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The impact of expeditioners' personality traits on their interpersonal interactions during long-term Antarctic expeditions

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Abstract: Interpersonal interaction performance is significantly determined by group members' personality traits. If a group lives in long-term isolation, the influence of personality traits on interpersonal interaction performance will be even stronger. The current study identified and examined the impact of the personality traits of the personnel living at the Ukrainian Antarctic *Akademik Vernadsky* station (N = 35) on their interpersonal interactions during long-term Antarctic expeditions. The results show that expeditioners' personality traits significantly determined their interpersonal interactions. However, the influence of personality traits on different areas of interactions can vary significantly among different groups of expeditioners, even sometimes in diametrically opposite directions. The main reason for this is a formed microclimate specific to each group and corresponding group norms for formal and informal relations due to significant differences in personality traits that are characteristic of different groups' participants. We determined that eleven indicators, out of a total of 23 examined personality traits, significantly differed among expeditioners from different groups (different expeditions). The study results can be used to enable better psychological selection of Antarctic expedition participants and to provide psychological support for these individuals.

Keywords: Antarctic, *Akademik Vernadsky* station, long-term isolation, personality assessment.

Introduction

The psychological factors that influence significantly on the effectiveness of an individual's and a group's activities are especially important in the case of prolonged living together and working in extreme conditions (Paul *et al.* 2010; Wagstaff and Weston 2014; Smith *et al.* 2017; Kokun *et al.* 2020). A typical example of extreme activities includes work performed during long-term Antarctic expeditions (Rothblum 1990; Zimmer *et al.* 2013; Tortello *et al.* 2018).

The extreme working and living conditions at Antarctic stations are due to the region's low temperatures, low atmospheric pressure, increased solar radiation, geomagnetic disturbances, stormy winds and the effects of polar days and polar nights (Wood *et al.* 1999; Belkin *et al.* 2016; Nicolas *et al.* 2016; Węsławski 2020). Mullin (2006), Palinkas and Suedfeld (2008), Roberts (2011) and many other researchers have noted that Antarctic expedition personnel are also influenced by other negative factors in life and work, such as the monotonous environment and landscape, hypo-dynamics and prolonged participation in a closed group.

Sandal *et al.* (2006), Khandelwal *et al.* (2017) and Smith *et al.* (2017) emphasise that emotional stress could be created for expeditioners by long-term spatial and temporal isolation from the outside world in a small group at an Antarctic station; isolation from traditional media, family and friends; and the absence of ordinary external stimuli and comfortable living conditions. Moreover, these factors could even have more serious negative impacts on expeditioners' physical, physiological and psychological states than the difficult natural conditions. In particular, Mullin (2006) named the following as the most important psychological stressors: the problem of individual adjustment to the group; more subtly, the relative 'sameness' of the milieu; and the absence of certain familiar sources of emotional satisfaction.

During their stay at Antarctic stations, expeditioners were characterised by impaired well-being, mood, sleep and performance (Collet *et al.* 2015; Chen *et al.* 2016) as well as increased tension, irritability, anger and confusion (Wencheng *et al.* 1995; Zimmer *et al.* 2013; Chen *et al.* 2016). Persistent mood disorders with signs of depression formed among part of the personnel (Palinkas and Suedfeld 2008; Roberts 2011; Khandelwal *et al.* 2017). Increases in anxiety and tension were most pronounced during the final phase of Antarctic residence (Bhargava *et al.* 2000; Khandelwal *et al.* 2017). Accordingly, it was natural that micro-groups formed, and that intergroup and interpersonal conflicts appeared in expeditionary teams that negatively affected interpersonal relationships and work efficiency (Wood *et al.* 1999; Chen *et al.* 2016).

However, as several researchers emphasize (Norris *et al.* 2010; Mehta and Chugh 2011; Zimmer *et al.* 2013; Blight and Norris 2018), some negative effects appears at psychological status or interpersonal relationships of people working for a long periods at Antarctic stations, but, at the same time, positive,

salutogenic results exist also, thanks to successful adaptation to environmental adversities, accompanied by personal growth, feeling of spiritual and existential changes, high enthusiasm, optimistic future orientation and determination, need for achievement. Many expeditioners had good psychological adaptation during all expedition and became emotional and professional leaders for the station personnel (Kokun and Bakhmutova 2020).

In this context, Peri *et al.* (2000), Johnson *et al.* (2003), Paul *et al.* (2010) and Smith *et al.* (2017) emphasised that expeditioners' performance and well-being largely depended on their psychological compatibility and interpersonal interaction performance. In general, such relationships have been understood and experimentally examined in various samples: managers in manufacturing departments of industrial organisations (Sharma and Parida 2018); telecom company personnel (Waber *et al.* 2014); employees at healthcare organisations (Saito *et al.* 2007); employees of multiple organisations (Shakiladevi and Rabiyathul Basariya 2019); and athletes on volleyball teams (Afanasieiva *et al.* 2019), among others.

In turn, interpersonal interaction performance was significantly determined by group members' personality traits, as shown in studies by Balthazard *et al.* (2004), Jenkins-Guarnieri *et al.* (2013), Xiao and Huang (2016) and Hensel and Visser (2018). In the context of the long-term isolation of a group, personality traits' influence on interpersonal interaction performance was even stronger (Kraft *et al.* 2002).

Although the personality traits of individuals participating in expedition teams and working in polar environments have received considerable attention (Leon *et al.* 2011), and moreover, a number of factors that impact the efficiency and quality of interpersonal relationships, including crew structure and cohesion, leadership style, gender and cultural background of crew members, and inter-group relationships were identified (Sandal *et al.* 2006), namely influence of personality traits on expeditioners' interpersonal interactions has not yet been studied for Antarctic expedition personnel.

The most similar study was conducted by Smith *et al.* (2017), who examined not personality traits but personal values. The research carried out by Doll and Gunderson (1970), Terelak and Maciejczyk (1989), Palinkas *et al.* (2000), Grant *et al.* (2007), Mehta and Chugh (2011) and Jaksic *et al.* (2019), corresponds only partially to our theme, as they mainly determined the adaptive significance of different personal traits. Terelak (1985) investigated dynamics of the informal structure of a small expeditioners' group, Paul *et al.* (2010) studied whether interpersonal behaviour of Antarctic personnel deteriorated after the halfway point of prolonged isolation.

Based on the above, we consider it appropriate to possible either positive or negative impacts of different personality traits on Antarctic expeditioners' interpersonal interactions, given that such data can significantly improve the psychological selection and training of Antarctic expedition participants. The

importance of this type of psychological research was emphasised by Grant *et al.* (2007), Leon *et al.* (2011), Zimmer *et al.* (2013), Domuschieva-Rogleva and Iancheva (2017) and Kokun and Bakhmutova (2020).

For this reason, the aim of the present study is to determine the impact of expeditioners' personality traits on their interpersonal interactions during long-term Antarctic stays. Because our study was exploratory and we investigated a problem which was not clearly defined, we formulated only our *initial hypothesis*, about most fundamental capability to determine expeditioners' interpersonal interactions on the base of their personality traits. But we did not have sufficient grounds, for example, to make assumptions about what personality traits affected expeditioners' interpersonal interactions positively and what traits did negatively, and to what extent. Only after analysis of the obtained results we have received an opportunity to put forward *two* additional *derived hypotheses*, which were not obvious before. Therefore, the results are presented in such a way that the analysis sequence and logic are demonstrated clearly enough.

Methods

Participants and procedure. — This study involved 35 expeditioners at the Ukrainian Antarctic *Akademik Vernadsky* station (all men aged 23 to 63 years old; M = 39.02, SD = 11.42), who participated in three annual expeditions between 2016 and 2019. Each expedition group consisted of 12 people, although one winterer was evacuated from the station due to illness three months after the start of the 2018–2019 expedition.

For each expedition, a personality assessment was conducted before the participants' departure from Ukraine to the Antarctic station (in March 2016, 2017 and 2018). An interpersonal interaction assessment was conducted immediately after participants' return to Ukraine (in March 2017, 2018, and 2019) after a year living at the Antarctic station in an isolated group.

The study was conducted with the approval of the National Antarctic Scientific Centre of Ukraine and the participants' personal consent. The participants were informed that there were no right or wrong answers and were encouraged to respond candidly. Complete confidentiality was assured.

Interpersonal Interaction Assessment. — The sociometry method was used to examine interpersonal interactions. This method was conceived as a specific technique to measure social relationships within a group (Fields 2007).

In our study, sociometric tests were conducted in three areas of interactions: professional, everyday and leisure. Participants in each expedition were asked to fill out a sociometric card indicating three people with whom they were most comfortable interacting in each of these areas. The questions were as follows: 'With whom did you usually work?' (professional sphere); 'With whom did you

mainly solve everyday household problems?' (household sphere); and 'With whom were you the most comfortable?' (leisure). An expeditioner received one point in the relevant field for each choice.

Personality Traits Assessment. — The Ukrainian adaptations of three measures were used to measure participants' personality traits.

The Leonhard–Schmieschek Questionnaire (Schmieschek 1970) is a personality inventory intended to identify ten types of personality accentuations, divided into two groups: character accentuation (demonstrative, affectively exalted, pedantic, stuck and excitable) and temperament accentuation (hyperthymic, dysthymic, anxious-fearful, cyclothymic and emotive). The inventory consists of 88 items that should be answered with a 'yes' or a 'no'. Total scores of 8–12 points are considered within the normal range; scores of 13–19 points are indicative of accentuations; and scores of 20–24 points testify to a high degree of character accentuation (https://srcaltufevo.ru/en/oprosnik-shmisheka-akcentuacii-haraktera-rasshifrovka-test-oprosnik.html). Cronbach's alpha for the total measure in the present sample was .85.

The Leary Interpersonal Checklist (ICL) (Leary 2004) is used to obtain descriptions of an individual with respect to the interpersonal domain of personality. The standard form of the ICL consists of 128 words or phrases such as 'well thought of', 'forceful', 'often gloomy', 'cooperative' and so on. Respondents are instructed to mark those items that they consider to be generally characteristic of themselves. The 128 items are grouped in Leary's system into eight behavioural categories or octants, labelled as follows: 1) managerial-autocratic; 2) competitive-narcissistic; 3) aggressive-sadistic; 4) rebellious-distrustful; 5) self-effacing–masochistic; 6) docile-dependent; 7) cooperative–over-conventional; and 8) responsible-hypernormal (https://www.scribd.com/document/60680189/Interpersonal-Checklist-Test-Correlated-with-Mind-Mirror). Cronbach's alpha for the total measure in the present sample was .85.

The Thomas–Kilmann Conflict Mode Instrument (TKI) (Thomas and Kilmann 2002) consists of 30 pairs of statements. For each pair, a respondent must choose either the A or B item (for example, one item describes collaborating while the other describes avoiding). Each pair of statements was specifically designed through a multi-stage research process to be equivalent in social desirability. The TKI uses two axes: 'assertiveness' and 'cooperativeness'. It identifies five different conflict styles: competing (assertive, uncooperative); avoiding (unassertive, uncooperative); accommodating (unassertive, cooperative); collaborating (assertive, cooperative); and compromising (intermediate assertiveness and cooperativeness) (https://people.themyersbriggs.com/TKI40.html).

All three methods used to measure participants' personality traits have been used by the National Antarctic Scientific Center of Ministry of Education and Science of Ukraine for more than ten years as mandatory for psychological selection of expeditioners to work at Ukrainian Antarctic *Akademik Vernadsky* station. Their use at our study is justified by the significant influence on

interpersonal interactions of personality accentuations (Motowidlo *et al.* 2006; Rudolph and Troop-Gordon 2010; Cheverikina *et al.* 2014), types of interpersonal behaviour (Rivers and Sanford 2018; Rocchi *et al.* 2020) and conflict styles (Aliakbari and Amiri 2016; Taylor *et al.* 2017), which are examined with these methods.

Statistical Analysis. — Statistical Package for the Social Sciences version 22.0.0.0 was used for statistical analysis. Descriptive statistics (mean, standard deviation, skewness, kurtosis); Spearman's rank correlation coefficient; an independent sample t-test; the Mann–Whitney U test; and Cronbach's alpha were used.

Results

In our study, we defined personality traits as independent variables and the results obtained from the performed sociometry of relations in the three interaction areas as dependent variables. This was based on both our theoretical analysis (the above mentioned studies of Balthazard *et al.* (2004), Jenkins-Guarnieri *et al.* (2013), Xiao and Huang (2016) and Hensel and Visser (2018)) and the method of study organisation. The expeditioners' personality assessments were carried out *before* the year-long expeditions and the sociometry examining interactions during the expeditions was performed *after* their completion. Accordingly, it is reasonable to consider the correlations among these variables in this study as the impact of expeditioners' personality traits on their interactions. Namely, the assumption that expeditioners' personalities determined their interpersonal interactions was the *initial hypothesis* of our study.

The analysis of the correlation among expeditioners' personality traits and sociometric statuses in different areas of interaction was performed for the total sample and included participants in the three expeditions (2016–2019; $N = 35$). The results give grounds to claim that this hypothesis is generally confirmed. Seven of the 23 indicators describing personality traits (from all three techniques used) had significant correlations ($p < .05$–$.01$) with three indicators of sociometric status that described different areas of interaction (Table 1).

Five of these seven personality traits had a negative impact on interactions: 'dysthymic' and 'competitive-narcissistic' on professional interactions ($r = –0.37$ and $–0.35$); 'managerial-autocratic' and 'accommodating' on leisure interactions ($r = –0.50$ and $–0.35$); and 'collaborating' on everyday interactions ($r = –0.39$). Two remaining personality traits had positive influences: 'competing' on everyday interactions ($r = 0.33$) and 'compromising' on leisure interactions ($r = 0.46$).

The signs of the three examined correlations were somewhat unexpected given the traditional notions – namely, the negative impact of such conflict styles as 'accommodating' and 'collaborating' and the positive impact of the

Table 1.

Correlations between expeditioners' personality traits and sociometric status in different areas of interaction

Indicators of personality traits	Area of interaction		
	Professional	Everyday	Leisure
Dysthymic	-.37*	-.31	-.29
Managerial-autocratic	-.24	-.27	-.50**
Competitive-narcissistic	-.35*	-.16	-.07
Competing	.16	.33*	-.08
Accommodating	-.02	-.14	-.35*
Collaborating	-.26	-.39*	-.01
Compromising	.19	.27	.46**

** $p < .01$; * $p < .05$.

'competing' style. However, since these correlations were found for the everyday and leisure spheres, we can assume that these correlations were explained by the prolonged isolation of the expedition participants. It is possible that interest in non-professional interactions decreases among people who are prone to accommodating and collaborating in such conditions.

In addition, the number and force of the reliable correlations among expeditioners' personality traits and sociometric statuses in different areas of interaction were slightly lower than expected based on the theoretical analysis. After analysing the possible reasons for this, we accepted one idea as among the most probable and available for verification: that the sample united the participants in three different expeditions. Although all respondents lived at the Antarctic station in approximately the same conditions and for the same period (one year), the study encompassed expeditions that took place in three different years (2016–2017, 2017–2018 and 2018–2019). Here, the fact that participants in different expeditions interacted with different colleagues is more important.

Thus, we formulated the *first derivative hypothesis*: the strength and direction of the impacts of participants' personality traits on their interactions *can have some differences* on different expeditions in the condition of working for a long time in a closed group. To test this hypothesis, we repeated the analysis of the correlations among expeditioners' personality traits and sociometric statuses in different areas of interaction separately for the three examined expeditions (n = 12, 12 and 11, respectively). In order to facilitate the consideration of the obtained data, the correlative results for the three methods used to determine personality traits are presented in separate tables (Tables 2–4). Given the small size of each sample (n = 11–12), the confidence level $p < .1$ was included in these tables.

There are the signs of the correlations for the 'demonstrative' and 'affectively exalted' accentuations with interactions in different areas change from negative for the first expedition to positive for the second, then again to negative for the

Table 2.

Correlations between expeditioners' personality traits as determined using Leonhard–Schmieschek Questionnaire and sociometric statuses on different expeditions

Indicators of personality traits	Expeditions								
	2016–2017 $n = 12$			2017–2018 $n = 12$			2018–2019 $n = 11$		
	Area of interaction			Area of interaction			Area of interaction		
	Professional	Everyday	Leisure	Professional	Everyday	Leisure	Professional	Everyday	Leisure
Demonstrative	-.16	-.19	-.10	.23	.38	.43	.09	-.07	-.22
Affectively exalted	-.18	-.26	-.17	.04	.23	.16	.08	-.21	-.34
Pedantic	-.43	-.41	-.45	-.11	.07	.13	-.31	-.35	-.16
Stuck	-.07	.29	.07	.23	.29	.50*	-.52*	-.10	-.02
Excitable	.08	-.08	-.14	.24	.14	.09	-.04	.40	-.44
Hyperthymic	-.62**	-.53*	-.34	.16	.22	-.03	.16	.07	-.28
Dysthymic	-.50*	-.36	.03	-.38	-.63**	-.64**	-.22	.12	-.44
Anxious-fearful	-.04	-.17	.07	.05	.07	-.02	.52*	.26	-.65**
Cyclothymic	-.43	-.73***	-.39	.12	.60**	.17	.01	.29	-.38
Emotive	-.07	.21	-.08	.06	.18	.28	.25	-.10	-.53*

*** $p < .01$; ** $p < .05$; * $p < .1$.

third expedition (Table 2). The difference between the values of some compared correlations is $r = 0.57$ (namely, the 'demonstrative' accentuation and interactions in the everyday sphere between the first and second expeditions). A similar trend can be observed for the correlations for the 'pedantic', 'stuck', 'excitable' and 'cyclothymic' accentuations. We should note the change from $r = –0.73$ ($p < .01$) in the first expedition to $r = 0.60$ ($p < .05$) in the second for the correlation between 'cyclothymic' accentuation and interactions in the everyday sphere; the difference between these correlations was 1.33.

The quite strong negative correlations among the 'hyperthymic' accentuation and the three areas of interaction which were characteristic of the first expedition (up to $r = 0.60$; $p < 0.05$) became insignificant in subsequent expeditions. The 'anxious-fearful' character accentuation had hardly any impact whatsoever on interactions in the first two expeditions but suddenly strengthened and changed its sign in the third: $r = 0.52$ ($p < 0.1$) for professional interactions and $r = –0.65$ ($p < 0.05$) for leisure interactions. A similar trend, although somewhat less pronounced, was observed for the 'emotive' accentuation.

Only the 'dysthymic' character accentuation had stable, relatively strong and negative correlations with interactions in various spheres for all three

expeditions. This explains why only this character accentuation was included in Table 1, which shows reliable correlations among personality traits and indicators of sociometric statuses in different areas of interaction for the total sample.

In the case of personality traits determined using the ICL (Table 3), behavioural categories such as 'managerial-autocratic', 'competitive-narcissistic', 'aggressive-sadistic' and 'rebellious-distrustful' influenced interactions in various areas in a mostly negative manner, albeit quite unstably from one expedition to another.

The pronounced influence of other behavioural categories ('self-effacing–masochistic', 'docile-dependent', 'cooperative–over-conventional' and 'responsible-hypernormal') on interactions in different spheres changed diametrically in different expeditions, which was especially clear when comparing the first and second expeditions. For example, the correlations of these behavioural categories with interactions in the field of leisure changed from *r* values of –0.54 to –0.64 to

Table 3.

Correlations between expeditioners' personality traits as determined using Leary Interpersonal Checklist and sociometric statuses on different expeditions

Indicators of personality traits	Expeditions								
	2016–2017 *n* = 12			2017–2018 *n* = 12			2018–2019 *n* = 11		
	Area of interaction			Area of interaction			Area of interaction		
	Professional	Everyday	Leisure	Professional	Everyday	Leisure	Professional	Everyday	Leisure
Managerial-autocratic	-.47	-.74***	-.72**	-.62**	-.32	-.35	.12	.14	-.28
Competitive-narcissistic	-.57*	-.58*:	-.47	-.01	.22	.29	-.47	.01	.14
Aggressive-sadistic	-.29	-.30	-.47	.03	.34	.20	-.42	-.05	-.29
Rebellious-distrustful	-.44	-.40	-.39	.29	.31	.10	-.77***	.10	.12
Self-effacing–masochistic	-.33	-.35	-.60**	.83***	.70***	.52*	-.48	-.15	.13
Docile-dependent	-.46	-.38	-.64**	.40	.52*	.41	-.23	.13	-.15
Cooperative–over-conventional	-.19	-.34	-.54*	.78***	.51*	.67**	-.11	-.02	-.22
Responsible-hypernormal	-.41	-.68**	-.58*	.52*	.34	.52*	.01	.53*	-.24

*** $p < .01$; ** $p < .05$; * $p < .1$.

Table 4.

Correlations between Thomas–Kilmann conflict mode and sociometric statuses on different expeditions

Indicators of personality traits	Expeditions								
	2016–2017 $n = 12$			2017–2018 $n = 12$			2018–2019 $n = 11$		
	Area of interaction			Area of interaction			Area of interaction		
	Professional	Everyday	Leisure	Professional	Everyday	Leisure	Professional	Everyday	Leisure
Competing	.19	.33	-.01	-.05	.36	.32	.31	.33	-.58*
Avoiding	-.06	-.02	.17	.31	-.21	-.24	.11	-.55*	.40
Accommodating	-.07	-.29	-.54*	.31	-.26	-.01	-.28	.12	-.41
Collaborating	-.28	-.43	-.11	-.44	-.40	-.45	-.26	-.30	.52*
Compromising	.53*	.52*	.71***	-.16	.12	.19	.17	.04	.28

*** $p < .01$; * $p < .1$.

r values of 0.41 to 0.67. The difference between the values of some compared correlations reached $r = 1.17$ ('cooperative–over-conventional' with leisure interactions)(Table 4).

Participants' styles of conflict also had a quite unstable effect, with impacts on interactions changing from one expedition to another. In particular, the 'competing' style had a mainly positive but not very strong influence on interactions in various fields, but the corresponding correlation became quite strong and negative for interactions in the field of leisure in the third expedition ($r = –0.58$). Conversely, in the same expedition and in the same area, the previously negative impact of the 'collaborating' style became strongly positive ($r = 0.52$) (Table 4).

'Avoiding' did not have any tangible influence on interactions during the first two expeditions but, in the third, showed increased positive correlations with interactions in the field of leisure ($r = 0.40$) and significantly affected interactions in the everyday sphere ($r = .55$). 'Compromising' had a strong positive impact on various areas of interaction only in the first expedition ($r = –0.52–.71$; $p < 0.1–0.05$). 'Accommodating' exhibited a negative impact only on leisure interactions in the first and third expeditions ($r = –0.41$ and $–0.54$).

Thus, based on the analysed data presented in Tables 2–4, we find that the *first derivative hypothesis* is fully confirmed. We found that the influence of expeditioners' personality traits on different areas of their interactions was quite strong but varied significantly in different groups, sometimes even in

diametrically opposite directions. The most obvious reason for this, in our opinion, is that the examined groups consisted of different expeditioners with different professional positions and sets of personality traits whose professional and interpersonal interactions were mediated by the conditions of long-term isolation. A natural consequence of this was the formation of microclimates and group norms for formal and informal relations specific to each group. This was the *second derivative hypothesis*, which was formulated at this stage of the obtained data analysis.

To test this hypothesis, we compared the values of the indicators describing expeditioners' personality traits from the three expeditions. The indicators with value distributions close to normal (modulo sum of skewness and kurtosis less than 1) were compared using an independent sample *t*-test; the Mann–Whitney *U* test was used in other cases. Tables 4 and 5, which present this comparison, include only those indicators of personality traits that showed significant differences ($p < 0.05$) between expeditions (Table 5).

The obtained results show that, of the 23 examined indicators, eleven indicators of expeditioners' personality traits were significantly different ($p < 0.05$–0.001)(Tables 5 and 6) for different expeditions. This confirms the *second derivative hypothesis*.

Table 5.

Comparison of indicators describing personality traits of participants from different expeditions according to independent sample *t*-test

Indicators of personality traits	Expeditions						*t*	*p* <	No. of expedi-tions
	No. 1 2016–2017 *n* = 12		No. 2 2017–2018 *n* = 12		No. 3 2018–2019 *n* = 11				
	M	*SD*	*M*	*SD*	*M*	*SD*			
Stuck	7.00	2.89	11.33	3.63	11.64	3.56	-3.24	.01	1 – 2
							-3.44	.01	1 – 3
Excitable	7.00	6.69	12.00	3.81	9.27	4.92	-2.25	.05	1 – 2
Hyperthymic	9.75	5.29	17.00	3.46	17.18	6.45	-4.00	.001	1 – 2
							-3.03	.01	1 – 3
Cyclothymic	9.75	6.15	7.33	3.23	10.36	3.11	-2.90	.05	2 – 3
Self-effacing–masochistic	6.42	2.23	4.25	2.30	4.73	2.37	2.34	.05	1 – 2
Docile-dependent	6.42	2.02	4.75	2.18	5.45	2.11	2.19	.05	1 – 2
Responsible-hypernormal	6.58	2.23	4.75	2.42	6.91	4.06	2.18	.05	1 – 2
Collaborating	5.58	1.83	7.25	1.86	5.73	2.41	-2.21	.05	1 – 2

Table 6.

Comparison of indicators describing personality traits of participants from different expeditions according to Mann–Whitney *U* test

Indicators of personality traits	Expeditions						*U*	*p* <	No. of expeditions
	No. 1 2016–2017 *n* = 12		No. 2 2017–2018 *n* = 12		No. 3 2018–2019 *n* = 11				
	Mean Rank	Sum of Ranks	Mean Rank	Sum of Ranks	Mean Rank	Sum of Ranks			
Competitive-narcissistic	15.42	185.00	9.58	115.00	-	-	37.0	.05	1 – 2
Aggressive-sadistic	16.25	195.00	8.75	105.00	-	-	27.0	.01	1 – 2
	15.17	182.00	-	-	8.55	94.00	28.0	.05	1 – 3
Rebellious-distrustful	15.63	187.50	9.38	112.50	-	-	34.5	.05	1 – 2
	15.17	182.00	-	-	8.55	94.00	28.0	.05	1 – 3

Discussion

In accordance with the main objective of our study, we conducted research with 35 expeditioners at the Ukrainian Antarctic *Akademik Vernadsky* station who participated in three year-long expeditions. The correlations between expeditioners' personality traits and sociometric statuses in different areas of interaction allowed us to conclude that the *initial study hypothesis that expeditioners' personality traits determine their interpersonal interactions is predominantly confirmed*.

However, the number and power of these correlations, as well as the signs of some, did not fully correspond with the expectations derived from the theoretical analysis we performed (namely, the negative impact of such conflict styles as 'accommodating' and 'collaborating' and the positive impact of the 'competing' style). As a result, the *first derivative hypothesis* was formulated: the personality traits of participants in different expeditions can impact interpersonal interactions in different ways and with different strengths. This hypothesis has been *fully* confirmed. Influence of the most personality traits on different areas of interactions in some groups of expeditioners was not only much stronger than in the general sample but varied significantly in different groups, sometimes even having diametrically opposite directions.

The main reason for this (the *second derivative hypothesis*) is the formation of microclimates and group norms for formal and informal relations specific to each group of expeditioners due to significant differences in group participants' sets of personality traits. This hypothesis was also fully confirmed, as it turned out that eleven indicators of expeditioners' personality traits (of the 23 examined indicators) were significantly different on different expeditions.

The utility of the results we obtained for improving the psychological selection of personnel for Antarctic expeditions is unfortunately quite limited and is more general than specific. We unequivocally state that it is undesirable to include people with strong dysthymic character accentuation in Antarctic groups because only this personality trait showed stable, relatively strong and negative correlations with interactions for all three expeditions. In other cases, however, we consider that it is undesirable for predictable and effective interpersonal interactions to select people whose personality traits deviate from the group norms. It is also advisable to develop special trainings aimed at group improvement based on the specific personality traits of Antarctic expedition personnel. Such trainings can significantly reduce the negative impact of unwanted personality traits on interpersonal interactions.

This result is fully consistent with the opinion of Belbin (2010), who studied managers and noted, that there were room in a firm for all types of people: that even those with unusual idiosyncrasies would find their roles somewhere within the organisation. The only proviso was that they were actually competent in the area for which they were being recruited. In addition, this author (Belbin 2010) pointed to a typical trend of some people to be drawn towards particular occupations due to particular personality characteristics, which led to the formation of teams from people who were likely to have much in common. In our case, we have found that expeditioners' personality traits were significantly different on different three expeditions.

In general, Turner *et al.* (2020) emphasized an existing broader range of individual difference and contact outcomes to be explored. And Smith and DeNunzio (2020) noted that, although, research suggested that personality traits and job characteristics were both important drivers of work outcomes, but potential interactions between the two were out of focus. Therefore, it is not surprising that the research was carried out in a context not similar to ours. And the most popular area concerning the impact of personnel's personality traits on interpersonal interactions were the studies of such traits as extraversion (Hassan *et al.* 2019), neuroticism (Greenfield *et al.* 2014; Hassan *et al.* 2019), social mindfulness (Dou *et al.* 2018; Pratscher *et al.* 2018), agreeableness and openness to experience (Vezzali *et al.* 2018; Hassan *et al.* 2019) and intergroup hostility (Kteily *et al.* 2019).

At the same time, we should note that the studies performed by various scientists have partially identified personality characteristics and behavioural strategies that are adaptively important for Antarctic expedition personnel, which can be used to some extent for psychological selection. Grant *et al.* (2007) determined that the poor adaptation of Antarctic personnel was due to 'high defensive hostility' and 'high emotional focused coping' but that good adaptation was supported by 'high openness to experience'. Smith *et al.* (2017) noted that an expeditioner's ability to view a situation positively and to seek alternative forms of social support had a positive influence on their capacity to overcome

interpersonal challenges. Mehta and Chugh (2011) found that positive personal characteristics such as high enthusiasm, adaptability, optimistic future orientation, determination and need for achievement were important for expeditioners' adaptation to difficult conditions. Palinkas *et al.* (2000) determined that personality characteristics such as low levels of neuroticism, extraversion, conscientiousness and a low desire for affection from others had the greatest adaptive significance for Antarctic expedition personnel. However, it is clear that these data are extremely insufficient for the organisation of high-quality psychological selection of expeditioners.

Conclusion

This study proved that expeditioners' personality traits significantly determine their interpersonal interactions. However, in different groups, the influence of personality traits on different areas of interaction can vary significantly, sometimes even in diametrically opposite directions. In contrast to the results obtained in other studies, we have found this effect for three different groups of expeditioners who underwent the same professional and psychological selection and worked for three consecutive years in the same conditions at the Ukrainian Antarctic *Akademik Vernadsky* station. The main reason for this is the formation of microclimates and group norms for formal and informal relations that are specific to each group of expeditioners due to significant differences in group participants' sets of personality traits.

The psychological selection and training of Antarctic expedition personnel can be improved by determining a clear list and normative indicators of their personality traits, as well as by developing special trainings for an expedition group that take into account the specific personality traits of the group participants.

The limitations of our study are determined by the peculiarities of the selected expeditioners at the Ukrainian Antarctic *Akademik Vernadsky* station, as well as the cultural and professional characteristics of Ukrainian expeditioners. It is also be worth mentioning the fact that only one sex was studied. Despite these limitations, the present study's findings expand our understanding of which – and to what extent – personality traits can influence expeditioners' interpersonal interactions.

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