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The Antecedents of Work–family Conflict and Well-being Among Volunteer Firefighters in Rural Communities

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Abstract

Volunteer firefighters represent important resources for the development of rural communities. The work of volunteer firefighters is stressful and influenced by a variety of factors, which is why we chose a psychological integrative research perspective. We investigated whether family size, coping self-efficacy, and social support are related to work–family conflict and well-being, conducting a cross-sectional study with 770 volunteer firefighters in rural communities from Austria, a country where volunteer fire brigades make an important contribution to people's lives. Measures included self-assessment scales, distributed via an online survey. We considered confounding factors (sex, age, education, work situation, and years in service), utilized hierarchical linear regression, and conducted multiple path analyses. The results showed a dual-buffering effect of self-efficacy on work–family conflict and well-being. Family size was associated with work–family conflict, and social support appeared to play both a direct and mediating role. Finally, we suggest enhancements to safety training and guidelines, and the implementation of work–family culture programs and activities for starting a family.

Keywords: volunteer firefighters, self-efficacy, dual-buffering effect, rural community resilience, family

Antécédents du conflit travail-famille et bien-être des pompiers volontaires en région rurale

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Résumé

Les pompiers volontaires sont une ressource importante pour le développement des communautés rurales. Leur travail est stressant et influencé par divers facteurs, ce qui explique notre choix d'une approche de recherche psychologique intégrative. Nous avons cherché à déterminer si la taille de la famille, l'auto-efficacité face aux difficultés et le soutien social, étaient liés au conflit travail-famille et au bien-être. Pour ce faire, nous avons mené une étude transversale auprès de 770 pompiers volontaires exerçant en milieu rural en Autriche, pays où les pompiers volontaires jouent un rôle important dans la vie des citoyens. Les mesures comprenaient des échelles d'auto-évaluation, diffusées par le biais d'un questionnaire en ligne. Nous avons pris en compte les facteurs de confusion (sexe, âge, niveau d'études, situation professionnelle et ancienneté), utilisé une régression linéaire hiérarchique et effectué des analyses de cheminement multiples. Les résultats ont mis en évidence un double effet protecteur du sentiment d'efficacité personnelle sur le conflit travail-famille et le bien-être. La taille de la famille était associée au conflit travail-famille, et le soutien social semblait jouer un rôle à la fois direct et médiateur. Enfin, nous suggérons d'améliorer la formation et les consignes de sécurité, ainsi que la mise en œuvre de programmes et d'activités favorisant l'équilibre travail-famille et l'accompagnement des personnes fondant une famille.

Mots-clés : pompiers volontaires, auto-efficacité, double effet protecteur, résilience des communautés rurales, famille

1.0 Introduction

Volunteer firefighters are a professional group that is often at the centre of crises, disasters, or accidents in rural communities in many countries around the world (Haski-Leventhal & McLeigh, 2009). Our study focuses on Austria, an Alpine country with a long and significant tradition of volunteer fire brigades in rural areas. In a country roughly the size of the US state of Maine and with a similar population to New Jersey, there are over 4,400 volunteer fire brigades (Österreichischer Bundesfeuerwehrverband, 2022). These brigades are independent public corporations with specific tasks and rights and "fulfill a state mandate to prevent, eliminate or minimize damage in the event of fires, accidents, technical malfunctions, natural disasters and other catastrophes" (Oö. Landesfeuerwehrverband, n.d., p. 1). As in every country, this group of volunteer (non-career) firefighters face additional pressure and stress as they simultaneously manage their primary work, family obligations, and the demanding temporary role of a firefighter in communities. Volunteer firefighters are second jobholders, which means they have "double duty" or "double trouble" in the form of increased work–family conflicts and severe challenges to personal well-being (Boyd et al., 2016). From a research perspective, the demanding personal situations of volunteer firefighters were traditionally reflected by considering job demands-resources models and work–family conflict models from psychology. These models were studied separately from one another so far. In this study, we connect them by integrating different lines of research on volunteer firefighters in rural communities (e.g., Hughes, 2015). In particular, we want to integrate different lines of research that took family-related (i.e., family size), personality-related (i.e., self-efficacy), and contextual factors (i.e., social support) into account, considering the complex challenges for volunteer firefighters in rural communities (e.g., Cowlishaw et al., 2008).

First, we focused on work–family conflict and the well-being of volunteer firefighters as dependent variables. Work–family conflict represents an "inter-role conflict in which work and family role demands are mutually incompatible; each role places unique demands on a person's time and energy" (Shreffler et al., 2011, p. 170). Work–family conflict is an important factor in the daily community activities of volunteer firefighters; it is directly related to emotional problems and indirectly related to safe working practices or activities related to work problems (Smith et al., 2018). Well-being refers to an individual being "content with oneself and being able to balance one's emotional, mental, and physical health" (Kling et al., 2022, p. e736). Well-being represents an essential social-emotional indicator for many professions and is an important goal in the firefighter community and work culture (e.g., Jacobsson et al., 2020). Research indicates that work–family conflict and well-being are related to each other; this is because conflicts represent stressors for individuals and can lead to emotional exhaustion and negative effects on well-being (Ozduran et al., 2023). However, to our knowledge, no volunteer firefighter studies within rural communities have addressed work–family conflict and well-being in a related and integrative manner. Our study was aimed at addressing this gap.

Second, we assumed that family size, self-efficacy, and social support are related to both work–family conflict and well-being. Concerning family size as a family context factor, we focused on a core family with close relationships, including a partner and children, following the expectation that family size is related to work–family conflicts. In a prominent model of work–family conflict from Michel et al. (2011), the number of children as well as marital status represent essential predictors of such conflict. Family size might be related to work–family conflicts because family members consume time and other resources and

because there are mutual demands and support. In our study, we also expected that family size might be related to well-being based on previous research. For example, in a study by Basińska and Wiciak (2013), firefighters reported marriage and children as being important for their well-being. Family members can serve as bridges to social contexts in rural communities or represent social capital or resources that are linked with well-being (e.g., Nomaguchi & Milkie, 2020). There are also strong emotions (e.g., dissatisfaction) in close relationships between firefighters and their family members that can affect well-being (e.g., Pasca & Wagner, 2023). While there is some evidence regarding the relationships between family size, work–family conflict, and well-being, a combined analysis is lacking, which drove our analyses in this study.

We also expected that self-efficacy is related to work–family conflict and well-being. In our study, self-efficacy is stress-related self-efficacy and about individual coping behaviour. In the firefighting context, it can be defined as a "firefighter's perceived capability for managing stress and trauma exposure encountered during work situations" (Lambert et al., 2012, p. 81). We assumed here that high self-efficacy leads to firefighting stress being managed individually before it reaches the family, where it can cause problems or conflicts. For example, Glaser and Hecht (2013) found a negative relationship between (general) self-efficacy and work–family conflict variables (among university employees). We also expected that high self-efficacy increases the well-being of firefighters in rural communities. For example, Prati et al. (2010) found that self-efficacy has a buffering effect between stress and quality of life in rescue workers. We examined self-efficacy in our study as we assumed that it could act as a single or double buffering effect for negative work–family conflict and positive well-being. If such a buffering effect could be demonstrated, it would also provide an innovative basis for social-emotional support programs for volunteer firefighters in rural communities.

We also assumed that the community factor of social support affects work–family conflict and well-being such that social support has a problem-solving capacity that can provide relief for individual problems. In turn, this relief should have a positive effect on work–family conflict and well-being. There is strong evidence that social support can reduce work–family conflict (French et al., 2018). Concerning well-being, Isaac and Buchanan (2021) found that firefighters who reported higher levels of peer support also reported lower levels of stress. It also seems to be the case that self-efficacy is related to social support. On the one hand, social support increases self-efficacy in solving problems through learning from others, but on the other hand, self-efficacious people also specifically seek support from others (e.g., Regehr et al., 2003). This focus in our study creates an innovative situation in research in that it is not entirely clear whether social support should be considered an independent or mediating variable within the personal and family contexts of volunteer firefighters.

Third, we expected that different potential confounders could affect our dependent variables. For example, Jacobsson et al. (2015) found that female and male firefighters differ in how they describe their experiences of critical events, which indicates that they process demands and stress differently. Goh et al. (2021) showed that age has a significant effect on psychological distress among firefighters, with mature firefighters being more resilient than younger firefighters. Concerning education, Soteriades et al. (2022) found that educational level was inversely related to stress, probably because higher-educated firefighters exhibit higher motivation for stress management. Furthermore, Billings and Focht (2016) found that firefighters who had a second job reported poorer sleep quality than those who did not, while Schnell

et al. (2020) found a positive correlation between years of service and resilience among firefighters. We expected that the selected confounders would help us ensure the validity of our study (Schjoedt & Sangboon, 2015). The evidence presented here must be viewed as preliminary and limited, especially in the contexts of rural communities. It is neither conclusive nor definitive regarding the direction of the confounders. It merely provides some rationale for including these confounding variables in our study. Furthermore, for the selection of these confounders, we can also find that sex, age, and education are related to primary stressors in an existing stress process model (Prizer & Hudson, 2023). Work situation (as employment opportunities) and years of service (as job tenure) are also part of a model of job stress and health (Huang et al., 2002).

Furthermore, we wanted to learn more about mediating processes and the position of the selected factors in a chain of effects, both to improve the validity of the study and to better distinguish between triggering and maintaining factors. Such learning is important for designing triggering events or support processes in the firefighting contexts of rural communities. Here, we focused on three main assumptions and related models. In a first model, we assumed that well-being is directly influenced by work–family conflict, which is affected by social support. This assumption is, for example, supported by research from Seiger and Wiese (2009) favouring social support as an antecedent of work–family conflict. In a second model, we assumed that social support has a direct effect on well-being and is itself influenced by work–family conflict. Our assumptions for this reversed mechanism were stimulated by research, for example, from Zheng and Wu (2018). In a third model, we assumed that both variables had a simultaneous direct effect on well-being. This assumption of a simultaneous effect was triggered by research from Lizano et al. (2014).

2.0 Focus of the Study

Summarizing and building on the previously reported research findings, we first integrated different lines of research on volunteer firefighters in the present study. We based our assumptions on a combined research perspective related to the job demands-resources and work–family conflict models. Such an integrated perspective can build bridges between separate lines of research, relate widely disparate research results, and trigger an innovative multi-faceted research perspective for volunteer firefighters in rural communities. Second, we explored the relationships between five major variables (family size, self-efficacy, social support, work–family conflict, and well-being) that can provide a connecting conceptual basis. We explored the relationships between these variables in a two-step process via appropriate statistical procedures. In the first step, we explored significant effect patterns via hierarchical multiple regression. In the second step, to improve the explanatory mechanisms and validate our hypothetical assumptions, we used path analyses to identify the mediating processes between our variables. The validity of our interpretations was also strengthened by considering five potentially confounding variables (sex, age, education, work situation, and years of service). Overall, we wanted to consider bipolar (positive and negative) experiences of firefighters as well as important personal, family, and contextual factors, and relevant confounding variables. In our study, we included 10 variables that can provide a multi-faceted basis for developing advanced psychosocial diagnostic and intervention programs for volunteer firefighters in rural communities. Based on the foregoing, we formulated the following hypotheses (H) and research question (RQ):

- H1: Work–family conflict and well–being are negatively correlated.
- H2a: Self-efficacy is negatively related to work–family conflict and positively related to well-being (dual-buffering effect).
- H2b: Social support mediates the relationship between self-efficacy and work-–family conflict/well-being.
- RQ1: Given the mixed prior evidence, how is family size related to work–family conflict and well-being, and is this relationship mediated by social support?

All models were controlled for sex, age, education, work situation, and years of service as confounding variables.

3.0 Method

3.1 Sample and Data Collection Procedure

Our study was conducted via the online survey platform LimeSurvey (https://www.limesurvey.org). The study was based on data from a larger research project that the second author conducted as part of a dissertation (Ortner, 2023). Here, we used selected variables that were analyzed in more depth and with additional assumptions than in the original dissertation project. The research process in this study was aligned with the ethical rules of the associated research institution. Since this project did not involve any impairment of physical or psychological integrity or other rights, a full ethical review was not legally required. In addition, and as part of the second author's dissertation, the research project was evaluated several times by various experienced researchers as well as the faculty's examination department. It should be noted that the study was conducted during the COVID-19 pandemic, during which special circumstances (e.g., increased frustrations with work and personal relationships) existed for volunteer firefighters and their families (Gaughan et al., 2022). Volunteer firefighters may have been particularly stressed during this time; this is the reason why we decided to publish our findings even with a slight delay.

All the participants were over 18 years old, completed an informed consent form, and were requested to fill out the questionnaire only once. The online questionnaire was distributed to active firefighters through multiple channels (managers of the Austrian Federal Fire Brigade Association, a firefighter information platform *Fireworld* (https://www.fireworld.at), Facebook and Instagram groups for firefighter services, a magazine for firefighters (*Brennpunkt*), companies that offer firefighter equipment, as well as family and friends' network). The distribution of the questionnaire was permitted by the respective responsible persons of the various channels. Overall, we had 879 participants in the sample; 770 were volunteer firefighters, 34 were volunteer firefighters who worked at a professional fire department, and 75 were professional firefighters from Austrian and German companies. We used only data from volunteer firefighters, who are mostly located in rural areas in Austria. In our sample, 66.71% of the participants came from areas with up to 5000 inhabitants, 24.77% from areas with 5000 to 20000 inhabitants, and 8.52% from areas with 20000 inhabitants or more. In Austria, areas with up to 20000 inhabitants are officially considered rural areas (Bundeskanzleramt Österreich, 2010). Some larger cities (about six in Austria) have professional fire departments, which we did not include in our analysis. Volunteer firefighters operate mainly in rural areas.

3.2 Measures

Our questionnaire was in German language, and only participants with German language skills were able to take part in the study. German language skills are also usually a prerequisite for participation as a volunteer firefighter in Austria, as accurate mutual communication is important during firefighter operations. The English scales were translated into German by the second author of the study. The original scales and their translations were presented and evaluated in a consultation session as part of a doctoral program. To pretest the linguistic quality of the questionnaire, six firefighters answered the questionnaire and related questions on comprehensibility, suitability, as well as the wording of the questions. A video conference was also held with a professional firefighter to discuss the questionnaire in more detail. Based on all responses, minor linguistic adjustments were made to improve the clarity of questions. All the items measuring self-efficacy, social support, and work–family conflict used a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

3.2.1. Potential confounding variables. The confounder variables were sex (female, male), age, education (low, medium, and high), work situation (not working, marginally busy, employed part-time, employed full-time), and years of firefighting service. Education was originally measured with eleven options, which were recoded into three levels (roughly comparable to middle school/junior high, (senior) high school, and college level). Recoding was done to convert the original nominal types into ordinal or interval measurements which better fit our assumptions of linear relationships between our variables. Regarding the work situation, no work means, according to local customs, approximately 0 hours; marginally busy, 6 to 12 hours; part-time, 20 to 30 hours; and full-time, 40 hours of work per week.

3.2.2. Family size. There is a complex situation regarding the measurement of family sizes (e.g., Office for National Statistics, n.d.). To measure family size, we asked participants about the number of children they had and whether they lived alone (value = 0) or were in a partnership (value = 1). To get the family size score, we added the answers to these two questions. A family size score of 0 meant that the participant had no children and lived alone. With this variable, we did not specifically distinguish between partners and children, because (due to the reported findings) we had to assume that both can have a positive or negative impact on the family. We were aware that, for example, the family size of a person in a partnership without children is the same as that of a single person with one child. Such constellations could have different effects on our dependent variables. We found correlations between the calculated family size and work–family conflict and well-being of 0.14 and 0.13 (see Table 1). For the variable number of children alone, these correlations were 0.12 and 0.11, and for the variable partnership status 0.15 and 0.12. We assume that both variables correlate with our dependent variables to a similar degree. We had no theoretical or data-based assumptions that a partner has a more positive or negative impact on conflict and well-being than a child. In addition, we also correlated these two variables with the derived variable family size. This yielded a correlation of 0.70 between family size and partnership status, and 0.95 between family size and number of children. This suggests that the number of children is weighted more heavily than marital status in our variable family size. We also focused on core families where all members are more or less present most of the time. We did not account for firefighters who may have children who do not live with them.

Table 1. *Descriptive Statistics for the Study Variables (722 < N < 771)*

Variables	**Frequency**	**Percentage**	***M***	***SD***	**Min**	**Max**	**% Missing**
Confounders							
Sex							0.39
Female	98	12.78					
Male	669	87.22					
Age			33.81	10.81	18	75	0
Education							6.10
Low	332	45.92					
Medium	285	39.42					
High	106	14.66					
Work situation							0
Not working	32	4.16					
Marginally busy	12	1.56					
Part-time	24	3.12					
Full-time	702	91.17					
Years of service			16.00	10.27	1	60	0.26
Independent variables							
Family size			1.53	1.39	0	6	1.04
Self efficacy			3.71	0.50	1.85	5	4.03
Social support			4.35	0.60	1.33	5	1.69
Dependent variables							
Work-family conflict			2.05	0.75	1.00	4.75	5.71
Well-being			4.41	0.86	1.36	6	2.99

3.2.3. Self-efficacy. To measure self-efficacy, we used a 20-item firefighter coping self-efficacy scale from Lambert et al. (2012). Example items included "Handling difficult environmental working conditions (e.g., darkness, weather)," "Handling the death of a patient or person I am responding to," or "Coping with feelings of guilt."

3.2.4. Social support. For measuring social support, we used 12 items (e.g., "There is a special person who is around when I am in need," "My friends really try to help me," or "I can talk about my problems with my family") from the Multidimensional Scale of Perceived Social Support from Zimet et al. (1988).

3.2.5. Work–family conflict. We adapted 12 items from the *Multidimensional Measure of Work–Family Conflict* from Carlson et al. (2000) to the situation of firefighters. We had items like "My job at the fire department takes me away from my family activities more than I would like," "The time I have to dedicate to my job at the fire department prevents me from equally participating in household tasks and activities," or "I have to miss family activities because I have to spend a lot of time working at the fire department."

3.2.6. Well-being. To measure well-being, we used the 14-item Mental Health Continuum–Short Form (MHC–FS) from Keyes et al. (2008; see also: https://peplab.web.unc.edu/wp-content/uploads/sites/18901/2018/11/MHC-SFoverview.pdf). Items such as "During the past month, how often do you feel ... happy?", "... satisfied" or "… interested in life?" were answered on a 6-point scale ranging from 1 (never) to 6 (every day).

All our scales were based on self-assessments, which can lead to common method bias (i.e., variance that is related to the measurement method rather than to the measured constructs). We explored this potential problem using Harman's single-factor test for common method bias (Harman, 1967). We conducted one exploratory factor analysis on all 58 items concerning work–family conflict, well-being, self-efficacy, and social support. We found one factor to be the most powerful explanatory factor, explaining 19,49% of the total variance, which is far below the 50% reference value. Therefore, we concluded that we had an approximate indication that our measurement instruments were not subject to common method bias.

3.3 Statistical Analyses and Analytic Approach

The data were analyzed using SPSS 30 (for the descriptive and correlational analyses) and R-JAMOVI statistical language (for the hierarchical regression analyses and path analyses). For examining missingness mechanisms, we performed Little's MCAR test on all 10 variables (Little, 1988). This test yielded: $\chi^2 = 195.04$, $df = 174$, $p = 0.13$. Therefore, we assumed MCAR (completely random missing values) in the data. Due to the large sample size and low missing rates, we refrained from using methods such as FIML (Full Information Maximum Likelihood) or multiple imputation (e.g., Newman, 2014; Schlomer et al., 2010). Our correlation coefficients within Table 2 referred to pairwise correlations. A combination of hierarchical regression analyses and path analyses is appropriate for first analyzing predictors and then analyzing the pathways from the independent to dependent variables to identify direct and indirect mediating processes. Since we combined two different theoretical strands for the first time in research on volunteer firefighters, payed attention to special control variables, and had diverging research results, this approach seemed more appropriate than simply testing path models. This combined approach can be found in many relevant works, such as Liu et al. (2023). Hierarchical regression analyzes represent a diagnostic tool, allow for pretesting control variables, and help test whether predictors are important, which is fundamental before building more complex path models. This combined approach also reduces the risk of overfitting or misinterpreting direct and indirect paths without fully understanding complex relationships between factors. The hierarchical regression analyses were used to analyze the variables associated with our dependent variables. The potential confounders were entered into the first regression model (Model 1). In the second regression model (Model 2), we also entered family size and self-efficacy as proxies for family-related and personal factors. In the third and final regression model (Model 3), we added social support as a situational factor that might also be relevant for the mediating effects.

Table 2. *Internal Consistency Estimates (Cronbach's Alpha) and Correlations for the Study Variables (683 < N < 771)*

Variables	***CA***	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Sex		-								
Age		-.19***	-							
Education		.08*	.02	-						
Work situation		-.22***	-.02	-.06	-					
Years of service		-.27***	.88***	-.01	.01	-				
Family size		-.11**	.59***	-.02	.03	.53***	-			
Self-efficacy	0.85	-.09*	-.08*	.01	-.01	-.05	.01	-		
Social support	0.90	.08*	-.03	-.01	-.05	-.01	.15***	.29***	-	
Work–family conflict	0.91	-.12**	.03	.00	.12**	.08*	.14***	-.19***	-.18***	-
Well-being	0.91	.00	.11**	-.01	-.07	.11**	.13***	.30***	.49***	-.16***

Note. CA = Cronbach's alpha. *$p < .05$. ** $p < .01$. *** $p < .001$.

The order in which the variables were entered depended on the strength of the expected effects and related causal priority. First, we considered the weakest variables (confounders with distant causal priority), then the second strongest (family and personal factors with medium distance), and then the strongest (situational factors with short distance) (e.g., Petrocelli, 2003). Path analyses (based on the observed variables) were used to analyze the mediating processes and improve the explanatory power of our sets of variables. The aim was to identify a mediating variable that demonstrated a good fit to the data. Here, we tested three different models and tried to explore a fourth (saturated) model. In all models, we assumed that all independent variables were related to all dependent variables and that the personal factors (family size and self-efficacy) would affect the mediating variable as well as the dependent variable(s). In the first sequence, Model A, we assumed that well-being would be directly related to work–family conflict, which is associated with social support. In Model B (as a flipped Model A), we assumed that well-being would be directly related to social support, which is associated with work–family conflict. In Model C, we gave up the sequence and assumed that both work–family conflict and social support would be directly related to well-being. In Model D, we tried to explore an alternative model based on the results of the first three models.

4.0 Results

4.1 Descriptive Statistics and Correlation Analyses

The descriptive statistics for the study variables are displayed in Table 1. The majority of the volunteer firefighters in our sample were male (87.22%) and working full-time (91.17%). Regarding educational level, 45.92% had a low level of education (without high school), 39.42% had a medium level of education (a high school diploma), and 14.66% had a high level of education (a college or university degree). The average age was 33.81 years, with, on average, 16 years of service. We also had some elderly people in our sample, which is due to the fact that older people are still active in the volunteer fire service. They are no longer involved in critical operations but can still take on advisory roles. The average family size was 1.53 members (without the person who participated in the study). Social support was at a high level ($M = 4.35$), whereas self-efficacy ($M = 3.71$) and well-being ($M = 4.41$) were at medium to high levels. Work–family conflicts were scored as medium to low ($M = 2.05$). Based on these descriptive statistics, our sample was assessed as "average" with no extreme scores in the many variables relevant to our study.

The internal consistency reliability estimates for the measures and the correlations for the study variables are depicted in Table 2. The self-efficacy, social support, work–family conflict, and well-being scales all had high internal consistency (Cronbach's alpha [CA] > .80). The correlations showed that, except for education, the confounding variables were mostly correlated with the other study variables. Work situation was significantly related to work–family conflict. Except for family size and self-efficacy, our major study variables were all significantly correlated with each other. In summary, the correlations showed that, as expected, our study variables were related, which was a basic requirement for further analyses. With the exception of the correlation between age and years of service, we found average correlations across the three variable groups (control, independent, and dependent variables). This suggests that the variables within the blocks were relatively independent and distinct. For example, in our study, family size and social support correlated significantly but weakly ($r = .15$), also illustrating their independence.

4.2 Analysing Hierarchical Relationships

We performed an assumption check in preparation for the multiple regression analyses (Flatt & Jacobs, 2019). The tests for homogeneity of residual variances indicated some assumption violations (highest value of Breusch–Pagan: 28.0, $p < .001$) and normality of residuals (Shapiro–Wilk: 0.98, $p < .001$). Therefore, for our analyses, we used the general linear model based on bootstrap confidence intervals and robust estimates (Kim & Li, 2023).

Table 3 summarizes the results of the hierarchical multiple regression analyses, which indicate correlational but not causal relationships. Confidence intervals (CIs) used a probability of 95% to contain the true value of the regression estimates. The upper part of Table 3 depicts the results on work–family conflict. First, we included only the confounder variables (from sex to years of service), which accounted for 4.0% of the variance in work–family conflict (Model 1). Second, the personal factors of family size and self-efficacy were added (Model 2), explaining 11.0% of the variance. Third, the situational factor of social support was included (Model 3), which increased the explained variance to 14.0%. In Model 3, the statistically significant standardized regression coefficients showed that sex was associated with work–family conflict: Female firefighters had lower work–family conflict than male firefighters ($b^* = -.09$, $p < .05$). We also found that age, employment level, and years of service were related to work–family conflict: A higher age corresponded with lower work–family conflict ($b^* = -.39$, $p < .001$), but a higher employment level ($b^* = .06$, $p < .05$) and more years of service with a higher work–family conflict ($b^* = .24$, $p < .01$). Furthermore, work–family conflict was higher with a larger family size ($b^* = .26$, $p < .001$), but lower with higher self-efficacy ($b^* = -.19$, $p < .001$) and higher social support ($b^* = -.18$, $p < .001$).

The lower part of Table 3 displays the results on well-being. Model 3 with all our variables explained 28.0% of the variance, whereas Model 2 (without social support) explained 12.0%, while Model 1 (with the confounders) only explained 2.0%. In the Model 3, we found that well-being was higher with higher self-efficacy ($b^* = .19$, $p < .001$) and higher social support ($b^* = .42$, $p < .001$). Overall, as there were several significant correlational relationships between our study variables, the results provided a sufficient basis for identifying mediating variables with path analysis.

Table 3. *Hierarchical Multiple Regression Analysis to Predict Work–Family Conflict and Well-Being*

Work–family conflict						
	Model 1 (N = 680)		Model 2 (N = 659)		Model 3 (N = 652)	
	b [95% CI]	*b**	*b* [95% CI]	*b**	*b* [95% CI]	*b**
Sex	-.19 [-.37/-.01]	-.09*	-.26 [-.46/-.07]	-.12**	-.21 [-.39/-.03]	-.09*
Age	-.01 [-.02/-.00]	-.17*	-.02 [-.03/-.01]	-.33***	-.03 [-.04/-.02]	-.39***
Education	.03 [-.02/-.00]	.02	.05 [-.03/.12]	.04	.04 [-.03/.12]	.04
Work situation	.12 [.05/.17]	.10***	.09 [.03/.15]	.08	.07 [.01/.13]	.06*

Table 3 continued

Years of service	.02 [.00/.03]	.21**	.02 [.00/.03]	.21*	.02 [.01/.03]	.24**
Family size			.12 [.07/.16]	.21***	.14 [.09/.19]	.26***
Self-efficacy			-.34 [-.46/.23]	-.23***	-.28 [-.40/-.16]	-.19***
Social support					-.22 [-.31/-.12]	-.18***
R^2	.04 ***		.11***		.14***	
R^2 change	.04		.07		.03	

Well-being

	Model 1 (N = 698)		Model 2 (N = 668)		Model 3 (N = 661)	
	b [95% CI]	*b**	*b* [95% CI]	*b**	*b* [95% CI]	*b**
Sex	.04 [-.16/.25]	.02	.13 [-.07/.32]	.05	.01 [-.18/.20]	.00
Age	.00 [-.01/.02]	.04	.00 [-.01/.02]	.06	.01 [.00/.03]	.17
Education	-.01 [-.10/.07]	-.01	-.04 [-.13/.05]	-.03	-.02 [-.09/.06]	-.02
Work situation	-.08 [-.18/.02]	-.06	-.06 [-.15/.03]	-.05	-.05 [-.14/.04]	-.04
Years of service	.01 [-.01/.02]	.09	.01 [-.01/.02]	.06	-.00 [-.02/.02]	-.01
Family size			.05 [-.01/.11]	.08	-.00 [-.06/.05]	-.01
Self-efficacy			.51 [.38/.65]	.30***	.32 [.20/.45]	.19***
Social support					.60 [.48/.72]	.42***
R^2	.02**		.12***		.28***	
R^2 change	.02		.10		.16	

Note. *b* = unstandardized coefficients; *b** = standardized regression coefficient; R^2 = coefficient of determination; CI = confidence interval. * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

4.3 Identifying Mediation Effects

The results of our path analyses are shown in Table 4. In Model A, we tested a model in which social support was assumed to be related to work–family conflict, which was assumed to be associated with well-being. This model explained 11% of the variance in well-being, but did not fit well with our data ($\chi^2 = 159.0$). The same was true for our Model B, in which we assumed that the sequence of relationships between social support and work–family conflict was reversed compared to Model A. Again, the fit for this model was not sufficient ($\chi^2 = 70.4$), but the explained variance increased to 22%. In Model C, we tested whether social support and work–family conflict were

simultaneously rather than sequentially related to well-being. Both the explained variance (25.0%) and the model fit ($\chi^2 = 17.4$) improved but did not reach an acceptable fit. In Model D, we identified a saturated model ($\chi^2 = 0.0$), again with an explained variance of 25.0%. We do not consider the saturated model to be a confirmed perfect model, nor one that can be compared with others based on goodness-of-fit values (e.g., Raykov et al., 2013). We view it merely as an exploratory model whose relationships are provisionally plausible regarding our data and our hypothetical assumptions.

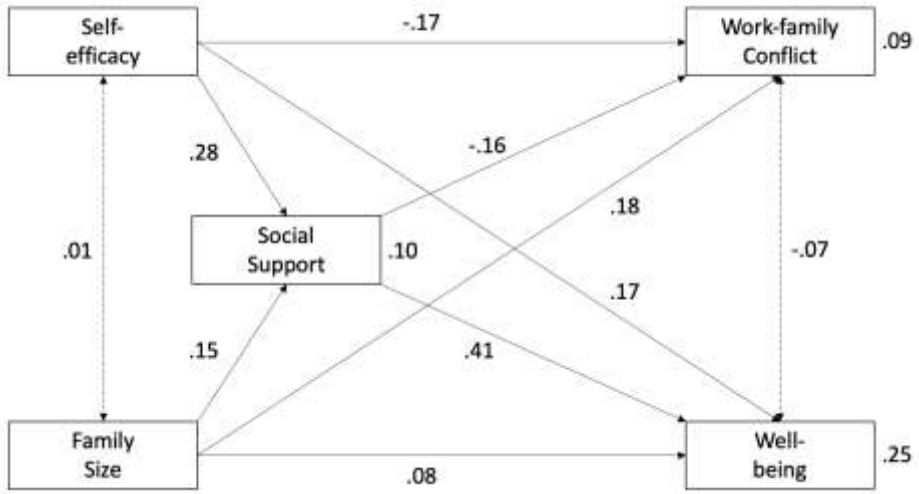
Table 4. *Fit Statistics on Different Path Analysis Models (N = 676)*

Model	χ^2	**df**	**p**	**RMSEA**	**SRMR**	**CFI**	R^2
A	159.0	3	<.001	.28	.10	.53	.11
B	70.4	3	<.001	.18	.08	.80	.22
C	17.4	1	<.001	.16	.04	.95	.25
D	0	0	1.00	.00	.00	1.00	.25

Note: Models: A ... social support > work–family conflict > well-being**;** B ... work–family conflict > social support > well-being**;** C ... social support + work–family conflict > well-being**;** D ... saturated. R^2 is for well-being.

Figure 1 depicts a visualization of the path analysis results of our saturated model (Model D). The standardized regression coefficients (showing changes in units of standard deviations) are all statistically significant ($z > 2.48$, $p < .05$). The explained variances are also all statistically significant ($Wald\ \chi^2 > 66.8$, $p < .001$). In this model, with this combination of variables, we found no significant relationship between work–family conflict and well-being ($r = -.07$, $p > .05$). Self-efficacy and family size also did not correlate ($r = .01$, $p > .05$). The regression coefficients showed the following direct correlational relationships between our study variables: work–family conflict was high when self-efficacy was low, family size was large, and social support was low; well-being was high when self-efficacy, family size, and social support were also high; and social support was high when self-efficacy and family size were high. Although not shown in Figure 1, we also tested for indirect effects. There was a positive indirect relationship between family size and well-being ($b^* = .06$, $p < .001$) and a negative one on work–family conflict ($b^* = -.03$, $p < .01$). An indirect relationship from self-efficacy was also found for well-being ($b^* = .11$, $p < .001$) and work–family conflict ($b^* = -.05$, $p < .001$). These indirect effects were consistent with a mediating role of social support, though—given the saturated model's zero degrees of freedom—they should be read as descriptive path estimates rather than as confirmatory evidence.

Figure 1: Results of a Saturated Path Analysis (Model D) of the study variables.



Note: All path coefficients are all statistically significant and are shown close to the arrows that point in one direction. The explained variances are also all statistically significant and are shown to the right of the dependent variables. The non-significant correlation coefficients are displayed next to the broken arrows, which point in both directions.

5.0 Discussion

Our study pursued two main objectives that are anchored in the current literature on volunteer firefighters. The first objective was to integrate two different lines of research on the job demands-resources model and work–family conflict models as related to volunteer firefighters. We achieved this objective by selecting and relating certain variables which are conceptually well connected and represent a new broader perspective in research and practice of firefighting in rural communities. The second main objective was to analyze and further validate relationships by combining different data analysis approaches. By this means, our study contributes significantly to new knowledge about how the positive and negative experiences of volunteer firefighters relate to factors studied cumulatively in different lines of research, and the direct and indirect associations between these factors, even when controlling for relevant confounders.

Of the hypotheses and the research question formulated in the study section, H1 and H2a were supported, H2b was partially supported, and RQ1 (family size) revealed an ambivalent pattern. Specifically, family size showed a positive association with work–family conflict but no meaningful association with well-being. This finding builds the basis for further clarifying research in the future on volunteer firefighters in rural communities. Concerning our first hypothetical assumption, we found that although work–family conflict and well-being were correlated (negatively), their shared proportion of variance corresponded only with small to medium effect sizes. Then, as expected in our hypothetical assumptions, we found self-efficacy and social support to be strongly related to both work–family conflict and well-being. Here, our research confirms existing findings but also leaves unexplained variance that can provide impetus for further research: Future activities could consider not only the quantity but also the quality of social support. For example, future research could examine what type of support (e.g., emotional, esteem, informal, or tangible) is provided by whom (e.g., family, friends, trainers, or crisis intervention teams) and how it is provided in rural communities (e.g., online, offline) (e.g., Ko et al., 2013). In our study, family size was found to increase work–family conflict but had no or only

a weak effect on well-being. Our research highlights the importance of this ambivalence and related future research. Whatever the case, this issue needs to be clarified in more detail in future studies, where family size could be broken down by marital status and number of children to identify the person-specific causes of a support–stress balance.

Regarding our confounding variables, we did not formulate and test specific hypotheses, as these variables served only as control variables in the statistical analyses. However, it emerged that female firefighters may experience fewer work–family conflicts because they are more frequently involved in childcare and—if at all—are more likely to work part-time, which could reduce such conflicts. It can also be assumed that older age reduces such conflicts, as children are then older and require less care and therefore less time. The more volunteer firefighters work and the more years of service they have, the greater the likely long-term individual burden, which then leads to more conflicts. However, these assumptions were not tested and can be investigated in more detail in follow-up studies, including also the interactions between such confounding variables.

We conducted path analyses in order to learn more about the mechanisms that lie behind the relationships between our dependent and independent variables. We tested multiple models leading to one in which social support represented a major mediating variable: We found correlations between self-efficacy and family size with social support, which in turn was associated with work–family conflicts and well-being. Volunteer firefighters with high self-efficacy seem to have recognized how valuable social support and activating it is for personal efficacy (Maddux, 2016). Furthermore, family size was associated with social support, leading to more social capital or more opportunities for social support in communities. Positive effects of family size on well-being are likely to outweigh the negative effects; however, when the family becomes larger or very large, then the effect is likely to reverse again (e.g., Heitzmann & Pennerstorfer, 2025). This assumption of an outweighing process, and our identified model as a whole, might be innovative in research but need to be tested in future studies.

5.1 Limitations

Our study has shortcomings that limit the conclusions but also provide a basis for further research activities beyond those described in the discussion section. First, our cross-sectional study was correlational and did not allow us to estimate the potential causal relationships between the variables in focus. However, we chose analysis strategies that were sensitive to the confounding variables and mediating processes. Long-term controlled studies should be conducted in the future, which would enable a more conclusive assessment of the causal mechanisms at play. Second, we had a self-report design and used self-assessment scales for many variables, but these can produce common method bias. We did not find any indications of such bias, but future studies could use unobtrusive measures and more advanced methods for bias testing based on structural equation modelling (Tehseen et al., 2017). We only had one data source available regarding problems in family and professional life. In the future, it would be helpful to also survey family members or colleagues. The generalizability of the results is limited. We had many men in the sample, most of whom were employed full-time. Some of our indicators could be further refined in future studies. For example, not only years of service might be important, but also the hours per month or per year spent volunteering in the fire service. Family size could also be considered in a more differentiated manner by distinguishing between partners and children, whereby it could also be relevant which of these persons actually or permanently live in the same household. We

translated most of our instruments from English into German and tested them for comprehensibility using preliminary tests; however, we did not conduct a formal equivalence check. Finally, it should be noted that the study was conducted during the COVID-19 pandemic, in which special circumstances (e.g., increased frustrations with work and personal relationships) existed for volunteer firefighters and their families (Gaughan et al., 2022). Volunteer firefighters may have been particularly stressed during this time. However, they may also have had positive and protective experiences through operations and social interactions with others.

5.2 Practical Implications

Our study offers a multi-faceted psychological research perspective on volunteer firefighters in rural communities. This perspective considers the diverse challenges that volunteer firefighters face due to their professional, family, and community duties. Beyond the individual level, these findings have implications for rural community development more broadly: Volunteer fire brigades represent critical, often fragile, community infrastructure in areas with limited access to professional emergency services, and their long-term viability depends on retaining volunteers whose family and well-being needs are adequately supported. We aimed to demonstrate how selected factors are interconnected to stimulate and promote a more unified approach to volunteer firefighting in rural communities.

In our study, we found that self-efficacy is a dual-buffering variable strongly associated with work–family conflict and well-being. Professional career firefighters are given training on the development of such personality characteristics, but in volunteer firefighting in rural communities, the topic is less relevant, although more important. For example, a training study by Petruzzello et al. (2016) showed that volunteer firefighters react more emotionally to stress than professional career firefighters. Based on our study results, we recommend that trainers further reflect on significantly integrating coping self-efficacy and other forms of self-efficacy into safety training or clinical practice guidelines for volunteer firefighters in rural communities (Johnson et al., 2020). Training curricula, exercises, exams, and evaluations could be systematically linked to specific competencies and associated self-efficacy. For example, Moran and Starling (2005) present four core competencies, including dimensions such as task skills, task management skills, contingency skills, and environmental skills. Such core competencies could lead to a focus on related self-efficacy and also to the development of specific measurement instruments that could be used in order to get a more evidence-based and professional view on volunteer firefighting in rural communities (for example, see the Guide for Constructing Self-Efficacy Scales from Bandura, 2006).

We also found that social support has an important mediating role as well as double-triggering function for work–family conflicts and well-being. Social support could therefore be placed at the heart of work–family programs to build a work–family culture for volunteer firefighters in rural communities (e.g., Fiksenbaum, 2014). Such a work–family culture could encompass, for example, issues regarding social time, or coping with sacrifices by creating a satellite family member (e.g., Hill et al., 2020). Furthermore, in our study, family size was related to social support, work–family conflict, and well-being. Of course, it is difficult to intervene in the family planning of volunteer firefighters. However, it would be helpful for many young people if they received support in maintaining close relationships with partners, raising children, or starting a family in the context of work, or double work, as in the case of volunteer firefighters in rural communities (e.g., Allen & Eby, 2016).

Volunteer fire brigades are a cornerstone of emergency response infrastructure in rural areas with limited access to professional services. Our findings showed that self-efficacy and social support were central levers for reducing work–family conflict and supporting well-being among volunteer firefighters, while family size played a more ambivalent role. Strengthening these personal and social resources through targeted training and family-supportive organizational practices may help sustain volunteer engagement and, in turn, the resilience of rural communities that depend on it.

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