

Article

Psychological Well-Being and Nature Relatedness

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Abstract: The way people perceive contact with nature may impact their environmental attitudes and psychological well-being (WB). Nature relatedness (NR) refers to the affective, cognitive, and experiential aspects of individuals' connection to nature. The aim of the presented research concentrates on the assessment of the relationship between well-being, self-control and connectedness with the natural environment. The data was collected via online questionnaire between March and April 2022. In the study, we combined descriptive statistics with analysis of variance. We also quantitatively assessed correlations between major components of NR scale and psychological WB across men' and women' inquires. The results showed that there is a statistically significant relationship between the general index of NR and overall psychological WB. Furthermore, correlation between specific aspects of NR and WB subscales were also observed. These interactions are considerable among both men and women. We have also identified a major correlation between NR and self-control, which indicates the link between the way a person approaches oneself and natural environment. Finally, the analysis provides evidence that women are on average more related to nature, although the men may benefit more from this kind of relationship. Further gender differences could be observed in terms of nature-relatedness perspective component, general self-control, score and overall NR score. These relationships are highly vital among men while irrelevant among women.

Keywords: nature relatedness; well-being; self-control; social status; human-nature relationship; ecosystem services; forests



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1. Introduction

Nature relatedness (NR) expresses the affective, cognitive, and experiential aspects of human–nature relationship [1]. The construct of nature relatedness (NR; and the self-report scale by the same name) disclose individual differences in the way people view their relationship with the natural world [1]. High nature relatedness, or a strong subjective connection with nature, is typically associated with greater happiness and environmental concern. While disconnection seems to have harmful consequences for both human and environmental health, it is a regular consequence of the modern lifestyles that often separate people (physically and psychologically) from the natural world [2].

Generally, being in contact with natural ecosystems is beneficial to humans [3–12]. The health benefits of contact with nature are described using the “Nature Therapy Theory” [13,14]. It seems that the relationships with the health benefits of contact with nature are the most intensively studied in relation to forests and green areas. Visiting forests is considered one method to positively influence mental, physical, and social well-being [15–18]. Both natural and urban woodlands upgrade people's quality of life [19,20]. From the medical point of view, various plant communities have a wide range of therapeutic properties, including disinfection, blood pressure-lowering, anti-asthma, immune-boosting, etc. [21].

Moreover, NR has been stated to be a basic psychological need. It has been proven that NR is strongly related to increased positive affect and decreased negative affect [22,23]. The effect of nature exposure has a greater influence on humans than simple relaxation [24] or exercise in general [25].

We also know that even indirect contact with nature enhances the physiological and psychological conditions of people. Elsadek's et al. [26] research explored the physiopsychological impacts of indirect contact with nature, using forest imagery, on the brain activity and autonomic nervous systems. They found that simple visual stimulation with a bamboo image induced a significant increase in *alpha* relative waves and parasympathetic nervous activity and a significant decrease in skin conductance (SC). In addition, a significant increase in perceptions of positive feelings was observed. Nisbet et al. [27] found that people could benefit from more exposure to nearby nature in terms of well-being. Their research showed that fostering connections with the local natural environment, including trees, was a promising and cost-effective strategy to improve both human and environmental health.

The findings from research on NR [28] also support the biophilia hypothesis, which suggests that NR may be associated with well-being as NR fulfills our innate need to connect with other life forms and therefore brings comfort and self-fulfillment.

Moreover, environmental education helped people maintain their sense of connection with nature and experience greater vitality over time [29]. It was clearly visible during the COVID-19 pandemic, when we observed an increase in searches for nature-related topics [30]. Several studies also focused on the link between well-being and the amount of time spent in nature during the pandemic. The general results suggest that spending more time in nature during the pandemic than previously makes people feel better [31–33].

Nature relatedness is also associated with people's self-construal as it moderates the relationship between the need to belong, the desire for social acceptance, and a sense of connectedness. Wai Li et al. [34] showed that independent self-construal, which emphasizes separateness from others in the social contexts, moderated the relationship between the need to belong and nature relatedness. The need to belong was negatively associated with nature relatedness among people with a stronger independent self-construal, while this pattern was not significant among those with a weaker independent self-construal. It is still a question of whether other aspects of self-regulation (e.g., self-control) moderate the level of NR and shape people's response to different environmental issues.

Bearing in mind such a vital influence of nature on man, conducting research in various social groups allows researchers to expand the existing knowledge on the contribution of NR to psychological health and well-being. This may also help to investigate the prerequisites for pro-environmental behavior and the factors that contribute to the promotion of the human-nature relationship.

The main research problem was the question about the relationship between particular aspects of psychological functioning and nature relatedness. The study aimed to determine the link between positive functioning (well-being, self-control) and connectedness with the natural environment. A strong relationship between the variables may indicate the importance of integration of mental health care with "green therapy and recreation" through direct contact with nature. We adopted the term "green therapy and recreation", which means the treatment of mild mental and emotional disorders without the use of drugs. The therapeutic process is based on direct contact with nature which affects the psyche through natural landscapes, colors, smells, and sounds of nature [35].

2. Materials and Methods

The data for this study was collected by an anonymous questionnaire available online. The invitation to participate in the research was sent by e-mail and through various groups on social media (Facebook). In order to extend the scope of the research, we used the method of snowball sampling [36–39]. The survey was conducted between 22nd March and 30th April 2022. The questionnaire consisted of four sections; the first 21-item Nature Relatedness Scale (NR) was an assessment of the overall subjective nature connectedness

with the natural environment [1]. Respondents answered statements using a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree) in which items averaged with higher scores indicated stronger connectedness. We also investigated NR in 3 different subscales: (1) NR self (the ecological self), which represents an internalized identification with nature, reflecting feelings, and thoughts about one's personal connection to nature; (2) NR perspective (the ecological attitude and behavior), which reflects an external, nature-related worldview, a sense of agency concerning individual human actions, and their impact on all living things; (3) NR experience, which reflects a physical familiarity with the natural world, the level of comfort with, and desire to be out in nature, and includes items such as "I enjoy being outdoors, even in unpleasant weather." This aspect of nature relatedness is evident in those who seek out nature, are drawn to the wilderness, and are aware of and fascinated with nature all around them. Nature relatedness was internally consistent, temporally stable, and correlated with time spent outdoors, in nature, and with measures of environmental attitudes and behaviors [1]. The second section of the questionnaire was Subjective Social Status (SSS), which represents a person's sense of position in the socio-economic structure [40]. The SSS is presented in a ladder format with 10 rungs. There are two versions of the ladder, with different references that enable individuals to compare themselves. The first one is a society ladder, which is a global measure of subjective social status and is related to the individual's place in the social hierarchy. References used in this case are indicators, such as education, income, and occupation. The second one is a community ladder, which assesses how individuals see themselves in the community they live in. Higher living standards are at the top of the ladder, while lower ones are at the bottom. The study of SSS shows that SSS can shape important life outcomes, such as health and well-being [41–43].

The third component was the Self-Control Scale (SCS), which consisted of 36 statements, and respondents were to decide if they agree with each statement or not (1 = not at all, 5 = very much). Higher overall scores meant higher levels of self-control. Higher scores on self-control correlated with better adjustment, better relationships and interpersonal skills, secure attachment, and more optimal emotional responses. Low self-control is considered a significant risk factor for a broad range of personal and interpersonal problems [44].

The last part was the Psychological Well-being Scale (WB) that encompassed 6 distinct dimensions of wellness: Autonomy, Environmental Mastery, Personal Growth, Positive Relations with Others, Purpose in Life, and Self-Acceptance. Respondents rated 18 statements about their wellness and functioning using a 7-point Likert scale (1 = strongly agree, 7 = strongly disagree). Several items in subscales were reverse-scored. Higher overall scores meant higher levels of psychological well-being. Simply feeling happy and satisfied with life is not synonymous with human well-being. The analysis of psychological well-being includes, among others measurement of one's sense of life purpose, the quality of their ties to others, and the feeling of being in charge of their own life. Self-acceptance is understood as a positive attitude toward the self and the past. High scores in the dimension of positive relations with others mean the ability to build warm, satisfying, trusting relationships with others, and being concerned about the welfare of others. Autonomy makes a person self-determining and independent. An autonomous person is able to resist social pressures and regulate behavior from within, according to personal standards. High scores in Environmental Mastery is evidence of mastery and competence in managing the environment, controlling external activities, and surrounding opportunities. In other words, environmental mastery enables a person to choose or create contexts suitable to personal needs and values. The Purpose in Life dimension is related to the life goals (aims and objectives) and a sense of directedness. The Personal Growth dimension describes the feeling of continued development, growth, and expansion. High scores in Personal Growth mean a person is open to new experiences, has a sense of realizing his or her potential, and is changing in ways that reflect more self-knowledge and effectiveness [45,46].

3. Results

We collected 302 properly filled questionnaires (147 from women—48.7% and 155 from men—51.3%). The majority of the respondents declared single status (68.9%). In terms of employment situation, there are two dominating groups: students (47.7%) and full-time employees (33.4%). Most of the respondents declared to be satisfied with their life (48.7%) or neutral (30.1%).

The social characteristics of the respondents in the background of demographic data is shown in Table 1.

Table 1. Social characteristics of the respondents on the background of demographic data: fraction of the respondents (share (%)).

Demographic Data		Share (%)
Gender	Female	48.7
	Male	51.3
Place of residence	village	32.1
	city ≤20 thou. inhabitants	6.0
	city 21–100 thou. inhabitants	12.9
	city 101–500 thou. inhabitants	15.2
	city >500 thou. inhabitants	33.8
Level of education	high school/college graduate, diploma or equivalent	12.9
	trade/technical/vocational training	3.3
	bachelor's degree	44.0
	master's degree	36.1
	doctorate degree or higher	3.6
Marital status	married	21.9
	divorced	3.0
	separated	0.3
	Single	68.9
	prefer not to say	0.6
Ethnic background	White/Caucasian	42.1
	Asian/Asian British	8.6
	Black/African/Caribbean/Black British	45.7
	mixed/multiple ethnic groups	1.0
	other ethnic group	2.6
Life satisfaction	very dissatisfied	2.6
	dissatisfied	10.6
	neutral	30.1
	satisfied	48.7
	very satisfied	7.9
Employment status	full-time employment	33.4
	self-employed	8.3
	part-time employment	7.6
	unemployed	2.3
	student	47.7
	inability to work	0.7

The majority of respondents were Black, African, Caribbean (45.7%), and White/Caucasian (42.1%). Most of them resided in a large city (33.8%) or village (32.1%). Survey participants were highly educated—80% of them had higher education (master's or bachelor's degree). They were also declared as singles (68.9%) and students (47.7%) or persons with full-time employment status (33.4%). Over half (56.6%) of respondents were either satisfied or very satisfied with their life.

In Figure 1, we present the comparison of the mean overall Nature Relatedness score together with Psychological Well-being across men and women. There are slight gender differences in the results. Women, on average, have lower well-being score but higher

Nature Relatedness. To investigate if these differences are statistically significant we employed Levene's test for equality of variances (Levene's: The p -value for WellBeingOverall was 0.344 while for NR_overall was 0.599) and one-factor ANOVA test for comparison of group means (ANOVA: The p -value for WellBeingOverall was 0.20 while for NR_overall was 0.001** and appeared significant) [47].

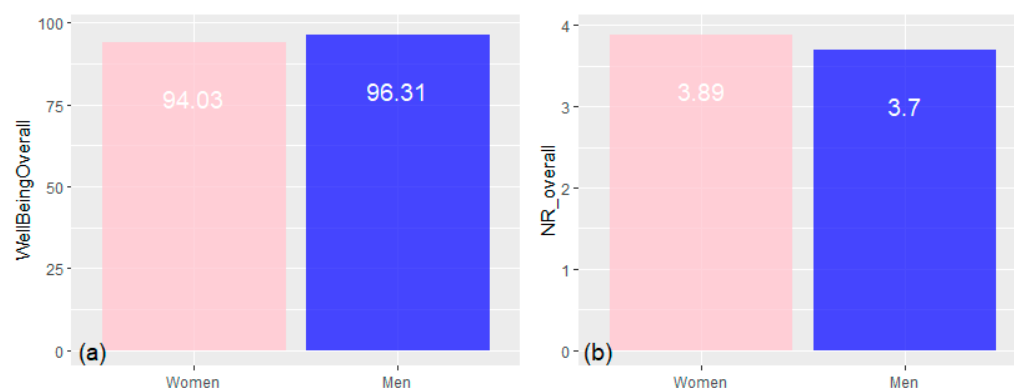


Figure 1. The comparison of average overall components for Psychological Well-being (a) and Nature Relatedness Scale (b).

According to Levene's test results, there are no gender differences in variances. However, ANOVA results provide evidence that gender has an impact on the overall Nature Relatedness scale (NR overall). Therefore, it can be concluded that women are on average more related to nature than men.

Some further juxtaposition of the results across particular components of the tests is presented in Table 2. The differences could be especially observed in terms of NR perspective, NR overall, Self-control overall, and Well-being Environmental Mastery. Interestingly, women have higher scores in every component of Nature Relatedness Scale, in turn men obtained higher scores in Psychological Well-being components except Personal Growth.

Table 2. The descriptive statistics for particular components of Nature Relatedness Scale and Psychological Well-being.

Test Component	Gender	Mean	SD
NR_self	woman	4.15	0.58
	man	4.04	0.64
NR_perspective	woman	3.99	0.61
	man	3.61	0.64
NR_experience	woman	3.40	0.78
	man	3.33	0.81
NR_overall	woman	3.88	0.50
	man	3.70	0.53
SelfControl overall	woman	3.45	0.55
	man	3.57	0.51
Well-being Autonomy	woman	15.38	3.38
	man	15.45	3.15
Well-being Environmental Mastery	woman	14.40	3.49
	man	15.36	3.18
Well-being Personal Growth	woman	17.95	3.47
	man	17.80	3.63
Well-being Relations	woman	14.84	4.17
	man	15.25	3.71
Well-being Purpose	woman	15.48	3.64
	man	16.167	3.82
Well-being Self-acceptance	woman	15.94	4.17
	man	16.25	3.81
Well-being overall	woman	94.03	16.21
	an	96.30	14.68

Accordingly, outcomes of the analysis of the Spearman's correlation between specific components of Nature Relatedness and Psychological Well Being among women and men are shown in Figures 2 and 3. The darker the color, the stronger the correlation. Insignificant correlations were crossed (for p -values > 0.01). We also marked some correlations clusters (black boxes in figures)—these are matrix areas that concentrate significant correlation values.

Results of Spearman's Rho between NR and WB for women show several significant relations. First of all, positive correlation (0.23) was observed between overall NR and overall WB. It means the higher the Nature Relatedness score, the higher the Psychological Well-being. In general, increasing NR scale is associated with higher values of WB (positive impact). The NR_self component (general identification with nature) is the one that is correlated with the vast majority of WB components. So, it can be concluded that women that feel a deep relationship with nature are happier than those who do not perceive themselves as closely related to the natural environment.

We also identified three correlation clusters (the continuous areas of matrix with strong and significant correlations). These could be mainly observed within the components of the same test, i.e., WB components are strongly and significantly correlated with each other, similar to NR components. The additional cluster was formed between overall Self Control and WB_Purpose.

The results for men's questionnaire analysis are different at some points compared to women's (Figure 3).

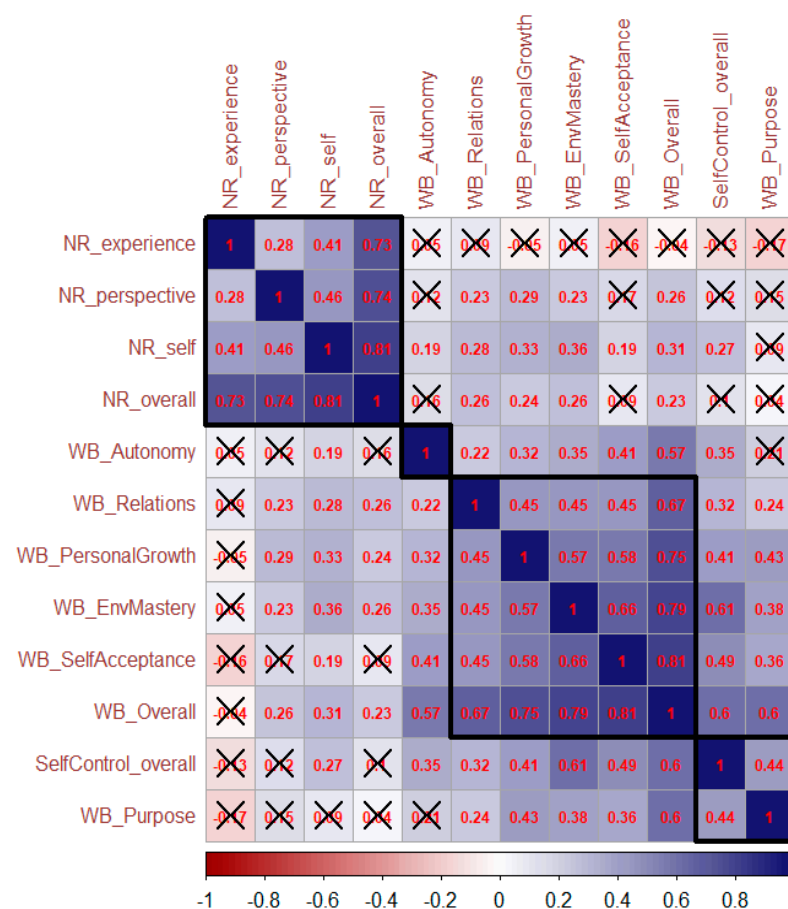


Figure 2. Correlation coefficients for Nature Relatedness and Psychological Well-being (women).

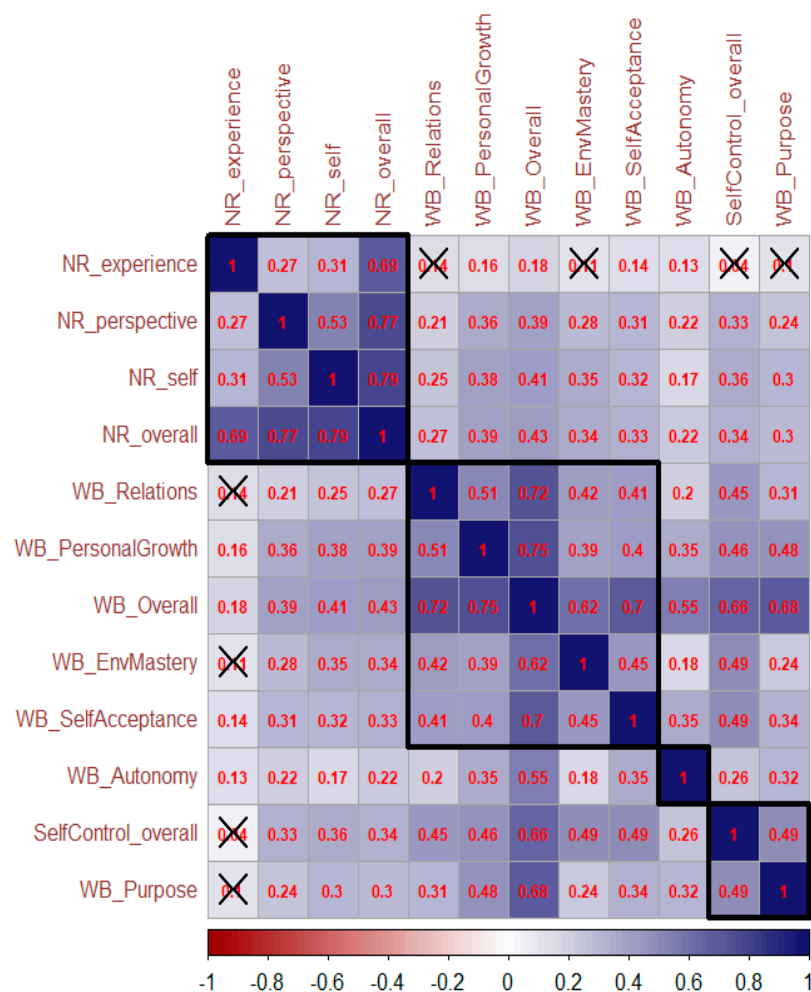


Figure 3. Correlation coefficients for Nature Relatedness and Psychological Well Being (men).

Mainly, the relationship between overall NR and overall WB is stronger. If we look at the correlations between specific components of the tests, they are also considerably higher. The number of significant correlations in the matrix is larger (i.e., in case of men, three of four NR components are associated with all seven WB components; in the case of women, three of four NR components relate to four WB components). It provides evidence that men, even if (on average) less related to nature, may benefit more from the contact with the natural environment in terms of well-being. It is consistent with the results from Rosa et al. [48]. They found that women were more connected to nature, but they were less likely than men to engage in nature-based recreation (NBR), which could be the source of improved well-being for them.

Another explanation of this outcome could be the fact, that women and men differ in the way they perceive environmental concerns and actions. As women are usually considered more empathetic than men, they may also express more environmental concern and behavioral intention, as represented by NR. Men could be less likely to admit a connection to nature in testing because it may suggest that they are weaker or more vulnerable. So, the NR among men could be biased somehow. Arnocky and Stroink [49] found significant gender differences among altruistic concerns, self-reported cooperation for the sake of the ecosystem, and competitiveness for ecological resources. Their research showed that women expressed greater levels of altruistic concern and cooperation for the sake of the ecosystem, while men expressed more competitiveness for resources.

We also found three clusters of similar correlation congestions. As in the case of women, they are mainly associated with the given components of the tests.

The results of the analysis of the relationship between NR and chosen metric variables for women are shown in Figure 4. In this study, social status is considered in two categories that are presented as questions below:

- Social Status_1 Am I a person who has the most money, the most education, and the most respected jobs?
- Social Status_2: How meaningful am I in the society?

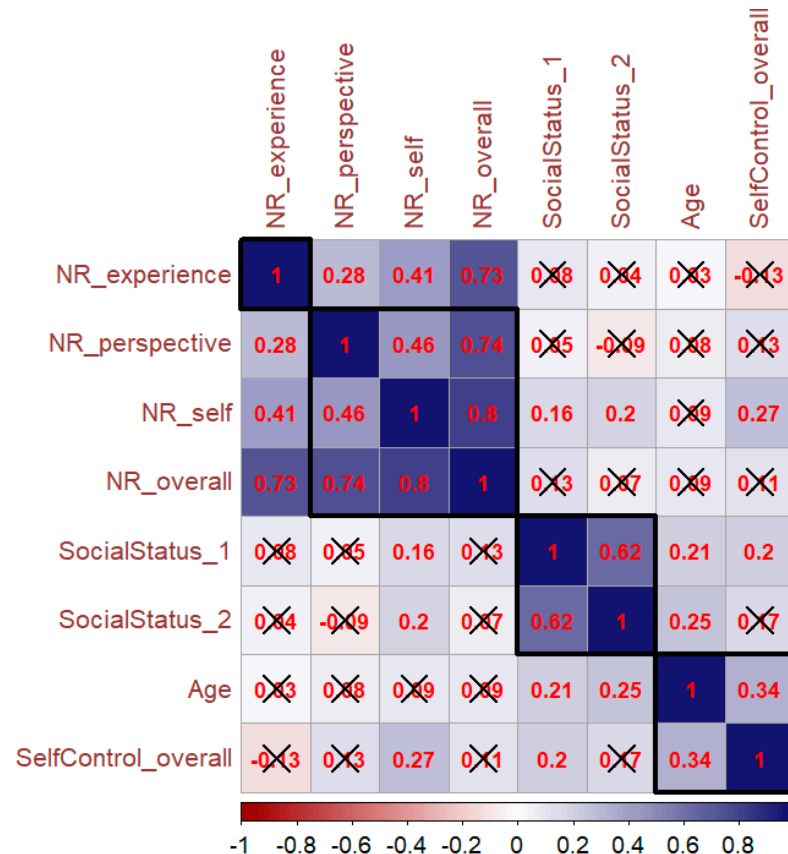


Figure 4. Correlation between NR components and chosen metric variables (women).

The results show a positive and significant correlation between age and both social status variables. It means the older the respondent, the higher the perceived social status. This may result from the social trend that wealth level rises together with age which is confirmed at least in Europe [50]. We, however, did not observe a connection between overall Nature Relatedness and any of the social status indicators among women.

In turn, we have identified a positive correlation between social status (mainly SocialStatus_1) and overall self-control assessments. It means the wealthier and the more educated the person is, the higher the level of self-control she possesses.

In Figure 5, we provide the correlation matrix for WB components and metric variables among women survey participants.

In the case of Psychological Well-being among women, the positive relations between all included metric variables are observed. The highest value of the indicator is associated with age (0.34). In general, stronger correlations were observed between SocialStatus_1 (hard measures of social status) and specific components of WB test (the WB_relations part had the highest Rho Spearman's value). In the case of SocialStatus2, these values were lower or/and the correlations were insignificant.

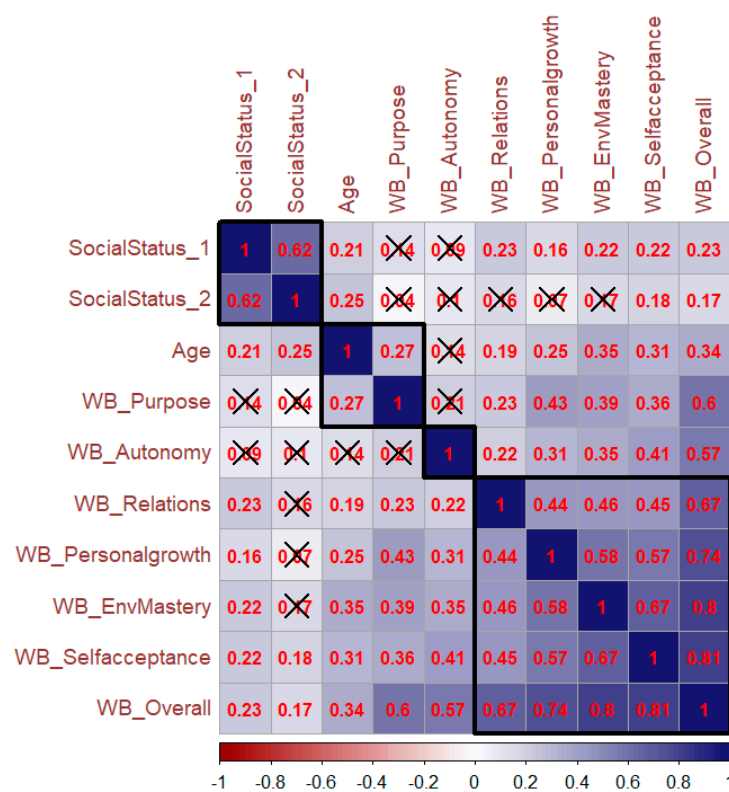


Figure 5. Correlations between WB components and chosen metric variables (women).

In men's results, self-control rises together with age—this relationship is stronger than in women's case (0.4 vs 0.34) (Figure 6).

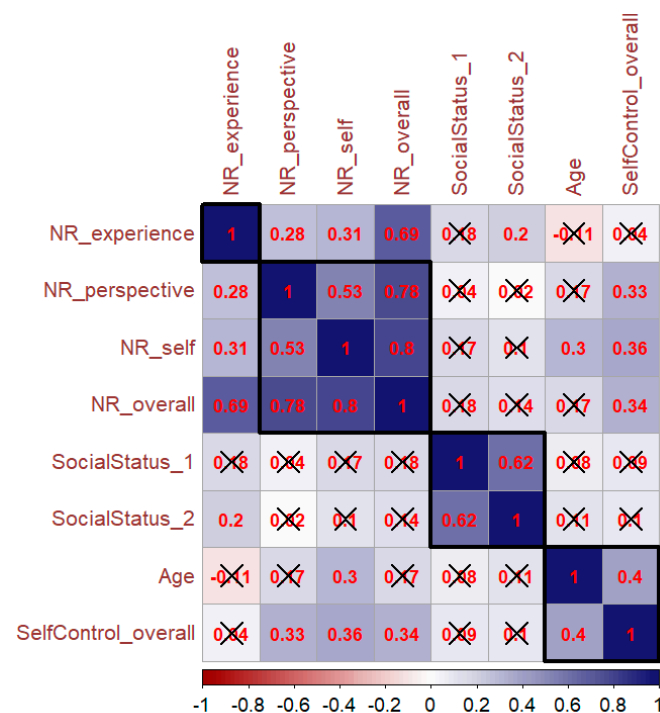


Figure 6. Correlations between NR components and chosen metric variables (men).

Interestingly, we did not observe significant connections between any of the social status variables and self-control, which is another difference between men's and women's

results. Therefore, while in women's case self-control links to social status, in men's case this relation seems irrelevant. In turn, in men results, there is a link between self-control and overall nature relatedness score—the higher NR, self-control also rises (which is not confirmed for women). The results were visualized in Figure 7.

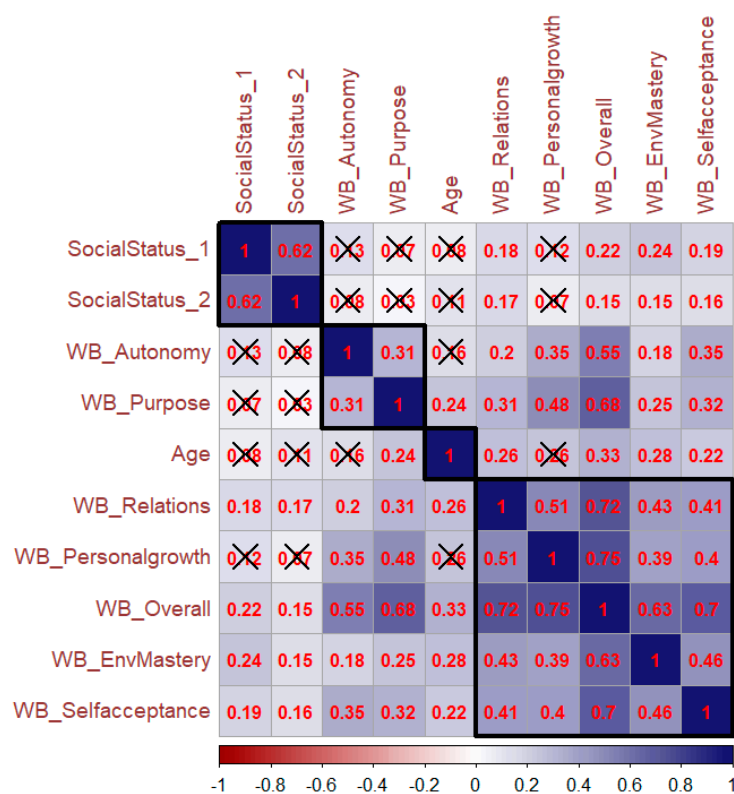


Figure 7. Correlations between WB components and chosen metric variables (men).

Finally, we juxtaposed particular WB components with metric variables for men. Similarly, like in the women's case, the higher social status is associated with higher values of psychological well-being. SocialStatus1, the variable which stands for hard measures of social status (money, job, education) is significantly stronger in predicting the relationship with well-being. Both social status indicators were, however, strongly and significantly correlated with each other across men's and women's answers. It may be interpreted that the more a person possesses in terms of financial situation and general social impact, the more meaningful they are to the society. This result confirmed several empirical findings on the impact of objective metrics of socioeconomic status on the subjective well-being of an individual [51,52].

4. Discussion and Conclusions

The paper presents the analysis of relationships between individual well-being and the level of connectedness with the natural world considering gender differences. These two constructs were measured with specific standardized tests: Psychological Well-being together with Nature Relatedness. We collected 302 properly filled questionnaires with an almost equal proportion of men and women. The quantitative analysis covered a description of data together with inferential techniques, which were analysis of variance, assessment of Spearman's correlation, and correlation matrices.

The results of our study showed that gender has an impact on the overall Nature Relatedness score. Consequently, the ANOVA analysis provides evidence that women are on average more related to nature than men. The gender differences were especially observed in terms of nature-relatedness perspective and overall nature relatedness score.

The results are consistent with similar findings, where women reported higher levels of connection to nature [48,53,54].

There were further gender differences in Self-control and Environmental Mastery (a component of well-being). Men had significantly higher scores for overall Self-control and Environmental Mastery. Previous studies on the gender differences in the Psychological Well-Being subscales have not provided consistent results. Li et al. [55] reported higher results in Environmental Mastery for men, whereas Ruini et al. [56] found that Italian women had significantly lower Environmental Mastery than men did. As Environmental Mastery is crucial for managing the environment, it is worth taking into consideration the context of COVID-19 pandemic, which may change the extent to which one can control the surrounding opportunities. Tan et al. [57] have shown that increasing resilience can effectively improve psychological well-being and buffer the negative effects of environmental stress on psychological well-being during the COVID-19 pandemic. Thus, further research may focus on the possible moderating role of resilience in the Psychological well-being and Nature Relatedness components.

We also found significant correlations between other components of Nature Relatedness and Psychological Well Being among women and men, which corresponds to the results provided by Nisbet et al. [58], who proved that nature relatedness is reliably and positively associated with two dimensions of psychological well-being: autonomy and personal growth. Research shows that nature relatedness is often associated with increased happiness and higher feelings of general-purpose and meaning in life [59], as well as increased mindfulness [60]. Also, Capaldi et al. [22] showed that nature relatedness is consistently and positively associated with increased life satisfaction and increased vitality.

Although our findings show that women seem to be more related to nature, the men may benefit more from such a connection—the correlation between the overall scores for well-being and nature relatedness is stronger for men. However, this type of interaction needs further in-depth investigation.

Also, it appears that, in the case of women, self-control rises together with social status. In turn, in case of men, self-control rises together with age, which is consistent with the previous research results [61].

For a change, well-being is positively associated with age in both men's and women's results. A comprehensive analysis of age patterns in subjective well-being by Stone et al. [62] may serve as an inspiration for an in-depth investigation of age patterns in nature relatedness. Hughes et al. [63] found age-related patterns for nature connectedness, with connection declining from childhood to an overall low in the mid-teens, followed by a rise to the early 20s and reaching a plateau that lasts to the end of the lifetime. However, since the human–nature relationship can be impacted by the country-specific differences in environmental education [64], the level of NR may be mediated by an increased environmental knowledge, and thus, we may observe an increase in the pro-environmental behaviors among educated young people.

Hard measures of social status (money, job, education) are significantly more correlated with well-being than the general perception of social status in terms of how meaningful a person is to society (soft measures). On the basis of our results, we stated that further research on association between well-being and nature relatedness is still needed (e.g., What is a specific direction of this interaction? Does NR impact WB or does WB impact NR?). Moreover, some more sophisticated variables could be investigated in this regard (e.g., Does ethnicity impact nature relatedness and well-being? or Does the place of residence (city vs village) impact nature relatedness and well-being?)

It would be also interesting to explore the detailed impact of COVID-19 on the level of nature relatedness, as current studies indicate that people tend to use nature to cope with the stresses of the global health crisis and lockdowns [65].

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data curation, O.G.-C., S.W.-Ś. and M.W.; writing—original draft preparation, O.G.-C., S.W.-Ś. and M.W.; writing—review and editing, O.G.-C., S.W.-Ś. and M.W.; visualization, O.G.-C., S.W.-Ś. and M.W.; supervision, O.G.-C., S.W.-Ś. and M.W.; project administration, O.G.-C., S.W.-Ś. and M.W. All authors have read and agreed to the published version of the manuscript.

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