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Do Conflict Structures of Family Networks Matter for Loneliness in Later Life? The Case of a Cohort of Swiss Older Adults

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Keywords: conflict | family networks | loneliness | mediation models | older adults | stress

ABSTRACT

This study explores the interconnection that exists between loneliness and conflict structures in older adults' family networks. Research has shown that close family dyads, such as marriages or partnerships, often generate conflict, with negative consequences for mental health. However, such dyads are embedded in larger family networks with their own conflict structures. When considering the development of loneliness, the significant role of these larger conflict structures and their characteristics (i.e., density, centralization) has been disregarded, to a large extent, thus far. This research draws on the Vivre/Leben/Vivere survey, which investigated the family life and health conditions of people aged 65 and over living in Switzerland. Analyses focused on 890 individuals who participated in two waves of the survey, separated by 6 years. Regression and mediation models show that the conflict density of family networks is related to loneliness through its association with stress. The importance of network conflict structures is discussed.

1 | Introduction

This study examines how conflict structures in older adults' family networks relate to loneliness. Research has shown that central family dyads, such as marriages or partnerships, often generate conflict, with negative consequences for mental health (Chen and Feeley 2014; DeLongis et al. 2004; Wickrama, Lee, and O'Neal 2020; Wickrama, O'Neal, et al. 2020). However, such dyadic conflicts are embedded in larger conflict structures that may be consequential for the development of loneliness. Indeed, a growing body of research has emphasized that personal networks generate conflict because they are prone to interference, disparagement, and violence (e.g., Birditt et al. 2009; Fingerman et al. 2004; Offer 2020; Offer and Fischer 2018; Rook 1998; Rook and Charles 2017; Widmer 2010). Using a unique two-wave dataset of individuals aged 65 and older living in Switzerland, this study investigates the role played by conflict structures (density and centralization of conflict) within family networks for the development of loneliness. We hypothesize that such conflict structures are interconnected with loneliness in later life and that stress plays a critical role in this as a moderating factor.

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2 | Family Factors Influencing Loneliness Beyond the Protective Effect of Marriage

The literature linking family and loneliness in old age has generally focused on the protective roles of marital status and other family ties (De Jong Gierveld et al. 2015; Van Tilburg and Fokkema 2021). First, the absence of a partner, when living alone or not being in a relationship, is associated with loneliness (Zoutewelle-Terovan and Liefbroer 2018). Having a partner protects against loneliness independently of having children (Margolis et al. 2022). However, having a partner does not always lead to positive outcomes: strength in married couples protects against loneliness, whereas strain and stress in married couples are associated with loneliness in old age (Wickrama, Lee, and O'Neal 2020; Wickrama, O'Neal, et al. 2020). In addition, marriage plays a different role for men compared to women, with men drawing more support from marriage and thus experiencing greater protective effects from marriage than women (Dykstra and De Jong Gierveld 2004; Margolis et al. 2022). Furthermore, the quality of the relationship with one's partner was found to be significant in reducing the impact of poor self-rated health on loneliness in older adults (Holtfreter et al. 2016). Only a few studies have also looked beyond the marital dyad at relational adversities, such as the presence of conflict with relatives in middle adulthood, which is correlated with increased loneliness in later years (Ejlskov et al. 2020). Additionally, negative childhood memories and a lack of emotional support received from siblings during young adulthood were both found to be associated with higher levels of loneliness expressed by older adults (Merz and De Jong Gierveld 2016). Such evidence suggests that the influence of family on loneliness goes beyond support, as well as beyond the marital dyad, suggesting that research should pay attention to conflict across a wider range of family relationships.

3 | Socio-Emotional Selectivity Processes and Conflict Structures of Family Networks

Socio-emotional selectivity theory describes processes by which aging individuals tend to actively disengage from negative and stressful personal relationships and focus on positive ones to maintain connectedness and well-being (Carstensen 1992; Carstensen et al. 1999). Such processes can be fruitfully analyzed using a personal or family network approach (Widmer 1999, 2010), which captures collective dimensions of positive and negative relationships. With the passing away of friends, partners, and siblings, older adults may lose positive voluntary ties. On the other hand, with increasing health problems, their dependencies on the remaining family members, mainly their children and children-in-law, increase. This may impact some key structural elements of their personal and family networks.

Some family networks present a high-density structure of supportive ties, in which all or almost all members cooperate with one another, generating a high proportion of reciprocal support (Widmer 2010). Such highly dense networks are conducive to a collective type of support that is easily activated when needed due to the interconnections between support providers. Dense support networks may become intrusive at times, as the collective dimension of support can limit the autonomy of aging individuals (Cornwell 2009, 2011; Offer and Fischer 2018). This may especially be the case for aging adults who cannot be emotionally selective in their support networks due to health issues or a lack of voluntary ties. In this case, one might expect a dense structure of negative ties to develop, which may cause interference and stress and therefore may generate loneliness (Offer and Fischer 2018; Widmer 2010). Indeed, a high-density conflict structure in the family network of an older adult would mean that a large share of family members is feuding against each other, potentially generating endless loops of conflict in which the older adult might be involved. This is particularly the case when conflict is not concentrated in a single relationship but rather spread throughout the family network (high density of conflict relationships).

In addition to density, centrality is another network structure that has been recognized as critically important (Everett and Borgatti 2005; Marsden 2002). Centrality in support networks is the extent to which individuals control the flow of support by acting as intermediaries in a chain of positive interactions. Centrality differs from reciprocity, as individuals can be central within their network without necessarily having reciprocal ties with their family members. Older adults are central either because they are the main recipients of support within their family or the main providers of such support, or, in many cases where reciprocity is present, when they are both providers and recipients. Being central within conflict structure may, however, pose a critical risk. Centrality in such structures reflects the extent to which individuals are encompassed by flows of negative interactions and systemic conflict (Bowen 1976; De Bel et al. 2021; Offer 2020). Older adults may be at the center of conflict within their family due to their very centrality in support structures. They may be upset by most of their family members or may be the target of all the family's frustrations and thus upset all their family members (Widmer et al. 2018).

In light of socio-emotional selectivity processes (Carstensen 1992; Carstensen et al. 1999), we expect the conflict structures of family networks, with specific attention to density and centrality, to play a critical role in the development of loneliness in older adults. In a significant number of cases, older adults may not be able to be selective with regard to the members of their family network and, thus, escape from their conflict structures. This can add another layer of negativity on top of other factors that increase loneliness.

4 | Stress as a Mediator

Research has provided evidence of significant correlations between loneliness and stress levels (Cacioppo et al. 2006). Stress is expected to play a critical mediating role between conflict structures in family networks and loneliness. In general, research highlights stress as a highly significant mediating factor between interpersonal relationships and well-being (DeLongis et al. 2004; Offer 2020; Rook 1998; Rook and Charles 2017). Evidence for such a mechanism is provided by a variety of studies pointing to the ways that well-being is significantly affected by interpersonal conflict and tension, particularly social strain and social negativity (Bertera 2005; Chen and Feeley 2014; Lee and Szinovacz 2016; Offer 2020; Rook 1998; Rook and Charles 2017).

In the family context, conflict with significant family members generates emotional stress, which in turn negatively affects psychological well-being (Kiecolt-Glaser and Newton 2001; Lee and Szinovacz 2016; Rook 1998; Rook and Charles 2017; Rook et al. 2012), including by increasing loneliness (Chen and Feeley 2014; Offer 2020). In negative interactions, the greater an individual's centrality, the less access they have to valuable resources, and the higher their stress levels, resulting in a higher risk of poor health outcomes (Sapin et al. 2016; Widmer 2010; Widmer et al. 2018).

5 | Summary and Hypotheses

The current study focuses on conflict structures in family networks and loneliness among individuals aged 65 and over at baseline. Based on the literature, we expect that conflict structures in family networks are correlated with loneliness. First, we hypothesize that higher conflict density in families and higher conflict centrality of respondents will be associated with subsequent loneliness (H1). Second, we expect that individuals' stress will mediate the relationship between the two family conflict structures and loneliness (H2). Individuals who are embedded in family networks with a high density of conflict or who are centrally positioned in family conflict are expected to develop higher levels of stress, accounting for a significant amount of their subsequent loneliness. Indeed, some individuals may find it difficult to maintain fulfilling relationships within their current family networks, while opportunities to develop alternative family ties remain out of reach (Sauter et al. 2023; Wrzus et al. 2013), thus negatively impacting their well-being. Finally, a statistical control for support structures (density of supportive ties and respondents' centrality in support), among other well-known correlates of loneliness, is necessary when addressing the effect of conflict structures (Widmer et al. 2018), since frequent contact with adult children and siblings, as well as providing support to noncoresident family members, often protects against loneliness (Fokkema et al. 2012; Merz and De Jong Gierveld 2016).

6 | Method

6.1 | Data and Procedure

This study uses data from two waves of the Vivre–Leben–Vivere (VLV) survey (Oris et al. 2016), a large, interdisciplinary survey on the life and health conditions of people aged 65 years and over living at home or in an institution in Switzerland, a country with a strong institutional emphasis on the breadwinner/nuclear family model and reliance on individual responsibility or family support rather than state support (Levy and Widmer 2013). The survey was conducted in five Swiss regions of residence (Basel, Bern, Geneva, Wallis, and Ticino). Respondents were first interviewed in 2011 (Wave 1, W1) and again in 2017 (Wave 2, W2) using a face-to-face computer-assisted personal interview method and questionnaires. All participants gave their written informed consent for inclusion in the study before participating. The present study was conducted in accordance with the Declaration of Helsinki, and the study protocol was approved by the ethics commission of the Faculty of Psychology and Educational Sciences of the University of Geneva (project identification code CE_FPSE_14.10.2010).

6.2 | Participants

Based on a random sampling design, the main sample included 3659 respondents who were selected from regional Swiss administrative records and stratified by age, gender, and region of residence. At baseline, the VLV sample is fully representative of the social structure of Switzerland at the linguistic, socioeconomic, and political levels (Oris et al. 2016). A total of 579 individuals with cognitive impairments were excluded from the initial sample because they were unable to provide responses. A subsample of 1050 respondents from four out of the five regions of the first wave (Basel, Bern, Geneva, and Wallis) was re-interviewed in W2. For the analysis, we dropped individuals from the W2 sample who did not provide valid responses for all measures used in the analysis, resulting in a working sample of 890 individuals living at home or in an institution. The analyses in the paper were all run on this sample.

The sample of W2-respondents differs from the sample of W1-respondents, given that over 6 years individuals had dropped out of the survey for various reasons (death, moving out of the region or the country, etc.). The comparison at baseline between the W2-respondents and those who did not participate in the W2 follow-up shows that the W2-respondents were younger, had a higher level of education, and were in better physical health than those who did not participate in the W2 follow-up. However, despite the attrition, the W2-respondents were still diverse in terms of their socio-economic and health profiles, showing sufficient variance in the working sample (Ihle et al. 2020).

6.3 | Measures

6.3.1 | Family Networks

The family network method (FNM), used in several research projects since the early 2000s (Widmer 1999, 2010; Widmer et al. 2013), was applied to identify family networks and measure family conflict. First, following personal network methods, a free-listing technique was used to delineate family networks. Respondents were asked to name a maximum of five individuals they considered to be significant family members at the time of the interview. In all studies using the FNM, the term "family" was deliberately left undefined in order to rely on the respondents' lay definition of "family." "Family" is not limited to blood ties or household members and may include in-laws or step-kin, as well as fictive kin if respondents considered them to be significant family members (Widmer 2010). Respondents were also told that the term significant referred to people in their family who had played either a positive or a negative role in their lives over the past year. This open-ended question allowed the researchers to capture both supportive and disruptive relationships that occur within family networks. After naming these family members, respondents were asked to describe the type of relationship they had with each person they had listed (e.g., "partner," "sister," "son," "son's partner," "partner's brother"), which provided information about the composition of their family network. For each significant family member listed, socio demographic information was collected, as well as details about the duration of the relationship and the frequency of contact between the respondent and each significant family member. The FNM makes it possible to analyze relationships within the family by asking respondents a series of questions about the support and conflict they perceive between the significant family members (Widmer 1999; Widmer et al. 2013). Family conflict was explored by asking the following question: “Each family has its conflicts and tensions. In your opinion, who makes X [i.e., each individual included in the respondent's family network, considered one by one] angry?” Respondents could select one or more significant family member by name (or none, if they felt that these questions did not apply to anyone in their significant family network). In line with personal network methods (McCarty et al. 2019), respondents were asked to provide responses not only about their own relationships with each significant family member, but also about the relationships between all of their significant family members (Widmer et al. 2013). Binary responses (having conflict versus having no conflict) were collected to investigate perceived conflictual relationships between respondents and their significant family members, as well as between all the family members listed. This procedure for collecting information on family conflict relied on the respondents' own perceptions of conflict within their family network. For example, if respondents rated the relationship between family members A and B as conflictual, then A and B were connected by a conflictual link, even though A and B may have different perceptions of their own relationship.

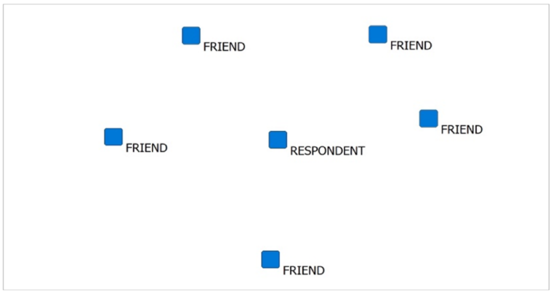
6.3.2 | Conflict Structures

Using the responses provided, we computed two indices of family network conflict structures for W1: density and respondents' betweenness centrality, both of which were suitable for assessing the properties of personal networks (Perry et al. 2018; Scott 2017). To ensure statistical robustness, only conflict structures computed in W1 were used in the analyses, as those measured in W2 were based on a reduced sample (see limitations section). The density index indicated the degree of tightness of the interconnections between family network members. Conflict density was measured by the number of conflictual ties present in a given network, divided by the network's number of available pairs (i.e., potential ties) in the network, including the respondent (Hanneman and Riddle 2005; Scott 2017). The number of potential ties was measured by $n \times (n-1)$, where n was equal to the total number of individuals in the network. For example, in a family network consisting of five family members and the respondent, the total number of individuals in the network is six; therefore, the number of potential ties was calculated as $6 \times (6-1) = 30$. If there were three conflictual connections, the conflict density would be $3/30 = 0.10$. Note that the conflict density was based not only on the conflictual links between respondents and their significant family members but also included all the conflictual links between the other significant family members in the network. The conflict density index ranged from 0 to 1, with one indicating that all significant family members, including the respondent, were interconnected by conflictual ties ($M = 0.12$, $\mathrm{SD} = 0.19$, in W1).

Respondents' betweenness centrality within their family networks indicated the extent to which respondents served as intermediaries between their significant family members who were not otherwise connected. In regard to conflict, a high betweenness centrality for a respondent would mean that the respondent was upset by all, or almost all, of their family members, while the other family members were not upset by each other. Similarly, all, or almost all, family members were upset by the respondent, but not by each other. In these cases, the tensions were centralized on the respondent, but according to the respondent, there were no tensions between their family members. It was calculated as the ratio of all the shortest paths between any two significant family members that passed through the respondent (Everett and Borgatti 2005; Marsden 2002). This indicator varied from 0 to 1, with one indicating that respondents were the nexus of all, or almost all, of their family members' tense relationships, but none of their family members were in conflict with each other, as they were not directly connected by a conflictual link ($M = 0.02$, $\mathrm{SD} = 0.09$, in W1). This indicator was greater when respondents were embedded in conflict circuits, such as when they were upset or tense with one family member, and they extended their family tensions by being in conflict with another family member. For example, if a respondent had a strained relationship with their son's partner, this tension could result in a conflict between the respondent and their son, without concurrently generating a direct conflict between the son and his partner. The respondent, in this case, becomes a critical node in the flow of tension and interpersonal conflict that shapes the family configuration.

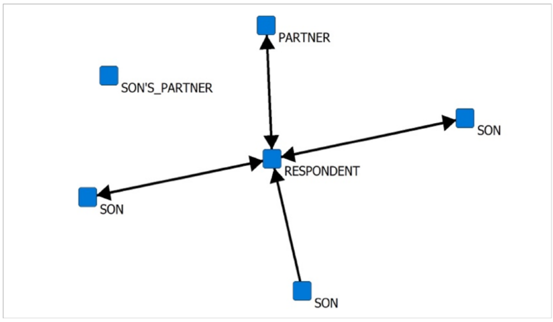
As the raw scores were not normally distributed, we dichotomized these different measures. Conflict density was dichotomized at a threshold of 0.10 to distinguish family networks with some conflict density from family networks with low or no conflict density. This means that if there was a conflictual relationship in at least 10% of the possible dyads, family networks were categorized as having *some* conflict, whereas if there was a conflictual relationship in less than 10% of the possible dyads, family networks were classified as having *low or no* conflict. For example, in a family network of six total individuals and with three conflictual relationships, the conflict density was 0.10 (3/30), and this family network was therefore reported as having *some* conflict. The same procedure, but with a different threshold, was applied to betweenness centrality. To distinguish respondents who were central in family conflict from those who were not, we set a value above 0 as a threshold, which refers to respondents who were intermediaries in at least some of their families' tense relationships. Overall, 34% of family networks were characterized by some conflict density, and 12% of respondents were qualified as having some centrality in conflict within their family networks in W1. The levels of conflict density and centrality were rather low in comparison with support density and centrality, but they are similar to those found in other research on negative ties in personal networks (e.g., Offer and Fischer 2018).

Conflict structures of networks are graphically illustrated in Figure 1, which shows three family networks from the sample, characterized by different conflict densities and respondents' centralities in conflict, with arrows pointing to conflict initiators (as perceived by the respondents). Figure 1a shows a family



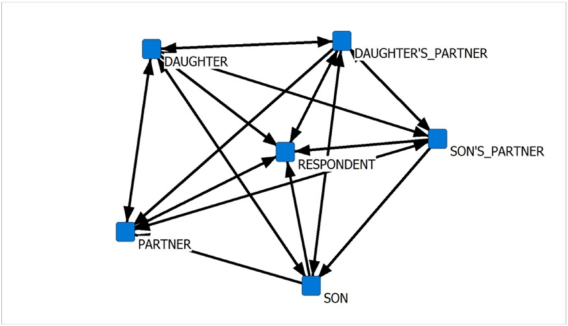
Family network a)

Conflict density = 0.00; Respondent's centrality in conflict = 0.00.



Family network b)

Conflict density = 0.23; Respondent's centrality in conflict = 0.45.



Family network c)

Conflict density = 0.77; Respondent's centrality in conflict = 0.02.

FIGURE 1 | Sampled family networks.

network in which no conflict was reported between any family members. Therefore, the conflict density and the respondent's centrality in conflict are both zero. Figure 1b shows a centralized conflict structure in which the respondent is associated with all conflicts that occur in the family network. Note that the conflict density is low in this case. Figure 1c shows a high-density conflict structure where the respondent has no centrality in the conflict.

6.3.3 | Loneliness

Loneliness was measured in W2, using the De Jong Gierveld six-item loneliness scale (De Jong Gierveld and Van Tilburg 2010). Since it was not measured in W1, only loneliness in W2 was included in the analyses (see Table 1). Using an indirect measure, the scale consisted of three negatively-worded items measuring "a general sense of emptiness," the feeling of "missing having people around," and "often feeling being rejected;" these were followed by three positively-worded items measuring the respondents' feeling of having "plenty of people to lean on in case of trouble," the feeling of "having many people to count on completely," and the feeling of "having enough people to whom one feels close" (De Jong Gierveld and Van Tilburg 2010, 124). The first three items measured the emotional component of loneliness, and the last three measured the social component. The overall loneliness score ranged from 0 to 6, with six indicating the greatest loneliness ($M = 1.57$, $SD = 1.65$, in W2). The Cronbach's α was 0.73. The average level of loneliness was low, but in line with the estimated prevalence of loneliness among older adults in Switzerland (34%; 95% CI [32%, 36%]; Storni et al. 2023) and in Europe (23%; 95% CI [18%, 27%]; Susanty et al. 2025).

6.3.4 | Stress

Stress was measured in W1 using Cohen's perceived stress scale (PSS), which consists of a series of four items asking respondents about their "ability to control important things in their life," "feeling confident about their ability to handle personal problems," "feeling that things were going their way," and "difficulties piling up so high that they could not overcome them." These different items tended to capture the extent to which respondents felt that their lives were "unpredictable," "uncontrollable," and "overloading" (Cohen 1986, 717). The PSS was not designed to measure stress specifically caused by the family context. Rather, it reflects individuals' subjective assessment of whether life circumstances—including a negative family context—exceed their adaptive capacity (Cohen et al. 1983). Indeed, a negative family context may be an important source of stress for older adults, as family remains one of the most important life domains in old age, influencing life satisfaction after health (Hsieh 2005). The overall PSS scores ranged from 0 to 4, with four indicating higher levels of stress ($M = 0.79$, $SD = 0.59$, in W1). The four items had a rather low level of reliability (Cronbach's $\alpha = 0.60$), indicating that they did not target identical aspects, but complementary ones in order to gain a broader perspective on stress (Cohen et al. 1983). Stress was measured in W1 and also in W2, to investigate how they correlated over time (see Tables 1 and 2).

6.3.5 | Control Variables

Drawing on the variables that have been found in the literature to be significant predictors of loneliness (cf. De Jong Gierveld 1998; De Jong Gierveld et al. 2015; Pinquart and Sörensen 2001), we also included a set of variables to account for possible confounding effects: support density, respondents' centrality in support, gender, age, citizenship, education level, area of residence, functional health (Katz et al. 1970; Rosow and Breslau 1966), marital status, offspring, and siblings. Support density and respondents' centrality in support were based on the same listed significant family members as for conflict, following the same procedure (Widmer et al. 2013).

TABLE 1 | Descriptive statistics of the variables used in the analysis ($N = 890$).

		Statistics						
		Variables used in W1				Variables used in W2		
		Range	**Mean**	**SD**	**α**	**Mean**	**SD**	**α**
Loneliness scale		[0–6]				1.57	1.65	0.73
Perceived stress scale		[0–4]	0.79	0.59	0.60	0.99	0.64	0.72
Some conflict density		[0–1]	0.34	0.47				
Some centrality in conflict		[0–1]	0.12	0.32				
Some support density		[0–1]	0.59	0.49				
Some centrality in support		[0–1]	0.37	0.48				
Gender	Male	[0–1]	0.52	0.50				
Regions of residence	Geneva	[0–1]	0.22	0.41				
	Wallis	[0–1]	0.19	0.39				
	Bern	[0–1]	0.32	0.47				
	Basel	[0–1]	0.28	0.45				
Citizenship	Foreign-born	[0–1]	0.16	0.36				
Age	Young-older adults (70–74 years)	[0–1]				0.24	0.43	
	Mid-range-older adults (75–84 years)	[0–1]				0.50	0.50	
	Eldest-older adults (85 years and above)	[0–1]				0.26	0.44	
Level of education	Low	[0–1]	0.09	0.28				
	Average	[0–1]	0.54	0.50				
	High	[0–1]	0.38	0.49				
Functional health	ADLs with difficulties	[0–1]				0.20	0.40	
Marital status	Married	[0–1]				0.61	0.49	
Offspring	Childless (never had or no living children)	[0–1]	0.13	0.34				
	Has children (at least one living child; no grandchildren)	[0–1]	0.15	0.35				
	Has grandchildren (at least one living child and/or grandchild)	[0–1]	0.73	0.45				
Has siblings	Yes	[0–1]	0.78	0.42				

Abbreviations: ADLs = activities of daily living; levels of education: average = apprenticeship and superior secondary; high = technical or professional college and university; levels of education: low = elementary and inferior secondary.

TABLE 2 | Bivariate correlations with confidence intervals ($n = 890$).

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Loneliness W2																				
2. Some conflict density W1	0.07*	1																		
	[0.00; 0.13]																			
3. Some centrality in conflict W1	−0.01 (ns)	0.41***	1																	
	[−0.07; 0.06]	[0.36; 0.47]																		
4. Some support density W1	−0.02 (ns)	0.09*	0.01 (ns)	1																
	[−0.09; 0.05]	[0.02; 0.15]	[−0.05; 0.08]																	
5. Some centrality in support W1	−0.09**	0.06 (ns)	0.06 (ns)	0.12***	1															
	[−0.15; −0.02]	[−0.01; 0.12]	[−0.01; 0.13]	[0.06; 0.19]																
6. Stress W1	0.19***	0.16***	0.09*	−0.05 (ns)	0.03 (ns)	1														
	[0.12; 0.25]	[0.10; 0.22]	[0.02; 0.15]	[−0.11; 0.02]	[−0.04; 0.10]															
7. Stress W2	0.39***	0.09*	0.01 (ns)	−0.03 (ns)	−0.06 (ns)	0.40***	1													
	[0.33; 0.44]	[0.02; 0.15]	[−0.06; 0.08]	[−0.09; 0.04]	[−0.12; 0.01]	[0.35; 0.46]														
8. Male W1	0.11**	0.00 (ns)	0.00 (ns)	0.04 (ns)	−0.20***	−0.11***	−0.08*	1												
	[0.04; 0.17]	[−0.07; 0.07]	[−0.07; 0.07]	[−0.03; 0.10]	[−0.26; −0.14]	[−0.18; −0.05]	[−0.15; −0.02]													
9. Foreign-Born W1	0.11**	−0.02 (ns)	−0.03 (ns)	−0.02 (ns)	0.05 (ns)	0.05 (ns)	0.06 (ns)	−0.07*	1											
	[0.04; 0.17]	[−0.09; 0.04]	[−0.09; 0.04]	[−0.08; 0.05]	[−0.02; 0.12]	[−0.01; 0.12]	[−0.00; 0.13]	[−0.14; −0.01]												
10. Young-older adults W2	−0.05 (ns)	0.10**	0.06 (ns)	0.05 (ns)	0.02 (ns)	−0.00 (ns)	−0.13***	−0.04 (ns)	−0.04 (ns)	1										
	[−0.12; 0.01]	[0.04; 0.17]	[−0.00; 0.13]	[−0.02; 0.12]	[−0.04; 0.09]	[−0.07; 0.07]	[−0.20; −0.07]	[−0.10; 0.03]	[−0.10; 0.03]											

(Continues)

TABLE 2 | (Continued)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
11. Mid-range-older adults W2	−0.00 (ns)	0.01 (ns)	0.06 (ns)	−0.04 (ns)	0.02 (ns)	0.00 (ns)	0.02 (ns)	−0.01 (ns)	0.01 (ns)	−0.56***	1									
	[−0.07; 0.06]	[−0.06; 0.07]	[−0.01; 0.13]	[−0.11; 0.03]	[−0.05; 0.08]	[−0.06; 0.07]	[−0.05; 0.08]	[−0.08; 0.05]	[−0.06; 0.08]	[−0.61; −0.52]										
12. Eldest-older adults W2	0.05 (ns)	−0.11**	−0.13***	−0.00 (ns)	−0.04 (ns)	−0.00 (ns)	0.11**	0.05 (ns)	0.03 (ns)	−0.33***	−0.59***	1								
	[−0.01; 0.12]	[−0.17; −0.04]	[−0.19; −0.07]	[−0.07; 0.06]	[−0.11; 0.02]	[−0.07; 0.07]	[0.04; 0.17]	[−0.02; 0.12]	[−0.04; 0.09]	[−0.39; −0.27]	[−0.64; −0.55]									
13. Low_educ W1	0.03 (ns)	−0.01 (ns)	−0.04 (ns)	0.05 (ns)	0.00 (ns)	−0.01 (ns)	0.07*	−0.11***	−0.01 (ns)	−0.11***	0.03 (ns)	0.07*	1							
	[−0.04; 0.09]	[−0.07; 0.06]	[−0.10; 0.03]	[−0.02; 0.11]	[−0.06; 0.07]	[−0.07; 0.06]	[0.00; 0.13]	[−0.18; −0.05]	[−0.08; 0.05]	[−0.17; −0.04]	[−0.04; 0.09]	[0.01; 0.14]								
14. Ave_educ W1	0.01 (ns)	−0.06 (ns)	−0.07*	−0.03 (ns)	0.00 (ns)	0.01 (ns)	0.03 (ns)	−0.12***	−0.11***	0.01 (ns)	−0.00 (ns)	−0.01 (ns)	−0.33***	1						
	[−0.06; 0.08]	[−0.12; 0.01]	[−0.13; −0.00]	[−0.10; 0.03]	[−0.07; 0.07]	[−0.06; 0.08]	[−0.04; 0.09]	[−0.18; −0.05]	[−0.17; −0.04]	[−0.05; 0.08]	[−0.07; 0.06]	[−0.08; 0.05]	[−0.39; −0.27]							
15. High_ educ W1	−0.03 (ns)	0.07*	0.09**	0.01 (ns)	−0.00 (ns)	−0.01 (ns)	−0.07 (ns)	0.19***	0.12***	0.05 (ns)	−0.01 (ns)	−0.03 (ns)	−0.24***	−0.84***	1					
	[−0.09; 0.04]	[0.00; 0.13]	[0.03; 0.16]	[−0.06; 0.07]	[−0.07; 0.06]	[−0.07; 0.06]	[−0.13; 0.00]	[0.12; 0.25]	[0.05; 0.18]	[−0.02; 0.11]	[−0.08; 0.05]	[−0.10; 0.03]	[−0.30; −0.18]	[−0.86; −0.82]						
16. ADLs with difficulties W2	0.16***	−0.01 (ns)	−0.04 (ns)	0.04 (ns)	−0.08*	0.11**	0.23***	0.01 (ns)	0.06 (ns)	−0.18***	−0.12***	0.31***	0.11**	0.03 (ns)	−0.09**	1				
	[0.10; 0.23]	[−0.08; 0.05]	[−0.10; 0.03]	[−0.03; 0.10]	[−0.14; −0.01]	[0.04; 0.17]	[0.16; 0.29]	[−0.06; 0.08]	[−0.00; 0.13]	[−0.24; −0.12]	[−0.18; −0.05]	[0.25; 0.37]	[0.04; 0.17]	[−0.04; 0.09]	[−0.15; −0.02]					
17. Married W2	−0.11**	0.04 (ns)	0.09**	0.05 (ns)	−0.07*	−0.06 (ns)	−0.08*	0.31***	−0.06 (ns)	0.15***	0.03 (ns)	−0.18***	−0.08*	−0.05 (ns)	0.10**	−0.07*	1			
	[−0.18; −0.05]	[−0.02; 0.11]	[0.02; 0.15]	[−0.02; 0.11]	[−0.13; −0.01]	[−0.12; 0.01]	[−0.14; −0.01]	[0.25; 0.36]	[−0.12; 0.01]	[0.08; 0.21]	[−0.03; 0.10]	[−0.24; −0.12]	[−0.15; −0.02]	[−0.11; 0.02]	[0.03; 0.16]	[−0.14; −0.01]				
18. Childless W1	0.08*	−0.07*	−0.08*	0.02 (ns)	0.01 (ns)	0.02 (ns)	0.03 (ns)	−0.12***	−0.04 (ns)	−0.01 (ns)	0.03 (ns)	−0.02 (ns)	0.00 (ns)	0.02 (ns)	−0.02 (ns)	0.02 (ns)	−0.23***	1		
	[0.01; 0.15]	[−0.14; −0.00]	[−0.15; −0.01]	[−0.04; 0.09]	[−0.05; 0.08]	[−0.05; 0.09]	[−0.04; 0.09]	[−0.18; −0.05]	[−0.10; 0.03]	[−0.08; 0.05]	[−0.04; 0.09]	[−0.09; 0.05]	[−0.07; 0.07]	[−0.05; 0.08]	[−0.08; 0.05]	[−0.05; 0.08]	[−0.29; −0.16]			
19. Has children W1	0.06 (ns)	0.03 (ns)	0.06 (ns)	0.04 (ns)	0.01 (ns)	0.03 (ns)	0.04 (ns)	0.06 (ns)	0.02 (ns)	0.13***	−0.02 (ns)	−0.11**	−0.06 (ns)	−0.02 (ns)	0.06 (ns)	−0.02 (ns)	0.06 (ns)	−0.16***	1	
	[−0.01; 0.12]	[−0.03; 0.10]	[−0.00; 0.13]	[−0.03; 0.10]	[−0.06; 0.08]	[−0.04; 0.10]	[−0.03; 0.11]	[−0.00; 0.13]	[−0.04; 0.09]	[0.06; 0.19]	[−0.08; 0.05]	[−0.17; −0.04]	[−0.13; 0.01]	[−0.09; 0.04]	[−0.01; 0.12]	[−0.08; 0.05]	[−0.00; 0.13]	[−0.22; −0.10]		

(Continues)

TABLE 2 | (Continued)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
20. Has grandchildren W1	−0.11**	0.03 (ns)	0.01 (ns)	−0.05 (ns)	−0.02 (ns)	−0.04 (ns)	−0.05 (ns)	0.04 (ns)	0.01 (ns)	−0.09**	−0.01 (ns)	0.10**	0.05 (ns)	0.01 (ns)	−0.03 (ns)	0.00 (ns)	0.12***	−0.63***	−0.67***	1
	[−0.17; −0.04]	[−0.04; 0.09]	[−0.06; 0.08]	[−0.11; 0.02]	[−0.08; 0.05]	[−0.10; 0.03]	[−0.12; 0.01]	[−0.03; 0.11]	[−0.06; 0.08]	[−0.16; −0.03]	[−0.07; 0.06]	[0.03; 0.16]	[−0.02; 0.11]	[−0.06; 0.07]	[−0.10; 0.03]	[−0.07; 0.07]	[0.05; 0.18]	[−0.66; −0.58]	[−0.71; −0.63]	
21. Has Siblings W1	−0.04 (ns)	−0.01 (ns)	0.05 (ns)	−0.04 (ns)	0.05 (ns)	0.03 (ns)	−0.01 (ns)	0.05 (ns)	−0.03 (ns)	0.12***	0.10**	−0.23***	0.04 (ns)	−0.06 (ns)	0.04 (ns)	−0.22***	0.12***	0.03 (ns)	−0.05 (ns)	0.02 (ns)
	[−0.10; 0.03]	[−0.08; 0.06]	[−0.01; 0.12]	[−0.11; 0.02]	[−0.02; 0.12]	[−0.04; 0.09]	[−0.07; 0.06]	[−0.01; 0.12]	[−0.10; 0.03]	[0.05; 0.18]	[0.04; 0.17]	[−0.29; −0.17]	[−0.03; 0.10]	[−0.13; 0.00]	[−0.02; 0.11]	[−0.28; −0.16]	[0.06; 0.19]	[−0.04; 0.09]	[−0.11; 0.02]	[−0.05; 0.08]

Note: $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

Control variables expected to change with aging (e.g., age, health, and marital status) were measured in W2 in order to analyze their impact on loneliness in W2. Table 1 presents the descriptive statistics of the key variables used in the analysis and the waves in which they were measured.

6.4 | Data Analyses

We first computed Pearson correlations for all variables used in the multivariate analyses. For network structures, we complemented these analyses with the F-test and the Kruskal–Wallis test, a non-parametric version of one-way ANOVA designed for cases where variables are not normally distributed. We then ran a two-step linear regression analysis to adjust for the statistical estimates of all covariates. First, we included both conflict structures (conflict density and respondent's centrality in conflict) from W1 as predictors in the first model to test which of them was most correlated with loneliness measured in W2 (Step 1). Second, we included eight measures from W1 (support density, respondent's centrality in support, gender, citizenship, educational level, region of residence, offspring, siblings) and three measures from W2 (age group, marital status, and functional health) as control variables (Step 2). Chi-square statistics, F-test values, adjusted R2, unstandardized (B) and standardized coefficients (β) were estimated for the full model. All of these analyses were run in R (R Core Team 2022).

To test whether stress in W1 mediates the relationship between conflict structures in W1 and loneliness in W2, we computed two mediating models between conflict structures (conflict density and respondent's centrality in conflict), stress, and loneliness using the PROCESS Macro in SPSS, a computational procedure for path analysis-based mediation analysis (Hayes 2022). Following Hayes (2022), we used conflict density and betweenness centrality in conflict from W1 as predictors (X), average stress score in W1 as the mediator (M), and loneliness scale score from W2 as the dependent variable (see Figure 2). Confidence intervals were estimated using bootstrapping with 10,000 bootstraps for each analysis (Hayes 2022).

7 | Results

Table 2 shows that loneliness in W2 was positively associated with conflict density and negatively associated with centrality in support in W1. Additional non-parametric bivariate analyses (see Supporting Information: Appendix 1) confirmed that respondents who were embedded in dense conflictual family ties in W1 were more likely to report higher loneliness scores in W2 ($\chi^2 = 4.14^*$; Kruskal–Wallis = 5.14*), and those respondents who were centrally positioned in family support in W1 reported lower loneliness scores in W2 ($\chi^2 = 6.98^{**}$; Kruskal–Wallis = 7.45**). Table 2 also shows that both conflict density in W1 and loneliness in W2 were positively and significantly associated with stress scores in W1 and in W2, with the two stress scores being positively and significantly correlated. Conflict density in W1 was also positively and significantly associated with respondents' centrality in conflict and support density in W1.

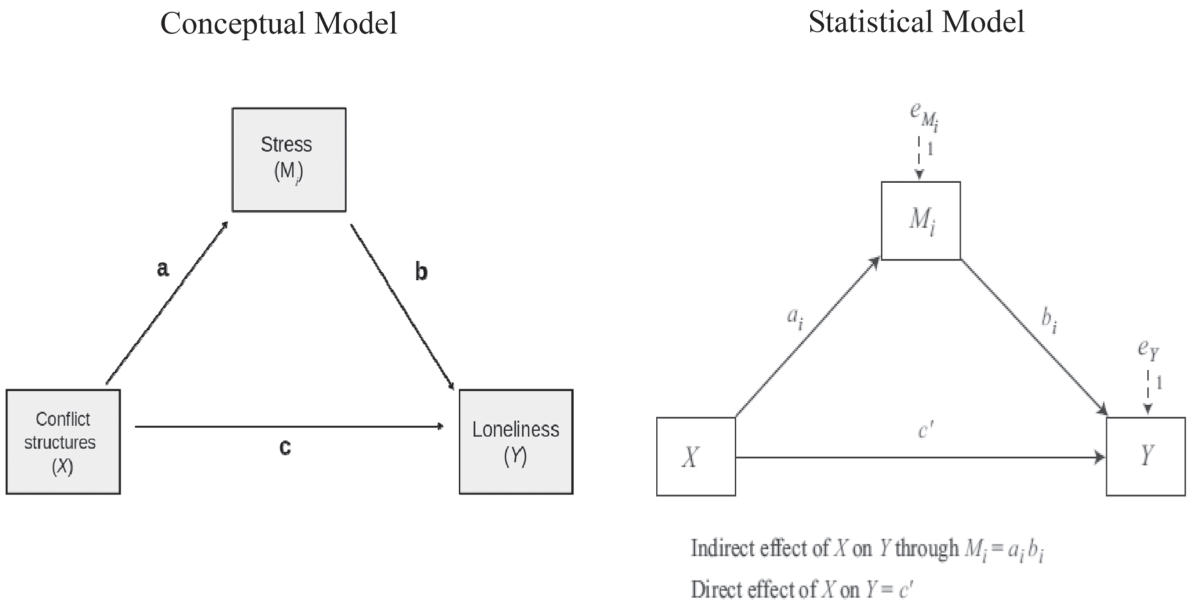


FIGURE 2 | Conceptual and statistical models used to assess the mediating effect of stress on the effect of conflict structures on loneliness (conceptual model 4, Hayes 2022). This applied path model (see the conceptual model) enabled simultaneous estimation of the direct relation of conflict structures (i.e., dichotomized density and betweenness centrality in conflict) to loneliness (c) and the indirect (i.e., mediated) relation via stress (a × b).

Table 3 presents a two-step model of linear regressions estimating the effects of both conflict structures in W1 on loneliness scale scores in W2, while controlling for potential confounding effects (see Model 2). Table 3 reveals a modest but nevertheless significant effect of family conflict density in W1 on loneliness in W2, as the respondents who reported higher levels of conflict density in W1 were more likely to score higher on the loneliness scale in W2 ($\beta = 0.10$, $p < 0.01$). Consistent with the bivariate results, respondents' centrality in conflict in W1 did not significantly predict loneliness in W2. To test robustness within the model, we included the number of family members upset by the respondent and the number of family members upsetting the respondent, all measured in W1. Neither of these structures showed a significant impact on loneliness in W2. Therefore, we limited the analyses to the conflict density and the respondents' betweenness centrality in conflict. We also included "living in an institution" in W2 in the analyses, and the results showed no difference between older adults who were living in an institution and those who were not. Stratified models were also run to examine the interactions between marital status in W2, conflict structures in W1, and loneliness in W2. The results showed that family conflict density in W1 was only significantly associated with loneliness in W2 for older adults married in W2.

To assess the role of stress in the relationship between family conflict structures and loneliness, we tested a mediating model with loneliness as the dependent variable and stress as the mediator, corresponding to the conceptual Model in Figure 2 (see Hayes 2022). Only conflict density, which was significantly associated with loneliness in the previous regression models, was used as a predictor variable in this additional analysis (see Table 3). In other words, we ran a mediating model in which the relationship between conflict density in W1 and loneliness in W2 was mediated by stress in W1 (see Table 4). In the mediating model, the estimate for conflict density was obtained by including all the control variables from the regression models that were significantly related to loneliness.

The results showed that the effect of conflict density in W1 on loneliness in W2 was mediated by respondents' level of stress as measured in W1 (see Table 4). The mediating effect of stress on the relationship between conflict density and loneliness was positive and significant (indirect effect = 0.10, $p < 0.001$; direct effect = 0.20, $p = 0.08$; total effect = 0.30, $p < 0.01$). In other words, the modest but significant share of the variance in loneliness measured in W2, as accounted for by conflict density in W1 in the regression model, was related to the increase in older adults' stress in W1, which was generated by conflict density within their families in W1. Overall, the results supported the hypothesis that family conflict would be positively associated with loneliness (H1); this association could be partly explained by the increasing levels of stress generated by family conflict, which, in turn, and over time, affected loneliness as measured 6 years later (H2).

8 | Discussion

In this study, based on a sample of 890 older adults interviewed twice over a six-year period, it was hypothesized that conflict structures in family networks are key to understanding loneliness in later life. The results of this research showed that conflict density in family networks, measured in W1, is modestly, yet significantly, associated with loneliness in W2. Conflictual and ambivalent family ties proved to have negative consequences for health and well-being (e.g., Chen and Feeley 2014; Lee and Szinovacz 2016; Offer 2020; Rook 1998; Rook and Charles 2017; Rook et al. 2012; Widmer et al. 2018), and may be critical in the development of loneliness. In line with research conducted on conflict in personal networks (e.g., Labianca et al. 1998; Widmer 2010), this suggests that it is not only direct negative ties with others that matter for older adults, but also the overall dynamics of conflict in family networks. Feuding family networks may represent contexts in which older adults see themselves embedded as collateral in persistent fights involving their children, their children's partners, or their children's children, revolving around the allocation of scarce resources such as time and care.

In this study, much of the association between conflict structures in W1 and loneliness in W2 was mediated by stress experienced by older adults in W1. Many of them and their significant family members are highly-interdependent emotionally, and in some cases, they are interdependent in terms of daily chores, finances, and instrumental support. Therefore, conflicts in family networks may contribute to the development of individual stress. In turn, stress translates into poorer psychological health (DeLongis et al. 2004; Offer 2020; Rook 1998; Rook and Charles 2017; Widmer et al. 2018). As their need for family support increases with age and declining

TABLE 3 | Regression coefficients for loneliness in W2 ($N = 890$).

	Loneliness W2					
	Model 1			**Model 2**		
Predictors	***B***	**SE**	**β**	***B***	**SE**	**β**
Conflict structures W1						
Some density (ref: Low)	0.29	0.13	0.08*	0.34	0.12	0.10**
Some centrality (ref: Low or none)	−0.19	0.19	−0.04	−0.07	0.18	−0.01
Support structures W1						
Some density (ref: Low)				−0.08	0.11	−0.02
Some centrality (ref: Low or none)				−0.23	0.11	−0.07*
Male (ref: female) W1				0.52	0.12	0.16***
Regions of residence W1						
Wallis (ref. Geneva)				0.45	0.17	0.11**
Bern				0.11	0.15	0.03
Basel				0.07	0.15	0.02
Foreign-born W1 (ref: Native-born)				0.54	0.15	0.12***
Age W2						
Mid-range-older adults (75–84) (ref. Young-older adults (70–74))				0.06	0.14	0.02
Eldest-older adults (85+)				0.03	0.17	0.01
Level of education W1						
Average (ref. low)				−0.05	0.20	−0.02
High				−0.20	0.21	−0.06
ADLs with difficulty W2 (ref: without)				0.62	0.14	0.15***
Married W2 (ref: unmarried)				−0.45	0.12	−0.13***
Offspring W1						
Has children (no grandchildren) (ref. childless)				−0.08	0.21	−0.02
Has grandchildren (at least one child and/or grandchild)				−0.46	0.17	−0.13**
Has siblings W1 (ref. None)				0.04	0.14	0.01
X^2		818.8***			981.5***	
F(df)		2.60 (2, 887)			5.44***(18, 871)	
Adjusted R^2		0.00			0.08^{a}	

Note: ^{a}significant change in R^2. $^{*}p<0.05$; $^{**}p<0.01$; $^{***}p<0.001$.
Abbreviations: β = standardized beta value; B = unstandardized beta value estimated by robust linear regressions for continuous variables; SE = standard error (B).

TABLE 4 | Mediation effects of individual stress in W1 on the relation between conflict density in W1 and loneliness in W2 ($N = 890$).

		Loneliness W2			
		B	**SE**	***p***	**CI 95%**
(a)	Some conflict density W1 → Stress W1	0.21	0.04	***	[0.13–0.29]
(b)	Stress W1 → loneliness W2	0.48	0.09	***	[0.30–0.66]
(c)	Indirect effect	0.10	0.03	***	[0.05–0.17]
(d)	Direct effect	0.20	0.11	ns	[−0.02–0.42]
(e)	Total effect	0.30	0.11	**	[0.08–0.52]

Note: Results of mediation analyses to examine whether the relationship between conflict density in W1 and loneliness in W2 was mediated by perceived stress in W1.
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.
Abbreviations: B = unstandardized B, beta value estimated by robust linear regressions for continuous variables; 95% CI = the upper and lower bounds of confidence intervals at 95%; SE = standard error (B).

health, older adults may strengthen their connections with family members with whom they have ambivalent relationships. Stressed by such a situation, older adults may contribute to increasing family conflict even more. Indeed, interpersonal conflict increases personal stress, and stressed individuals are more likely to be in conflict with their network members than nonstressed individuals (Brown and Veinot 2021; Ellwardt et al. 2020). Such a conundrum is likely to have detrimental consequences for older adults' physical and mental health, including loneliness (e.g., Rook 1998; Rook and Charles 2017; Rook et al. 2012).

Overall, socio-emotional selectivity processes make older adults reduce their social networks, avoid regular negative interactions with others, and maintain only relationships that generate low levels of stress as they get older, in order to adapt to the constraints of old age (Carstensen 1992; Carstensen et al. 1999). The results of the current study suggest that liberating oneself from negative and stress-generating family relationships may be a hard task for many older adults. A complementary analysis (see Supporting Information: Appendix 2) was conducted on individuals who completed network measures (network composition, support and conflict structures) in both waves of this study. The results showed that individuals with high-density conflict structures in W1 had more stable family compositions than individuals with low-density conflict structures. Across both waves, these families with high conflict density were characterized by a long-term focus on partners and children, as well as on grandchildren. This suggests that it is difficult for many older adults to escape from conflictual family networks. Getting older means, in some cases, turning back toward children and children's partners to seek support (Sauter et al. 2023), thus increasing the potential for conflict in family networks through overloading, interference, and decreases in autonomy among members of the network (Cornwell 2009, 2011; Offer and Fischer 2018). This may account for the notable widespread in ambivalent relationships in families as adults age (Connidis 2015; Fingerman et al. 2004; Girardin et al. 2018; Lüscher and Pillemer 1998; Offer 2020; Offer and Fischer 2018; Rook and Charles 2017). In many cases, older adults may be stuck in conflictual family networks for years due to a lack of alternatives to familial support. In such cases, socio-emotional selectivity processes may be quite limited.

9 | Limitations and Future Directions

Some limitations of the sample design should be acknowledged. Although it made sense to use well-separated data collection periods to measure how loneliness is affected in the long term by stress, likely and partly caused by family conflict, the time gap between the two waves is quite large (6 years). Several events and life changes may have occurred in between, so there are various pathways through which conflict structures in W1 may affect loneliness in W2.

Second, it was not possible to measure the association of conflict and support structures with stress and loneliness in W1, as the questions regarding loneliness were only asked in W2, and not in W1. When testing the mediating role of stress between network structures in W2 and loneliness in W2, the results were not statistically significant. Such findings may be accounted for by the reduction in the size of the subsample to only the respondents who completed the conflict network measures in W2. Due to time and budget constraints, the network measures were randomly administered to only two-thirds of the W2 sample ($n = 573$ instead of 890) to reduce the total length of the interview period. This drastic reduction of sample size in W2 may have affected the robustness and, thus, the statistical power of the statistical analyses conducted in W2 (Abraham and Russell 2008; Button et al. 2013). However, the results showed a strong association between stress measured in W1 and in W2 (see Table 2), highlighting the persistence of stress—likely and partly generated by family conflict density in W1 and contributing to loneliness in W2. This is consistent with the findings from other studies on the long-lasting associations of negative social interactions with health (Rook 2015).

Another limitation is the use of the perceived stress scale (PSS), which is not specific to family stress. General perceived stress can be caused by different life events and circumstances. However, in old age, family remains one of the most important domains influencing life satisfaction, aside from health

(Hsieh 2005). It follows that the effect of family conflict on perceived general stress may outweigh other sources of stress. This is especially true as older adults may wish to reduce their personal networks as they age and shift their focus to close family members on whom they can rely for emotional support, as suggested by socio-emotional selectivity theory.

Future research should consider using larger samples and multi-period longitudinal studies with reduced time gaps, focusing specifically on older adults' family network structures (support and conflict but also composition) and including questions about various sources of individual stress, to better capture the contribution of negative family interactions to one's overall stress. Such a design would allow researchers to better examine the positive and negative dynamics of family networks, both over time and in response to life course transitions, and their impact on individual stress and various health outcomes, including loneliness in later life. In this way, research would be able to further investigate the paradoxical effect of family relationships in conjunction with stress (DeLongis et al. 2004; Rook 1998; Widmer et al. 2018) on loneliness.

Furthermore, future research should investigate family conflict structures in greater depth, using the full range of network measures and concepts made available by network science (Bidart et al. 2020). Beyond centrality and density measures, the dimensions related to the subgroups present within family networks and the multiplexity of some family relationships linking positive and negative valence still need to be assessed (Girardin et al. 2018). It is also unclear whether the identity of the family members involved interacts with conflict structures. For example, we might expect conflict to spread more widely throughout the family if the respondent's partner were involved, given that he or she may be an intermediary with other family members.

Finally, it is necessary to examine how older adults cope with conflict structures in the long term, using both quantitative and qualitative data. While some probably develop effective coping strategies to overcome stress and maintain their well-being in the long term, others lack efficient coping mechanisms and are therefore at greater risk of loneliness.

10 | Conclusion

Loneliness in later life is not only related to a lack of family support and interaction, a well-documented mechanism, but it also results from conflict structures present in family networks due to the difficulty of developing socio-emotional selective strategies for many older adults. Conflict between significant family members is associated with emotional stress, which in turn negatively affects psychological well-being (Kiecolt-Glaser and Newton 2001; Lee and Szinovacz 2016; Offer 2020) by contributing to loneliness. Many individuals' loneliness stems from the long-lasting effects of stress resulting from negative family interactions years after they were observed. It is not only the direct negative relationships with significant family members that affect older adults' well-being, but also the complex network of both supportive and conflictual connections among their family members, which is associated with stress and eventually loneliness.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are openly available in CIGEV at https://gitlab.unige.ch/cigev.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Data S1:** pere70025-sup-0001-SupInfo1.doc. **Data S2:** pere70025-sup-0002-SupInfo2.doc.