


Predictors of life-satisfaction in Croatian war veterans: a cross-sectional study

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Aim: To examine the predictors of life satisfaction among Croatian war veterans.

Methods: A cross-sectional survey was conducted using a 14-item questionnaire distributed across multiple Croatian cities. We used multiple linear regression to determine the influence of demographic, social, and lifestyle factors on life satisfaction, measured by the Satisfaction with Life Scale (SWLS).

Results: Our sample included 167 veterans. Higher monthly household income ($\beta = 0.30, P < 0.001$) and greater friendship satisfaction ($\beta = 0.29, P < 0.001$) were associated with higher life satisfaction, while not having a partner was associated with lower life satisfaction ($\beta = -0.24, P < 0.001$). Other variables, including age, gender, pet ownership, and religiosity, were not significant predictors. The final model accounted for 33.1% of the variance in life satisfaction ($R^2 = 0.33$).

Conclusions: Social and economic stability, as well as the quality of social relationships, play a crucial role in the subjective well-being of Croatian war veterans, and can thus be considered as targets for support interventions. Future research should explore the effects of demographic, social, and lifestyle factors on well-being and life satisfaction in this population on a wider sample and dive deeper into the meaning of pets in the lives of veterans.

Keywords: life satisfaction, war veterans, Croatia, social support, income, friendship, partnership, pet ownership

Introduction

Life satisfaction is one of the key components of subjective well-being and an indicator of successful aging (1, 2). It refers to the degree to which a person positively evaluates the overall quality of their life as a whole (3), and has been empirically confirmed to influence socioeconomic attainment (4, 5), risk of suicide (6), and all-cause mortality (7, 8).

Due to exposure to different types of traumatic events during military service, such as threat to one's own life or the life of close ones, witnessing the suffering of others, active

participation in combat, captivity, or wounding, a considerable percentage of veterans will develop long-term problems that will impact their life satisfaction (9). While the majority will not develop or maintain post-traumatic stress disorder (PTSD), subthreshold reactions should not be overlooked (10). The consequences of exposure to traumatic events are also evident in other aspects of mental health, primarily in the increase of depression, anxiety, and addiction (11).

A study among war veterans and military personnel (n = 12 806) identified emotional dysregulation, including problem anger, as a growing issue that could be associated with suicidality and violence (12). It found that 30.7% of veterans and 16.4% of military personnel reported problem anger, while 14.9% and 7.4% reported physical violence, respectively. Further analyses conducted among veterans (n = 4,326) indicated that correlation with suicide attempts occurs primarily through suicidal ideation and violent behavior (12). In fact, suicide is considered a public health crisis among service members and veterans both in the USA and around the world (13-15). In the USA in 2022, it was the twelfth-leading cause of death for veterans of any age and the second-leading cause of death for veterans under the age of 45 years (16).

A study evaluating life satisfaction among older Korean veterans who fought in the Vietnam War found that their perception of their physical health and the amount of received social support were significant determinants of life satisfaction in later life and successful aging (17). Life satisfaction was higher in veterans with higher education and income levels (2, 18) and those who were married (18). Likewise, social support and a positive attitude toward life have been shown to alleviate the effects of trauma (19, 20). Research on older civilians also showed that social support played a crucial role in having better subjective well-being (21, 22).

Many veterans face difficulty in social functioning that may negatively affect their life satisfaction. This can include difficulties re-establishing family and intimate relationships, problems with employment, social withdrawal due to discomfort, difficulties relating to other people who did not have military experience, and overall reduced participation in community activities (23). A lack of understanding or recognition from society, difficulty finding meaningful roles, loss of identity, and limited access to community-based support systems have also been recognised as challenging in a study on Iraq and Afghanistan war veterans (24).

Social support was found to affect adaptation and psychological well-being (25). These periods of adaptation are particularly challenging for veterans due to the change in communities, environments, and separation from the support of other military groups on base, as well as challenges related to family stability and reintegration. Research has shown that reintegration into established family roles can be difficult after deployment, with veterans experiencing stress and functional impairment in parent and partner roles, and that strong family support is associated with better psychosocial adjustment and well-being following military service (26). These findings highlight the importance of addressing the mental health of those living in or returning from war-affected regions. Social support greatly impacts and protects mental health in American veterans (27), with those who report strong social support from family members or friends also reporting better qual-

ity connections and improved spirituality (28). Alongside social support, veterans who are married or in a relationship show greater life satisfaction, a finding that is consistent with evidence from the general population indicating that married or partnered individuals tend to report higher life satisfaction than those who are single or divorced (29, 30). Strong familial bonds provided a stabilizing force for veterans struggling with PTSD, as close family relationships appeared to contribute significantly to a sense of belonging and emotional security, which, in turn, mitigates some of the adverse psychological effects associated with combat trauma (11). In this sense, veterans who had conflictual family environments showed higher PTSD symptoms in later life (31). Research on American war veterans showed that subjective well-being and life satisfaction are positively correlated with social support, and inversely correlated with post-military service variables, such as stressful life events after homecoming, and physical health (18).

Croatian war veterans fought in the Croatian War of Independence, which began in 1991 after Croatia declared independence from the Socialist Federal Republic of Yugoslavia and lasted until 1995. Although previous studies of Croatian veterans found that there are various factors influencing the life satisfaction of war veterans; however, their findings have been inconsistent. Croatian veterans suffering from severe PTSD symptoms indeed consistently report a poorer health-related quality of life and express lower satisfaction with life, which showcases deeper and longer effects of trauma on everyday life (32). Simultaneously, those who have greater social support, especially from friendships, also score better on psychological and well-being evaluations, while those who lack such support show more intense PTSD symptoms and slower recovery (33). Veterans also report higher stress while transitioning back to civilian life (34). Lastly, war veterans who engage in regular religious practices and spiritual reflection report enhanced resilience and a more positive outlook on life, which suggests that faith can be an important factor for the long-term psychological impacts of combat stress (35).

While there have been studies on Croatian war veterans and the effects of PTSD and trauma exposure (10, 11, 32-36), there is still insufficient data about the factors associated with their life satisfaction. Social and economic factors, such as income, partnership status, and friendship satisfaction, have not yet been examined as predictors of life satisfaction in Croatian veterans altogether. We aimed to explore this gap by examining predictors of life satisfaction among war veterans in Croatia and to help better understand the psychological effects of combat exposure.

Methods

Study design and procedure

We conducted a cross-sectional survey from October 2022 to September 2023 using a 14-item questionnaire in the Croatian language devised by the authors. Participants were Croatian Homeland War veterans recruited by convenience sampling from veteran associations in Split, Zagreb, Osijek, Ploče, Omiš, Podstrana, Zadar, and Rab. The authors provided veterans with a pen-and-paper survey and an informed consent form. The latter

consisted of the authors' names, the research aims and procedures, potential benefits and risks of participation, information on confidentiality and data security, and an option for participants to either agree or decline participation. They wrote their full name and surname on the paper as a sign of agreement. Anonymity and confidentiality of data were strictly maintained by separating the informed consent forms from the questionnaires and analysing the data without any identifying information. Ethical approval for the study was obtained from the Ethics Committee of the Faculty of Humanities and Social Sciences, University of Split (approval no. 2181-190-00-1-22-0039, December 12, 2022).

Instruments

Data were collected using the Satisfaction with Life Scale (SWLS) and demographic questions that gathered information on age, sex, pet ownership, religion, income, education level, social network characteristics, and everyday activity patterns (Questionnaire S1 in online supplementary document at <https://osf.io/kjuf8/>). The SWLS is a widely used self-report instrument designed to measure global life satisfaction as a cognitive-judgmental process (e.g., "In most ways, my life is close to my ideal.") (37). It consists of five items, each rated on a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The SWLS demonstrated good reliability with high internal consistency (Cronbach's $\alpha=0.87$) and strong two-month test-retest reliability ($r=0.82$).

Data analysis

We presented categorical variables as frequencies and percentages and continuous variables as medians with interquartile ranges. We used multiple linear regression to examine the associations between the predictors and life satisfaction (SWLS) among Croatian war veterans, and compared nested models using analysis of variance (ANOVA). We evaluated assumptions for the final regression model (model 3) by examining the distribution of SWLS (descriptive statistics, histogram, and Shapiro–Wilk test) and by inspecting regression diagnostics, including a Q–Q plot of standardized residuals, residuals-versus-fitted values, collinearity statistics (VIF), and influence diagnostics (Cook's distance). Heteroskedasticity was assessed using the Breusch–Pagan test. Diagnostic plots and statistics are reported in Appendix C in online supplementary document at <https://osf.io/kjuf8/>. We conducted all statistics using the Jamovi software (38).

Results

We tested 222 Croatian war veterans, but excluded 53 who did not want to provide informed consent and 2 who impartially completed the survey. This left us with a sample of 167 participants, who were predominantly from Split, followed by Zagreb, Zadar, Ploče, Omiš, Podstrana, and Rab. There were 157 (94%) men and 10 (6%) women aged between 45 and 75 years (median=55, interquartile range=8). The median number of children among participants was 2, with a range from 0 to 6. **Table 1** and **Table 2** present the descriptive statistics for the predictor variables included in the linear regression model. For binary variables, only one category is shown, as the complementary category is implied.

Table 1. Descriptive statistics of predictor variables in the linear regression model: personal and lifestyle factors

	Number (%)
Male	157 (94)
Yes	75 (44.9)
In a relationship	133 (79.6)
Religious	151 (90.4)
Level of education	
Primary school	13 (7.8)
Secondary school (three years)	40 (24)
Secondary school (four years or more)	88 (52.7)
Undergraduate program	14 (8.3)
University or a graduate program	11 (6.6)
Postgraduate program	1 (0.6)
Monthly household income (in EUR)	
<796	53 (31.7)
796–1327	64 (38.3)
1327–1859	27 (16.2)
1859–2390	14 (8.4)
>2390	9 (5.4)

Table 2. Descriptive statistics of predictor variables in the linear regression model: recreational and social well-being factors

	Number (%)
Exercise frequency	
Never	14 (8.4)
Once a month	18 (10.8)
Few times per month	24 (14.4)
Once a week	15 (8.9)
Multiple times per week	54 (32.3)
Every day	42 (25.2)
Having a hobby	
Yes	118 (70.7)
Frequency of engaging in hobbies	
Once a month	7 (5.9)
Few times a month	29 (24.6)
Once a week	37 (31.4)
Multiple times per week	26 (22)
Every day	19 (16.1)
Frequency of spending time with friends	
Never	2 (1.2)
Once a year	3 (1.8)
Few times a year	10 (6)
Once a month	4 (2.4)
Multiple times a month	22 (13.2)
Once a week	20 (12)
Multiple times a week	58 (34.7)
Every day	48 (28.7)
Friendship satisfaction	
Extremely satisfied	7 (4.19)
Quite satisfied	6 (3.59)
Neither satisfied nor dissatisfied	19 (11.38)
Not very satisfied	96 (57.49)
Completely dissatisfied	39 (23.35)

For example, the values listed for “Religious”, “In a relationship”, “Pet owner”, “Male”, and “Having a hobby” represent the proportion of participants in that category, while the inverse category (e.g., non-religious, single, not a pet owner, female, not having a hobby) is not displayed, but can be inferred (coding of variables is presented in Table S1 in online supplementary document at <https://osf.io/kjuf8/>).

Model prediction

The overall multiple linear regression model was statistically significant and explained a substantial portion of the variance in life satisfaction (Table 3). The results (Table 4) revealed that partnership status was a significant predictor of life satisfaction ($\beta = -0.24$, $P < 0.001$). Given that partnership status was coded as 0 = in a partnership and 1 = not in a partnership, the negative regression coefficient indicates higher life satisfaction among veterans who are in a partnership compared to those who are not in a partnership. Monthly household income ($\beta = 0.29$, $P < 0.001$) and friendship satisfaction ($\beta = 0.29$, $P < 0.001$) were statistically significant predictors of life satisfaction among Croatian war veterans. Age, gender, pet ownership, number of children, exercise frequency, having a hobby, hobby engagement frequency, time spent with friends, and religiosity were not significant predictors.

We constructed a series of regression models to identify the most important predictors of life satisfaction. Model 1 included all initially considered predictor variables. Based on significance levels, non-significant variables were removed to create a more parsimonious model 2. Model 3 was then developed by excluding one additional variable that had been significant in model 1, but not in model 2.

An ANOVA comparing the models showed that reducing the number of predictors did not significantly weaken the model’s predictive power. Given the lack of improvement from including additional variables, we selected model 3 – containing the fewest predictors – as the final model (Table 4). This model explained 33.1% of the variance in life satisfaction ($R^2 = 0.331$), with all remaining predictors (monthly household income, partnership status, and friendship satisfaction) being statistically significant. Detailed regression coefficients for models 1–3 (unstandardized β with 95% CIs and 95% CIs for standardized β) are provided in Table S2 in online supplementary document at <https://osf.io/kjuf8/>.

Table 3. Model summaries

Model	R	R ²	Adjusted R ²	Durbin-Watson
Model 1	0.611	0.373	0.320	1.73
Model 2	0.587	0.344	0.328	1.77
Model 3	0.575	0.331	0.318	1.74

Table 4. Effect of predictors on life satisfaction in Croatian war veterans

	Standard error	Standard estimate	t-ratio	P-value
Model 1				
Age	0.017	0.061	0.87	0.388
Gender	0.416	-0.031	-0.46	0.647
Pet ownership	0.203	0.026	0.37	0.712
Level of education	0.110	0.168	2.30	0.023
Monthly household income	0.096	0.230	3.07	0.003
Partnership status	0.310	-0.324	-2.82	0.006
Number of children	0.101	0.005	0.06	0.952
Exercise frequency	0.069	-0.097	-1.26	0.209
Having a hobby	0.384	0.168	1.39	0.165
Frequency of engaging in hobbies	0.104	0.171	1.37	0.171
Frequency of spending time with friends	0.071	0.114	1.43	0.155
Friendship satisfaction	0.124	0.232	2.91	0.004
Religiosity	0.332	-0.037	-0.54	0.587
Model 2				
Level of education	0.104	0.126	1.84	0.068
Monthly household income	0.089	0.262	3.77	0.001
Partnership status	0.242	-0.233	-3.47	0.001
Friendship satisfaction	0.104	0.270	4.07	0.001
Model 3				
Monthly household income	0.087	0.296	4.38	0.001
Partnership status	0.243	-0.244	-3.61	0.001
Friendship satisfaction	0.102	0.293	4.46	0.001

Assumption checks for the final regression model (model 3) are summarized in Tables S3-S6 in online supplementary document at <https://osf.io/kjuf8/>. The mean SWLS scores was 4.50 (SD = 1.45), and the Shapiro–Wilk test indicated deviation from normality ($W = 0.974$, $P = 0.003$). Visual inspection of the histogram and diagnostic plots indicated an approximately unimodal SWLS distribution and generally acceptable residual behavior. The Breusch–Pagan test did not indicate heteroskedasticity ($BP = 0.023$, $P = 0.880$). Multicollinearity was low, with VIFs ranging from 1.05 to 1.11. Cook's distance values were generally small (median = 0.00222), with a maximum of 0.302.

Discussion

The aim of this study was to explore which factors influence life satisfaction among Croatian war veterans. The results showed that life satisfaction was significantly predicted by monthly household income, partnership status, friendship satisfaction, and, to some extent, by the level of education.

The outcomes on friendship satisfaction align with previous research that both having and meeting with friends, as well as having good quality friendships, are important for overall life satisfaction (36). Similarly, prior research has demonstrated a positive association between social support and life satisfaction among war veterans (39). However, existing correlational studies do not provide causal information, which would explain whether social support increases well-being or whether individuals with higher well-being tend to have more friends. However, such relationships are difficult to test empirically.

The significant role of education and monthly household income in predicting life satisfaction also aligns with previous findings, which reported their small to medium correlations with life satisfaction (40). Moreover, individuals who earned more on average and those who earned more over time reported higher levels of life satisfaction. Individuals in the high- or middle-income groups have also been found to experience greater life satisfaction compared to those in the middle- or low-income groups, as did those with higher levels of education (40). These two variables are likely to give veterans more opportunities for personal development and economic stability, which results in greater life satisfaction. One particular study on Korean Vietnam War veterans highlighted similar patterns, where marriage, higher income, and social support were positively associated with life satisfaction (17).

However, research in the general population of the UK reported that having children has been shown to enhance life satisfaction (41). Another study found that a higher number of children has also been correlated with greater life satisfaction (42). In contrast, in our study, the number of children did not significantly predict life satisfaction. Additionally, several other variables that have been found to influence life satisfaction in previous research were not significantly associated with it in our sample. These findings suggest that veterans' life satisfaction may be influenced by different factors, possibly related to unique family dynamics, stress, or trauma experiences.

Contrary to our results, prior studies have demonstrated the psychological advantages of animal companionship for veterans. A study conducted in a sample of child abuse survivors and war veterans examined the effects of animal-assisted intervention on war veterans with PTSD and found a positive association between dog companionship and emotional well-being (43). Similar findings of greater life satisfaction of pet owners compared to non-owners were reported in a study by Bao and Schreer (44). Moreover, O'Haire *et al.* (45) found that veterans with PTSD who have service dogs show better mental health and wellness. This difference may suggest that, for example, emotional bond with a pet, as well as the specific role of the pet (*e.g.*, service animal or pet), might be more important than simple ownership.

Engagement in sports and physical activities, as well as in leisure activities, is associated with subjective well-being and overall quality of life among veterans (46, 47). However, we did not find these two factors to be significant predictors of life satisfaction in our analysis. Exploring specific types of activities in which veterans engage (*e.g.*, physical, social, or leisure activities), as well as the quality of their engagement, might provide further explanations for these inconsistencies. One study found a significant relationship between war veterans' spiritual well-being, life satisfaction, and mental health among war veterans

(48). Conversely, another study among people who had been exposed to a natural disaster did not find religiosity to be related to higher levels of life satisfaction (49).

There are several limitations that need to be considered in interpreting our results. The first is our small sample of 167 veterans gathered through convenience sampling, which affects the generalizability of our results and might have led to the underrepresentation or overrepresentation of certain subgroups. For instance, veterans who were more socially engaged and actively involved in veteran support programs might have been more likely to be involved in the sampled veteran associations and, therefore, participate in our study, leading to an overestimation of social support and life satisfaction levels. Conversely, veterans experiencing severe isolation, financial difficulties, or mental health issues may have been underrepresented, thereby weakening the observed relationship between these factors and life satisfaction. Future studies might consider the implementation of a stratified random sampling technique, as well as a larger sample size to ensure more representative results. Secondly, we utilized a survey based on self-reporting, which is prone to response bias and context effects. Social desirability bias in a sensitive study such as this one, for example, could have motivated the veterans to overreport or underreport their life satisfaction or exaggerate their level of social engagement, friendship satisfaction, hobbies, or exercise frequency, and underreport feelings of loneliness, financial difficulties, or dissatisfaction in relationships, to align with social expectations and avoid feelings of judgement and stigma. This could have distorted the observed relationship between life satisfaction and its predictors, leading to biased estimates and potentially resulting in non-significant effects for some variables. Finally, we assessed religiosity using a simple binary measure, without capturing changes in beliefs, intensity of practice, or differences between religious affiliations. Given that most participants identified as religious, this variable was skewed and may have limited discriminative power. Future research could employ more nuanced measures, such as multi-point scales assessing the strength or change in religiosity, to better explore its relationship with life satisfaction among veterans.

This study highlights several important directions for future research on life satisfaction among war veterans. Further research could explore some psychological mechanisms (*e.g.*, personality traits, emotional regulation) that may also affect the relationship between predictors and life satisfaction in veterans. Since we found friendship satisfaction, monthly income, and partnership status to be significant predictors, it would be relevant to deepen the understanding of these variables and how they impact life satisfaction. Lastly, since PTSD could also impact the observed relationships, new studies should differentiate between veterans with and without PTSD to see how mental health issues might interact with these variables. Given a general lack of systemic monitoring of war veterans in Croatia and their behavioural patterns over time, a longitudinal approach would allow for examination of whether changes in predictors over time affect veterans' life satisfaction. Such research could help identify risk and protective factors and, with that, inform policies and support future programs. We initially wanted to evaluate whether pet ownership is related to the life satisfaction of Croatian war veterans, but did not do so at a deeper level. Besides asking whether participants own a pet and what type of pet they have, investigating the time they spend with pets or how often they engage with them in specific activities (*e.g.*, walking, playtime) could offer valuable data. This could also include inqui-

ries on the nature of this bond, such as questions emotional attachment, the value of the pet in their life, whether it provides structure in their daily routines and comfort during stressful situations, and how it affects their sense of responsibility.

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