with their own wellbeing. Likewise, there was also a significant caregiver partner effect ($\beta = 0.58, p < 0.001$), where greater social support perceived by caregivers was positively associated with the care recipients' psychological wellbeing. In other words, an increase of 1 unit on the caregiver's perceived social support would translate into a 3.31 unit increase on the caregivers' wellbeing scale and into a 0.58 unit increase on the care recipients' wellbeing scale. This model was controlled for a number of covariates. Caregivers' gender ($\beta = -10.79, p < 0.001$), age ($\beta = -0.30, p < 0.001$), and hours of care per week ($\beta = -0.14, p < 0.001$) were used to control caregivers' wellbeing. Care recipients' gender ($\beta = -8.89, p < 0.001$) and ability to perform activities of daily living (ADL) were used to control care recipients' wellbeing ($\beta = 0.16, p < 0.001$). Exploratory analyses selecting only adult child caregivers ($n = 137$) indicated that the size of dyadic associations between perceived social support and wellbeing was very similar for this subgroup compared to the whole sample ($N = 215$).

No significant care recipient actor or partner effects were detected (see Table 3).

This model fits the data well ($\chi^2(11) = 15.22, p = 0.173, RMSEA = 0.042$ [CI, 0.0- 0.08], $CFI = 0.971$) and explained 28% of the variance in caregivers' psychological wellbeing and 10% in care recipients' psychological wellbeing. Dyadic correlation between caregivers' and care recipients' outcomes (i.e., interdependence in psychological wellbeing) is explained by the combination of actor and partner effects: 24.20% is explained by the caregiver driven effect, 2.31% by the care recipient driven effect, 1.17% by the actor effects and 1.08% by the partner

effects. Therefore, actor and partner effects of perceived social support explained a combined 28.76% of the caregiver-care recipient interdependence in psychological wellbeing.

Discussion

The purpose of this dyadic study was to gain a better understanding of dyadic associations between perceived social support from the broader social network (e.g., family or friends) and psychological wellbeing of caregivers and older adult care recipients with long term care needs. Study findings confirmed the positive role of perceived social support in the caregivers' wellbeing (i.e., caregiver actor effect) and, interestingly, showed that social support perceived by caregivers was also positively associated with the care recipients' psychological wellbeing (i.e., caregiver partner effect). However, we did not find any significant association between care recipients' social support and their own (i.e., actor) or caregivers' wellbeing (i.e., partner); although positive associations suggested a consistent trend also for care recipients.

There are several possible explanations for the caregiver actor and partner effects. On an intrapersonal level (i.e., caregiver actor effect), in line with the *buffering model*, the perception that others (e.g., family and friends) are willing to provide necessary resources may redefine the caregiving situation, reinforce caregivers' ability to cope with the care demands, and hence improve their psychological wellbeing (Cohen & Wills, 1985). In other words, caregivers are likely to maintain their psychological wellbeing in a stressful context when they can count on a larger and supportive network. Findings are in line with previous studies conducted within families providing care for an older person with dementia. That is, the overall family caregiving system's functioning (e.g., the presence or absence of social support and the degree of intimacy and emotional connectedness) was found to be related to caregivers' health and wellbeing (Fisher & Lieberman, 1996; Heru & Ryan, 2006). This may be particularly true within high-risk

caregiving situations. Specifically, due to growing impairments of ageing adults in need of care, caregivers might feel that they are unprepared to provide care or lack the knowledge and resources to provide good care. As a result, caregivers may neglect their own needs in order to assist people in need of care, causing deterioration in their own health and wellbeing (Reinhardt et al., 2006). Supporting family caregivers may reduce the risks for these negative outcomes (Chappell & Funk, 2011; Litzelman et al., 2016).

On an interpersonal level (i.e., caregiver partner effect), adequate support perceived by caregivers may buffer not only their own wellbeing but also their care recipients' wellbeing. Moreover, a considerable percentage (24.20%) of the association between caregivers' and care recipients' wellbeing (i.e., shared variance) was explained by a caregiver driven effect. These findings extend previous results on crossover effects (Kelley et al., 2019; Bodschwinn et al., 2012; Hasson-Ohayon et al., 2010; De Maria et al. 2020; Shamali et al. 2019), and confirm the crucial role of caregivers in the wellbeing of older adults with long-term needs. There might be several explanations for the caregiver partner effect. Perhaps, caregivers who are well-supported have more energy and provide better care, thereby enhancing the wellbeing of care recipients (Litzelman et al., 2016). Caregivers' availability of social resources may also indirectly reduce care recipients' concerns with protecting their caregivers. Indeed, older care recipients might feel relieved while perceiving their caregivers being supported by significant others, often peers or spouses (Chappell & Funk, 2011; Silverstein & Giarrusso, 2010). When care recipients perceived that their caregivers receive help, they might consider themselves as less of a burden and interpret the caregivers' choice to provide care driven by emotional bonding rather than by a sense of obligation, or by lack of choice in caregiving decisions (Revenson et al., 2016).

With regard to the unexpected absence of a significant association between social support perceived by care recipients and their own wellbeing (i.e., care recipient actor effect), it is possible that this reflects the controversial findings emerged in the existing literature on social support perceived by older people with disabilities. Although social support may generally be perceived as helpful, people in need of assistance may sometimes perceive social support from others as a limitation to their autonomy and independence (Chappell & Funk, 2011). However, this has been found particularly when support was conceptualized as *received support*, that is the actual transfer of help through interpersonal networks, rather than *perceived (availability of) support*, as in our study (Reinhardt et al., 2006).

The absence of a care recipient partner effect might be related to the measurement of perceived social support that did not disentangle different sources that the care recipients may have had in mind. Perhaps, when care recipients were asked about the support they perceive from their social environment, they included the care received from their primary caregivers. It seems logical that, in contrast to support from other members in the social network, the degree of care provided by the caregiver would be negatively associated with the caregivers' wellbeing. Therefore, we did control for caregivers' hours spent on caregiving tasks and on the care recipients' functional impairments, but unfortunately, we could not disentangle support from the caregiver and other members of the social network. Future research should build on the present findings by detecting different aspects (e.g., emotional vs. instrumental) and sources (e.g., family, friends and others) of perceived social support.

Although the findings of our study contributed to understand how external support is associated with the caregivers' and care recipients' wellbeing, a substantial part of the shared variance in wellbeing remained unexplained, which may be ascribed to emotional contagion

between dyad members (Goodman & Shippy, 2002). According to this hypothesis, people catch and acquire emotional states of others with whom they interact (Hatfield et al., 1993). Even though we did not measure emotional contagion, we found that dyad members' psychological wellbeing was moderately correlated, which means that caregivers and care recipients mutually experienced similar states. Emotional contagion is likely to occur in close relationships in which people have frequent contact, such as caregiving relationships (Goodman & Shippy, 2002); for example, when caregivers experienced depressive states, care recipients were more likely to report poor self-efficacy and worse wellbeing (Buck et al., 2015). Conversely, when caregivers reported positive experiences (e.g., benefits and less burden), care recipients reported better mental health over time (Pristavec, 2019). Further longitudinal research, such as diary studies, might be appropriate to capture daily reports of wellbeing (Bolger & Laurenceau, 2013), and test whether the association in dyad members' outcomes depends on emotional contagion processes or merely reflects reactions to a shared environment (i.e., the same caregiving/family context). Indeed, sharing the same environment is one of the main indicators of emotional contagion and this was partially confirmed by our results; half of the dyads in our sample shared the same house, suggesting that interdependence between caregivers and care recipients did not depend on their physical closeness only.

Moreover, the fact that the other half of the caregiving dyads did not cohabit is reflected in the majority of adult-daughter parent dyads. This is in line with the existing literature, which identified adult children as the coming generation of caregivers (Laditka & Laditka, 2000). Further research is needed to examine whether being the care recipient's spouse or adult child might determine differences also in the crossover effects. For example, in spousal dyads cohabitation with the care recipient might expose the partner to continuous caregiving demands

leaving them without time to meet their personal needs, which might impact the caregiver's wellbeing (Oldenkamp et al., 2016). On the other side, adult daughters who provide care to their parents, known as the “sandwich generation”, experience difficulties in balancing their marital, parental, home and work roles with the caregiving demands. As shown in our sample, supporting adult daughter caregivers might prevent them and their parents from negative outcomes.

The strengths of this study are reflected, first, in its dyadic design, which allowed us to consider the caregiving dyad as a unit and to validate the perspective from each member of the dyad. Further, we included in our study older adults (i.e., 75 years and older) able to take part without assistance. In the literature, many studies obtained information about the care recipient only from the caregiver because of the difficulties in recruiting older adults, especially when they present dementia or other severe health impairments (Long et al., 1998). However, recent research indicates that care recipients with mild to moderate cognitive impairment are able to answer questions about their own care and preferences with a high degree of accuracy and reliability (Roberto & Jarrott, 2008).

A number of limitations should be acknowledged when considering the findings of this study. First, the cross-sectional nature does not permit to test causality. Replication with a longitudinal design would be important to examine the validity of our findings and to explore the dynamic nature of the constructs under investigation. Second, our study is limited to psychological wellbeing as an outcome variable, without addressing other possible outcomes such as relationship quality (Rippon et al., 2020). Moreover, we did not consider for our analyses the presence of paid live-in care workers ($n = 83$) who, while not being the primary caregivers, may in many cases still represent a remarkable component of the everyday life of frail older people and their caregivers. As such, they may potentially affect also the quality of the dyadic

relationship between the two, to the point that it might be worthwhile to start thinking about the micro-level implications of this triadic relationship (care recipient, caregiver, paid live-in care worker), in parallel to what in the literature has long recognized at the macro-level as the *migrant-in-the-family care model*, typical of Italy and other Mediterranean countries (Bettio et al., 2006).

The implications of this study are twofold: first, on a theoretical level, findings highlight the importance to involve both caregivers and care recipients in research. Powerful dyadic analytic techniques (e.g., APIM) have been extensively used in spousal research and they might be integrated also into caregiving and ageing research (Kenny, et al., 2006). Second, from a clinical perspective, our findings have implications for family-based programs and dyadic interventions aimed at supporting caregivers who provide care to family members in need of care. Health care and social service professionals need to recognize and understand both perspectives to increase the chance of successfully fulfilling the needs of both members of the dyad. Including both the members of the dyad, either spouses or adult-children, would help health practitioners to identify situations where perceived social support is lacking or limited and plan interventions targeted to caregivers or care recipients most at risk of poorer mental health and, indirectly, enhancing their mutual wellbeing. Additionally, we would recommend that interventions that involve caregivers and care recipients might also address their broader social environment and patterns of exchange of support within the larger caregiving systems, as this might have implications for the dyad members' wellbeing. Similar interventions with other chronic diseases have demonstrated the effectiveness of addressing the family as a whole (Gilliss et al., 2019; Shoushi et al., 2020).

In conclusion, findings suggest that there is a need to investigate caregiving dyads with interpersonal perspectives, including systemic frameworks and dyadic models which entails considering the complex dynamic interaction between individual, relational and environmental factors (Berg & Upchurch, 2007; Patterson & Garwick, 1994).

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Table 1

Sample characteristics and descriptive of caregivers and their older adult care recipients

Sample characteristics	Caregivers N = 215		Care recipients N = 215	
	M (SD)	N (%)	M (SD)	N (%)
Age, years	62.80 (11.09)		86.09 (6.11)	
Gender				
Male		77 (35.8%)		56 (26.0%)
Female		138 (64.2%)		159 (74.0%)
Relationship type				
Spouse		43 (20.0%)		
Son/daughter		137 (63.7%)		
Sibling		6 (2.8%)		
Daughter/son in law		16 (7.4%)		
Nephew		5 (2.3%)		
Cousin		1 (0.5%)		
Grandson/daughter		7 (3.3%)		
Education				
No formal education		0		27 (12.0%)
Primary		4 (1.9%)		134 (62.3%)
Middle-school		30 (14.0)		31 (14.4%)
High-school		65 (30.2)		13 (6.0%)
Post-secondary		91 (42.3)		0
Post-secondary tertiary		1 (0.5%)		0
Bachelor degree		5 (2.3%)		3 (1.4%)
Master Degree		16 (7.4%)		5 (2.3%)
Marital Status				
Married		150 (69.8%)		67 (31.2%)
Widow		11 (5.1%)		135 (62.8%)
Divorced		21 (9.8%)		1 (0.5 %)
Single		33 (15.3%)		12 (5.6 %)
Employment				
Yes		69 (32.5%)		N/A
No		143 (67.5%)		N/A

Accepted version
 DYADIC ASSOCIATIONS IN CAREGIVING DYADS

	Caregivers <i>N</i> = 215	Care recipients <i>N</i> = 215
Living arrangements		
Same house	119 (55.3%)	
Different apartments but same building	26 (12.1%)	
Walking distance 10-min distance by car, train or bus	38 (17.7%)	
30-min distance by car, train or bus	24 (11.2%)	
More than 1 hour by car, train or bus	7 (3.3%)	
1	1 (0.5%)	
Hours of care per week	59.59 (53.50)	N/A
Activities of daily living	N/A	11.3 (6.01)
Cognitive impairment	N/A	6.03 (3.60)
Perceived social support	10.82 (2.45)	9.53 (2.99)
Psychological wellbeing	46.45 (26.01)	30.95 (22.98)

Table 2

Intercorrelation coefficients for caregivers and their older care recipients (N = 215)

Main variables	1	2	3	4	5	6	7	8
1. CG age	-							
2. CR age	0.11	-						
3. CG social support	0.03	-0.64	-					
4. CR social support	-0.04	-0.01	0.24**	-				
5. CG wellbeing	-0.15*	-0.01	0.34**	0.10	-			
6. CR wellbeing	0.07	-0.01	0.26**	0.15*	0.41**	-		
7. Caregiving hours per week	0.20**	-0.08	0.00	0.06	-0.35**	-0.28	-	
8. CR ADL	0.00	-0.19**	0.10	0.05	0.12	0.17**	-0.17*	-

Legend. CG = caregiver; CR = care recipient; ADL = care recipient's ability to perform Activities of Daily Living independently.

Note. *Correlation significant at $p \leq 0.05$; **Correlation significant at $p \leq 0.01$.

Table 3

Actor-Partner Interdependence Model parameter estimates for perceived social support and psychological wellbeing

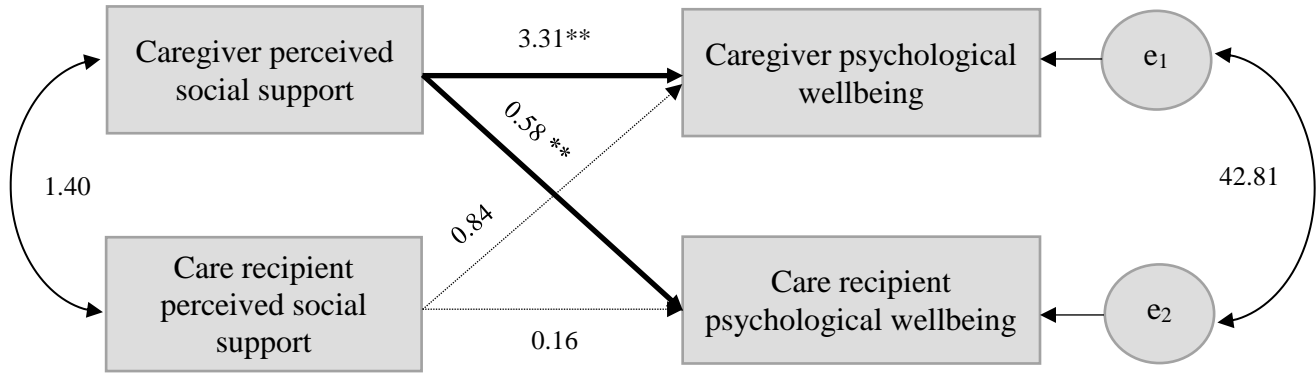
Effects	<i>b</i>	β	<i>SE</i>	<i>p</i>
Actor effects				
Caregiver	3.31	0.30	0.63	< .001
Care recipient	0.15	0.08	0.12	.204
Partner effects				
Caregiver	0.58	0.25	0.15	< .001
Care recipient	0.84	0.09	0.51	.106
Covariates				
CG Hours of care per week	-0.14	-0.29	0.02	< .001
CG Age	-0.30	-0.12	0.13	< .001
CG Gender	-10.79	-0.19	2.94	< .001
CR Gender	-8.89	-0.12	2.98	< .001
CR ADL	0.16	0.17	0.05	< .001

Legend. *b*=unstandardized coefficients; β = standardized coefficients; *SE*= standard error; *p* = *p*-value; CG = caregiver; CR = care recipient; ADL = care recipient's ability to perform Activities of Daily Living independently.

Note. Statistically significant effects are shown in bold. Only unstandardized coefficients are interpreted. The model is controlled for covariates (caregiving hours per week, caregiver's age, gender, care recipient's gender and ability to perform activities of daily living).

Figure 1

Path diagram of the Actor-Partner Interdependence Model



Note. ** $p < 0.001$. Statistically significant effects are shown in bold. Only unstandardized coefficients are reported. The actor effects are represented by horizontal arrows (i.e., intrapersonal effect of each dyad member's perceived social support on their own wellbeing), and the partner effects by diagonal arrows (i.e., interpersonal effects of dyad member's perceived social support on the wellbeing of the other member of the dyad). On the left, a curved double-headed arrow describes the correlation between the independent variables (i.e., perceived social support) of dyad members, and on the right, the double-headed curved arrow describes the correlation between the two error terms (e_1 and e_2) of dependent variables (i.e., psychological wellbeing).

Appendix 1

Path tracing to determine the percent of dyadic interdependence accounted for by actor and partner effects of perceived social support on psychological wellbeing

Type of effect	Calculation	Percent explained
Caregiver-driven	$A_{actor} * A_{partner} * \text{Residual variance in caregiver support} / \text{Residual covariance wellbeing}$ (3.31*0.58*7.98)/62.28	24.20%
Care recipient-driven	$P_{actor} * P_{partner} * \text{Residual variance in care recipient support} / \text{Residual covariance wellbeing}$ (0.84*0.16*10.92)/62.28	2.31%
Actor-driven	$A_{actor} * P_{actor} * \text{Covariance support} / \text{Residual covariance wellbeing}$ (3.31*0.16*1.40)/62.28	1.17%
Partner-driven	$A_{partner} * P_{partner} * \text{Covariance support} / \text{Residual covariance wellbeing}$ (0.58*0.84*1.40)/62.28	1.08%
		Total 28.76%

Note. A_{actor} = Caregiver actor effect; P_{actor} = Care recipient actor effect; $A_{partner}$ = Caregiver partner effect; $P_{partner}$ = Care recipient partner effect.

Appendix 2

Associations between socio-demographic variables and dyad members' psychological wellbeing

Sociodemographic variables	Caregivers' wellbeing N = 215			Care recipients' wellbeing N = 215		
	<i>t</i>	<i>r</i>	<i>p</i>	<i>t</i>	<i>r</i>	<i>p</i>
Age, years		- 0.15	< .05		- 0.01	.77
Gender	2.20		< .01	2.25		< .01
Relationship type (spouse /other family member)	0.84		.32	1.52		.12
Marital status (married yes/no)	1.77		.76	1.74		.78
Hours of care per week		- 0.35	< .01			
Activities of Daily Living		N/A			0.17	< .01
Perceived social support		0.34	< .01		0.15	< .05

Legend. *t* = paired *t*-test; *r* = Pearson correlation coefficients; *p* = p-value.

Note. Paired *t*-test for associations between dichotomous categorical and continuous variables;
 Pearson correlation coefficients for correlations between continuous variables.