Is Hostility the Link Between Low and High Levels of Psychological Symptoms?: A Latent Profile Analysis

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Abstract

An alternative for the study of co-occurring syndromes is the empirically derived Latent Profile Analysis (LPA). Due to the apparent non-existence of research using this method with a wide variety of psychological symptoms, the aim of the present study comprised the empirical determination of their patterns. After identifying the latent subgroups, the second objective of the study was to analyze their differences concerning symptom severity, use of coping strategies, selected social support variables, personality traits, and sociodemographic variables. The sample (n= 918) was collected through the Internet and, employing van der Waerden's non-parametric test, differences were evaluated between the five profiles found. The results evidenced considerable effect sizes regarding *hostility* and no significant differences for extraversion. After controlling for demographic variables and personality traits, adaptive coping strategies showed no significant differences. It was concluded that future research should further study *hostility* as a possible link between high and low levels of the symptoms analyzed and their associations with *perceived understanding, emotional support received*, and *availability of emotional support*

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as protective factors.

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1. Introduction

The World Health Organization has already conducted four studies on the *Global Burden of Disease* which is the largest epidemiological study and covers mortality and morbidity from major diseases, injuries, and health risk factors. In 1990, depression ranked fourth in Disability-Adjusted Life Years (DALY) and accounted for 10.7% of Years Lost due to Disability (YLD). According to the forecasts of this first study, depression was to reach the second place of all DALYs by the year 2020 (Lopez & Murray, 1998). The latest study published by the World Health Organization (2018) evidenced that mental and substance use disorders are already occupying the first place of DALYs with 20.61% of all YLDs.

In addition to these figures, it should be noted that major depression is associated with psychiatric comorbidities (Avenevoli et al., 2015; Kang et al., 2015). In a patient with a given illness, the term comorbidity refers to any additional coexisting complaints (Feinstein, 1970). For example, depression is associated with hostility and anxiety (Moser et al., 2010; Riley et al., 1989; Stewart et al., 2010), hostility with aggressiveness (Berkout et al., 2019) and psychoticism (Eysenck, 1995), and psychotic-like experiences with paranoid ideation (Coid et al., 2016).

1.1 Coping

Considering the DALYs and the transcendental role of depression, it should be noted that, not only there is a relationship between depression and stressful life events (Duman et al., 2016) but, on many occasions, some

psychosocial stressor also tends to cause the first episode of depression in a person's life (Khan et al., 2005). Thus, the strategies that people use to cope with stressful situations should be taken into account. According to Lazarus and Folkman's (1984) transactional model, stress can arise when a person experiences that he or she does not have sufficient resources to meet the needs of the environment. There are numerous ways of classifying coping strategies. Roth and Cohen (1986) differentiate between approach strategies and avoidance strategies, Lazarus (1993) between problem-oriented strategies and emotion-oriented strategies, and Tobin et al. (1989) combine both classifications and distinguish between problem-oriented engagement strategies, emotion-oriented engagement strategies, problem-oriented disengagement strategies, and emotion-oriented disengagement strategies. According to several meta-analyses on the use of coping strategies, *emotional concealment* and *problem avoidance* exhibited the most significant associations with certain symptoms, and *problem focused coping strategies, acceptance, positive reappraisal and social-emotional support* coping strategies were related to higher well-being and health (Compas et al., 2017; Dempster et al., 2015; Gilhooly et al., 2016; Kvillemo & Bränström, 2014).

1.2 Social Support

Lazarus and Folkman (1984) already mentioned the importance of social support and pointed out that there are two complementary concepts of social support. On the one hand, the psychological perspective understands social support as a process, in which a stressed individual actively seeks social support. According to this buffering effect model, social support operates as a moderator and does not influence an individual in the absence of stressors (Baron & Kenny, 1986; S. Cohen & Hoberman, 1983; Schwarzer & Leppin, 1988). On the other hand, the epidemiological perspective understands social support as a characteristic of the environment (Lazarus & Folkman,

1984) and, according to the main effect, social support increases well-being independently of the existence or degree of eventual stressors (S. Cohen & Syme, 1985). In addition to these conceptualizations, it is also possible to differentiate between the perception of available social support and the social support actually received. Although several studies showed that the perception of available social support has more considerable effects on increasing well-being (Uchino, 2004, 2009), it should be contemplated that significant others as social support providers should be most efficacious in reducing the negative effects of stressful situations (Thoits, 2011). Thus, the perceived responsiveness of the social support provider is decisive for a person to better cope with stressful life situations (Feeney & Collins, 2015). To conclude, it is worth recalling Lazarus (1993), who stated that:

> To answer this question it is not enough merely to look at given, mostly unchangeable social and personality characteristics - such as a supportive family, friends, financial support, ego-strength, intelligence, and skills - which mitigate personal vulnerability and help people through crises. Because we can usually do nothing about these characteristics, if we want to learn how to help people to cope better, we must also examine what they are actually doing and telling themselves in an effort to cope (p.244).

Despite the importance of analyzing the strategies individuals use to cope with stressful situations, it is worth noting that the perception of available social support appears to have a greater impact on mental health than adaptive coping strategies (Budge et al., 2013; Lin, 2016; Zeidner et al., 2016).

1.3 Personality traits

Furthermore, keeping in mind Lazarus' (1993) quote (i.e. mostly unchangeable social and personality characteristics), it is essential not only to include the aforementioned factors in any analysis but also

personality traits. According to the Big Five-Factor Model (Costa Jr & McCrae, 1989, 2008), five personality traits represent two poles of a continuum: Neuroticism-Emotional Stability, Extraversion-Introversion, Openness to Experience-Closed to Experience, Agreeableness-Hostility, and Consciousness-Unconsciousness. Relating personality traits to psychological variables, the importance of *neuroticism* should be emphasized, as it is associated with burnout (Fornés-Vives et al., 2019), displacement behaviors (Mohiyeddini et al., 2015), and maladaptive coping strategies (Arumuganathan et al., 2020; Menon et al., 2018; Pearson et al., 2014). On the other hand, *extraversion* is linked to experiencing and expressing positive emotions (Andrés et al., 2016; Diener et al., 2003).

1.4 Latent Profile Analysis as an alternative analysis approach

Taking into account the importance of major depression and its associations with psychiatric comorbidities (Avenevoli et al., 2015; Kang et al., 2015), an alternative approach for the analysis of co-occurring syndromes (Doss & Weisz, 2006) could be considered: The empirically derived Latent Profile Analysis (LPA). While factor analysis groups items and/or variables, LPA is person-centered. LPA detects the characteristics shared by certain individuals, groups them together, and thus facilitates the possibility to distinguish members of one group from members of another group. That is, through a set of variables, LPA identifies latent, i.e., unobserved, subgroups within an overall population (Collins & Lanza, 2013; Howard & Hoffman, 2018).

It is important to note that LPA assumes population heterogeneity. Consequently, LPA is used to identify those differences that are not observed a priori. For this reason, LPA complements traditional techniques (e.g., t-test or analysis of variance) that allows comparison of certain groups in relation to observed variables, such as gender (Spurk et al., 2020).

While LPA has been conducted, for example, with bulimic symptoms

(Thomas et al., 2011), post-traumatic stress disorder (Au et al., 2013; Műllerová et al., 2016), obsessive-compulsive symptoms (Boysan, 2014), psychosis (Bucci et al., 2017), and metabolic risk factors and perceived health (Ekblom-Bak et al., 2020), it does not appear to have been employed, in adult population, to analyze the co-occurrence of a wide variety of syndromes. Likewise, no LPA was found that included psychological symptoms, coping strategies, personality traits, and social support variables describing the perceived responsiveness of the social support provider.

1.5 The present study

Determining patterns regarding the co-occurrence of a wide variety of psychological symptoms has several benefits: In addition to identifying latent profiles with similar symptom levels, intergroup differences in symptom severity can be determined. In this way, those symptoms that most differentiate latent subgroups can be detected. Furthermore, LPA facilitates the analysis of the respective group sizes and their proportions in relation to the overall population. Having knowledge of the clinically relevant profiles contributes to the possibility of deepening the study of which variables are associated with these latent profiles: To determine the social and personal characteristics of the individuals belonging to each profile and, in addition, to analyze how they cope with stressful situations.

Thus, the first objective of the present study was to determine the empirically derived patterns of psychological symptoms in an adult population. After identifying the latent subgroups, the second study objective was to analyze their differences concerning symptom severity, coping strategies, certain social support variables (emotional support received, availability of emotional support, and perceived comprehension), personality traits, and sociodemographic variables.

2. Methodology

2.1 Sample

The Google Forms© digital platform was used for data collection. On the initial page of the questionnaire, information was provided on anonymous participation and confidential treatment of the information. Likewise, the possibility of withdrawing at any time from the research was communicated and, after agreeing to participate through informed consent, the questionnaires were presented. In case the individuals had any inconveniences or doubts, the email address of one of the researchers was provided. Participants were recruited through the social networks Facebook, Instagram, and WhatsApp and, to ensure successful completion of the survey, a pilot test was conducted with 30 individuals.

Non-probabilistic and snowball sampling was performed. The sample consisted of 918 adults (M_{age}= 44.22, SD= 15.61, female= 490) residing in Argentina, composed of 15.3% from the Autonomous City of Buenos Aires, 18.6% from Greater Buenos Aires, 13.6% from the Province of Buenos Aires, and 52.5% from other provinces of Argentina. A total of 63.2% were of incomplete university level or superior.

2.2 Instruments

Symptom Assessment-45 Questionnaire

The *Symptom Assessment-45 Questionnaire* (SA-45) is a brief version of the SCL-90-R and has evidenced its validity and reliability (Hildenbrand et al., 2015). In the present study, the Spanish version of Sandín et al. (2008) was used, which has 45 items corresponding to nine dimensions: *somatization, obsession-compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism.* Participants rate each item on a five-point Likert scale (0 = *Not at all* to 4

= *Very much or extremely*) and, in the Spanish-language validation study, internal consistencies reached values between .63 ≤ α ≤ .85.

Mini-IPIP

The Argentine validation of the *Mini International Personality Item Pool* (Mini-IPIP) by Simkin et al. (2020) was used. The instrument has 20 items corresponding to five personality traits: *openness to experience, conscientiousness, extraversion, agreeableness and neuroticism.* The participants respond using a five-point Likert scale (1 = *Completely disagree* to 5 = *Completely agree*). The authors of the aforementioned study obtained internal consistencies between .77 ≤ ω ≤ .88.

Berlin Social Support Scale

In the present study, the Argentine adaptation of the *Berlin Social Support Scale* was used (Schetsche, 2021). This instrument consists of 15 items representing five dimensions: *availability of emotional support, availability of instrumental support, need for social support, emotional support received and perceived comprehension.* Regarding the items corresponding to *emotional support received* and *perceived comprehension*, the participants should respond thinking of the person closest to him/her. The instrument offers a 5-point Likert scale (0 = *Totally disagree* to 4 = *Totally agree*) and, in the aforementioned study, the internal consistencies of the instrument were found to be between .71 ≤ α ≤ .90. Based on the characteristics of the present study, only the following dimensions were included: *perceived comprehension, availability of emotional support, and emotional support received.*

Coping Strategies Inventory

The brief version of the *Coping Strategies Inventory* (CSI) by Schetsche et al. (2022) comprises 24 items representing 4 engagement coping

strategies (*problem-solving, cognitive restructuring, emotional expression, social support seeking*), and 4 disengagement coping strategies (*problem avoidance, wishful thinking, self-criticism, and emotional concealment*). The instrument uses a 5-point Likert scale (0 = *Not at all* to 4 = *Completely*) and, in the mentioned study, internal consistencies were between $.74 \leq \alpha \leq .83$.

2.3 Procedure

Outlier analysis and transformations

Through the *Minimum Covariance Determinant* test (Leys et al., 2018), 106 values were classified as severe outliers. These were removed from the sample, reducing it to n = 812 (female = 435). Before starting the statistical analysis, all variables were normalized ($M = 0$, $SD = 1$) through Yeo and Johnson (2000) transformations, thus following the suggestions of G. B. Morgan et al. (2016) for the LPA. In addition, this measure facilitated the comparison of the profiles, as the psychometric instruments used had Likert scales with different value ranges.

Latent Profile Analysis (LPA)

To evaluate the LPA models, suggestions from several studies were followed using the *Bayesian information criterion (BIC)* and the *Bootstrapped Likelihood Ratio Test (BLRT)* as fit indicators (McLachlan & Rathnayake, 2014; G. B. Morgan et al., 2016; Nylund et al., 2007). Considering the importance of similar shapes of covariances (Bertoletti et al., 2015), we used an ellipsoidal distribution with variable volume; furthermore, shapes and orientation matrix were constrained to be equal (Celeux & Govaert, 1995). This last assumption allows a parsimonious characterization of the clusters (Scrucca et al., 2016).

In the exploratory analysis of latent profiles with clinical relevance,

only the nine psychological symptoms described by the SA-45 were used. In this way, it was intended to retain some independence between clinically relevant classes and other auxiliary variables. The inclusion of these variables may lead to undesired results since they would influence the formation of latent classes and become indicators of these. That is, this procedure could cause the meaning of the latent class to be changed (Asparouhov & Muthén, 2014).

Consequently, the described covariance structure was used to estimate the number of profiles that minimized the BIC and, on the other hand, the BLRT procedure (which keeps adding components sequentially) was terminated when a test was not significant at the $p \leq .05$ level. Thus, it was determined whether a model with k classes significantly improved model fit over a model with k–1 classes. As large samples tend to overestimate the number of profiles (Lubke & Neale, 2006), we then analyzed the group sizes of the top-models. In tune with previous research using LPA (Kircanski et al., 2017; Versella et al., 2016), model retention was further based on the size of the smallest latent profile, because subgroups representing less than approximately 5% of the total sample may overfit the data. This means that the inclusion of exceedingly small subgroups may increase the likelihood that the results cannot be replicated in an independent data set.

Comparison between profiles

For demographic data representing nominal characteristics (gender, place of residence, being in psychological treatment, employment status, use of psychotropic drugs), several Chi-square tests were performed. Subsequently, the profiles found were compared concerning age, educational level, personality traits, social support, coping strategies and symptoms. Among several profiles, many variables did not represent homogeneity of variances according to Levene's test, so comparisons were conducted employing a non-parametric test (van der Waerden, 1953a, 1953b). The van der Waerden

test has asymptotically the same efficiency as the F-test (Hajek, 1969) and was generalized to multi-group comparison designs (Mansouri & Chang, 1995). Concerning statistical power, this method outperforms the classical analysis of covariance (ANOVA) in the case of assumption violations (Sheskin, 2003). Furthermore, in a comparison of several non-parametric methods, the van der Waerden test exhibited the best overall performance, especially concerning type I errors and statistical power when the total number of observations in the table is $n > 10$ (Luepsen, 2018).

Following this analysis, an overall comparison was conducted including the five profiles and age, educational level, and personality traits as control variables. This decision was based on the fact that, throughout adulthood, the *educational level* remains fairly stable, is considered a person's resource (Ross & Mirowsky, 2006), and appears to have a protective effect against certain symptomatology (Bjelland et al., 2008). On the other hand, numerous studies evidences the associations of *neuroticism* with the development of many psychological conditions (Barlow, Ellard, et al., 2014; Barlow, Sauer-Zavala, et al., 2014; Cuijpers et al., 2010). In this way, it was intended to determine which differences among the profiles (concerning social support, coping strategies, and the nine symptoms) could not be attributed to sociodemographic and/or personality trait differences.

In order to control for the probability of committing any type I error, the Benjamini and Hochberg (1995) adjustment for multiple inferences was used for all comparisons. To compute effect sizes, Cramer's V (φ_c) was used and, for their interpretation, J. Cohen's (1988) suggestions were followed: with one degree of freedom, the cutoff value for a small effect is $\varphi_c = .10$, for a medium effect $\varphi_c = .30$ and, for a large effect $\varphi_c = .50$. With 4 degrees of freedom, the cutoff value for a small effect is $\varphi_c = .05$, for a medium effect $\varphi_c = .15$ and, for a large effect $\varphi_c = .25$.

Data analysis

The Minimum Covariance Determinant test (Leys et al., 2018) was conducted with the *MASS* package (Venables & Ripley, 2002); the Yeo and Johnson (2000) transformations, with *bestNormalize* (Peterson & Cavanaugh, 2020); with *mclust* (Scrucca et al., 2016), the LPA; with *psych* (Revelle, 2021), the calculation of Cronbach's alphas (α) and omega coefficients (ω); with *rstatix* (Kassambara, 2020), Levene's tests; with *np.anova* (Luepsen, 2021), van der Waerden's tests. All these packages are part of the R software (R Core Team, 2020) and, for all calculations, the probability value $p \leq .05$ was used.

3. Results

3.1 Latent Profile Analysis

Exploratory analysis of latent profiles

According to the content of Table 1, the BIC and the *Integrated Complete Likelihood* (ICL) criteria evidenced the presence of 7 profiles, while the BLRT showed the existence of 5. Because large samples tend to overestimate the number of profiles (Lubke & Neale, 2006), clusters corresponding to 7 and 6 profiles were analyzed. It was noted that their respective smallest group consisted of 14 and 38 individuals. As these represented less than 5% of the total sample, we retained the model with 5 profiles and used this to continue the following analyses, thus giving preference to the result obtained by the BLRT. Likewise, the number of 5 profiles was in line with previous studies that used certain symptoms and found between 4 and 5 distinct profiles: For example, P. Morgan et al. (2020) assessed depression and stress generation in couples and found 4 profiles; Herman et al. (2007) analyzed depression with other concurrent symptoms and found 5 profiles; assessing irritability, anxiety, depression, and attention

deficit hyperactivity disorder, Kircanski et al. (2017) found 5 profiles. Considering entropy, all values were found to be above the recommended threshold value of 0.80 (Clark & Muthén, 2009).

Table 1. Exploratory analysis of latent profiles

No. of profiles	BIC^{VEE}	ICL^{VEE}	$BLRT^{VEE}$	Entropy
2	16200.96	16265.25	.001	.833
3	16027.19	16155.97	.001	.860
4	15977.57	16166.26	.001	.832
5	15975.74	16191.06	.054	.834
6	16021.79	16300.26	-	.804
7	15726.96	15912.65	-	.874
8	15733.65	15933.19	-	.876

Notes. n = 812; BIC, Bayesian information criterion; ICL, integrated complete-data likelihood criterion; BLRT, Bootstrapped Likelihood Ratio Test; ^{VEE}, covariance matrix within each group with variable volume and shape and orientation constrained to be equal.

Graphical comparison of profiles

Figure 1 shows the 5 latent profiles of the model retained. The corresponding patterns were used to name the profiles as follows: profile P1 represented no psychological issues, P2 mild psychological issues, P3 moderate psychological issues with an accentuated *hostility* level, P4 considerable psychological issues with a pronounced level of *psychoticism and phobic anxiety*, and P5 severe psychological issues. Regarding group sizes, P2 and P3 can be considered dominant profiles, as they comprise 75% of the total sample. Considering the scale of the vertical axis, it should be noted that it represents the means after performing Yeo and Johnson (2000) transformations.

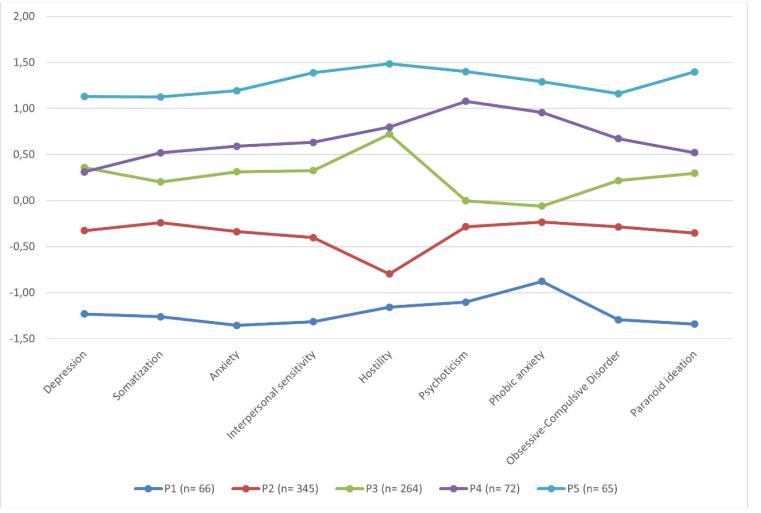

Figure 1. Graphical representation of the 5 latent profiles

3.2 Demographic comparison of profiles

We performed several Chi-square tests concerning the 5 profiles and those demographic data representing nominal characteristics. Regarding gender, no cell had an expected count less than 5 and no significant association could be found, χ^2 (4) = 9.08, p = .059; regarding place of residence, no cell had an expected count less than 5 and no significant association could be found, χ^2 (12) = 20.71, p = .055; in relation to being in psychological treatment, no cell had an expected count less than 5 and no significant association could be found, χ^2 (4) = 5.65, p = .227; regarding employment status, no cell had an expected count less than 5 and a significant association could be found, χ^2 (12) = 42.59, $p \leq .001$, φ_c = .13: most of the employed individuals belonged to the P2 profile, while most of the unemployed participants belonged to the P3 profile; regarding the consumption of any psychotropic drug, no cell had an expected count less than 5 and a significant association could be found, χ^2 (4) = 16.44, p = .002, φ_c = .14:

the majority of individuals who consumed psychotropic drugs belonged to the P3 profile, while the majority of individuals who did not consume psychotropic drugs belonged to the P2 profile.

3.3 Comparison of psychological variables

As can be seen in Table 2, all internal consistencies were found to be within adequate ranges (Hinton et al., 2014). When observing the *educational levels* of the 5 profiles, an apparent similarity was noticed concerning profiles P1 and P4 and, on the other hand, between profiles P2, P3, and P5. The graphical representations of profiles P1 and P4 (see Figure 1) also showed a certain similarity.

Table 2. Descriptive statistics of the 5 latent profiles

	Total		**P1 (n= 66)**		**P2 (n= 345)**		**P3 (n= 264)**		**P4 (n= 72)**		**P5 (n= 65)**	
	α	**ω**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
Age			.33	.93	.04	1.05	-.05	.98	-.10	.84	-.23	1.00
Educational level			.40	.97	.04	1.02	-.11	.96	.22	.96	-.43	.94
O - Openness	.58	.73	.28	.94	.04	1.00	.06	1.00	-.33	.89	-.41	1.01
C - Conscientiousness	.70	.74	.54	.97	.09	1.00	-.13	.98	-.03	.75	-.47	1.07
E - Extraversion	.62	.69	.22	.88	.03	.99	-.05	1.08	.01	.85	-.21	1.00
A - Agreeableness	.74	.81	.27	.90	.16	.96	-.06	1.02	-.32	.95	-.55	.98
N - Neuroticism	.67	.73	-.92	.73	-.31	.90	.34	.96	.32	.69	.86	.83
Emotional support received	.89	.89	.46	.74	.15	.94	-.05	1.02	-.44	.95	-.58	1.09
Availability of emotional support	.85	.86	.38	.88	.14	.98	-.06	1.04	-.22	.80	-.64	.92
Perceived comprehension	.77	.78	.68	.67	.14	.97	-.10	1.01	-.29	.84	-.67	1.01
Problem solving	.75	.75	.22	1.02	.16	.94	-.06	1.06	-.29	.79	-.51	1.00
Cognitive restructuring	.67	.70	.09	.99	.11	.97	-.17	1.07	.19	.81	-.20	.91
Express emotions	.77	.77	.08	.90	.04	.98	-.01	1.08	-.05	.83	-.20	1.02
Search for social support	.80	.82	-.02	.97	.10	.98	-.04	1.06	-.01	.86	-.38	.90
Problem avoidance	.66	.67	-.13	1.06	-.03	1.01	-.10	1.03	.24	.88	.41	.71
Wishful thinking	.78	.79	-.62	1.05	-.02	1.02	.16	.96	-.15	.84	.28	.86
Self-criticism	.80	.81	-.58	.95	-.12	.96	.14	1.07	.09	.78	.60	.73
Emotional concealment	.77	.78	-.52	.92	-.13	1.00	.06	1.02	.23	.77	.69	.77

Depression	.85	.88	-1.24	.49	-.32	.86	.38	.96	.27	.54	1.15	.45
Hostility	.83	.86	-1.16	.18	-.80	.46	.76	.53	.79	.30	1.49	.26
Interpersonal sensitivity	.81	.85	-1.33	.28	-.40	.83	.35	.84	.61	.50	1.40	.40
Somatization	.82	.84	-1.30	.44	-.24	.89	.22	.96	.50	.58	1.14	.50
Anxiety	.83	.87	-1.39	.36	-.33	.85	.33	.86	.58	.65	1.20	.52
Psychoticism	.68	.70	-1.12	.30	-.27	.85	-.01	.88	1.10	.43	1.41	.41
Obsessive-compulsive	.81	.86	-1.31	.37	-.28	.86	.23	.94	.68	.55	1.16	.54
Phobic Anxiety	.83	.86	-.89	.40	-.23	.90	-.07	.97	.97	.42	1.30	.41
Paranoid Ideation	.74	.78	-1.35	.38	-.35	.83	.32	.86	.49	.56	1.41	.45

Notes. *M* and *SD* after Johnson transformations; α, Cronbach's alpha; ω, McDonald's omega.

Table 3 shows the statistical summary of the differences between profiles. Since P2 and P3 represented 75% of the sample, it was decided to analyze the differences between these two dominant profiles and, subsequently, the overall differences.

Table 3. Statistical summary of differences between profiles

	Differences between P2 and P3 (df = 1)			**Differences between all profiles without control variables** (df = 4)**			**Differences between all profiles with control variables** (df = 4)**		
	χ^2	φ_c	p^{BH}	χ^2	φ_c	p^{BH}	χ^2	φ_c	p^{BH}
Age	2.00	.06	.16	13.86	.07	.01	-	-	-
Educational level	3.51	.08	.06	29.86	.10	.00	-	-	-
O - Openness	.05	.01	.83	26.22	.09	.00	-	-	-
C - Conscientiousness	6.45	.10	.01	4.74	.11	.00	-	-	-
E - Extraversion	.81	.04	.37	7.11	.05	.14	-	-	-
A - Agreeableness	7.87	.11	.01	43.64	.12	.00	-	-	-
N - Neuroticism	64.86	.33	.00	174.23	.23	.00	-	-	-
Emotional support received	6.10	.10	.01	53.43	.13	.00	2.25	.08	.00
Availability of emotional support	5.96	.10	.01	46.01	.12	.00	1.42	.06	.03
Perceived comprehension	9.69	.13	.00	76.31	.15	.00	34.70	.10	.00

Problem solving	7.76	.11	.01	35.36	.10	.00	6.32	.04	.18
Cognitive restructuring	11.77	.14	.00	18.20	.07	.00	8.97	.05	.06
Express emotions	.62	.03	.43	3.93	.03	.43	.57	.01	.97
Search for social support	2.95	.07	.09	12.46	.06	.02	6.49	.04	.17
Problem avoidance	.80	.04	.37	18.27	.08	.00	1.69	.06	.03
Wishful thinking	5.03	.09	.02	39.99	.11	.00	15.93	.07	.00
Self-criticism	1.46	.13	.00	55.41	.13	.00	8.55	.05	.07
Emotional concealment	5.83	.10	.02	58.32	.13	.00	13.35	.06	.01
Depression	74.37	.35	.00	258.79	.28	.00	86.12	.16	.00
Hostility	408.27	.82	.00	609.76	.43	.00	399.91	.35	.00
Interpersonal sensitivity	99.62	.40	.00	359.89	.33	.00	175.52	.23	.00
Somatization	37.27	.25	.00	245.30	.27	.00	139.08	.21	.00
Anxiety	77.78	.36	.00	303.69	.31	.00	12.20	.19	.00
Psychoticism	14.13	.15	.00	348.55	.33	.00	242.08	.27	.00
Obsessive-compulsive	45.44	.27	.00	27.13	.29	.00	113.79	.19	.00
Phobic Anxiety	4.50	.09	.03	25.77	.28	.00	179.05	.23	.00
Paranoid Ideation	84.72	.37	.00	346.19	.33	.00	19.62	.24	.00

Notes. *M* and *SD* after Yeo and Johnson transformations; ^{BH} , p-values after Benjamini and Hochberg (1995) adjustment for multiple inferences; df, degrees of freedom; $\chi 2$, chi square; φ_c, Cramer's V; **, control variables: age, educational level and personality traits.

Finally, a last van der Waerden test was performed. In this test, the 5 profiles were included, and age, educational level, and the 5 personality traits were used as control variables. In this way, the aim was to evaluate to what degree the differences could be attributed to the 3 dimensions of social support and coping strategies. The results of this analysis can be found in the last columns of Table 3.

4. Discussion

In order to identify empirically derived patterns of psychological symptoms in an adult population and to determine the differences among them, a latent profile analysis was performed considering the following symptoms: *somatization, obsession-compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation*, and *psychoticism.* Based on the results of this analysis, the differences between

the 5 resulting profiles were analyzed. For this purpose, the 9 symptoms mentioned, 8 coping strategies, 3 social support variables, 5 personality traits, and sociodemographic variables were considered. According to the subsections described in the results, the most relevant findings will be discussed.

4.1 Analysis of Latent Profiles and their demographic differences

Although BIC and ICL had evidenced the existence of 7 profiles, all statistical analyses were performed on 5 profiles, thus giving priority to the BLRT result. This decision was based on the fact that more profiles would have comprised solutions whose smallest group would have represented less than 5% of the total sample, thus increasing the likelihood of overfitting.

Concerning symptoms, the 5 profiles found were classified as follows: profile P1 (n= 66) represented no psychological issues, P2 (n= 345) mild psychological issue, P3 (n= 264) moderate psychological issue with an accentuated level of *hostility*, P4 (n= 72) considerable psychological issue with a pronounced level of *psychoticism and phobic anxiety*, and P5 (n= 65) severe psychological issue. The mean age was found to decrease according to the severity of symptoms. These results are in line with previous studies that found the same relationship between age and certain symptomatology (Drentea, 2000; Lijster et al., 2017).

Profiles P2 and P3 stood out for several reasons. First, because these groups represented 75% of the sample. In addition, it was evident that most unemployed people and most individuals who used psychotropic drugs belonged to the P3 profile.

Finally, it was found that the 5 profiles did not evidence significant differences concerning gender, place of residence, and the fact of being in psychological treatment. This last result could be considered striking since it would be expected that individuals with greater severity of symptoms would be more frequently in psychological treatment. Poor knowledge of

their own illness has been analyzed especially in the study of psychosis. For example, Lysaker et al. (2011) found relationships between schizophrenia and lack of awareness of symptoms and need for treatment. Poor self-awareness could also be considered a strategy to increase quality of life (Kravetz et al., 2000), to decrease depression (Drake et al., 2004), and to reduce hopelessness and low self-esteem (Lysaker et al., 2006). On the other hand, recognition of mental illness was significantly related to suicidal ideation and attempts (Gonzalez, 2008). Thus, it could be explained that no significant differences were found concerning the fact of being in psychological treatment.

4.2 Comparison of psychological variables

Since 75% of the sample can be assigned to only two groups, the next subsection of the discussion will focus on the analysis of the differences between the respective P2 and P3 profiles.

Differences between profiles P2 and P3

First, it should be emphasized that no significant differences were found in relation to *age* and *educational level*. In addition, a considerable effect size was observed for *hostility* ($\varphi_c = .82$) and medium effect sizes for *interpersonal sensitivity* ($\varphi_c = .40$), *paranoid ideation* ($\varphi_c = .37$), *anxiety* ($\varphi_c = .36$) and *depression* ($\varphi_c = .35$). When analyzing the effect sizes of the remaining psychological variables, it was observed that the differences between P2 and P3 were possibly due more to *neuroticism* ($\varphi_c = .33$) than to behavioral differences in coping with stressful situations and/or social support variables ($.09 \leq \varphi_c \leq .13$). Associations of *neuroticism* with the development of many psychological conditions has been shown in numerous studies (Barlow, Ellard, et al., 2014; Barlow, Sauer-Zavala, et al., 2014; Cuijpers et al., 2010).

Even so, attributing the effect size of *hostility* simply to the difference

concerning *neuroticism* seems insufficient. Thus, it was intuited that, in addition, the increased levels of *hostility* could be due (1) to the fact that the P3 profile represented the highest number of unemployed participants, this being a factor that is not only related to increased levels of *anxiety* and *depression* (Lennon & Limonic, 2010), but also to *hostility* (Hakulinen et al., 2013) (2) to the pandemic situation during which the data collection was conducted and the negative impact this has on job search (Ernst & López Mourelo, 2020; Hensvik et al., 2021). Leaving aside the pandemic context, it should also be emphasized that P3 exhibited significantly lower levels regarding *emotional support received, availability of emotional support, perceived comprehension, problem-solving, and cognitive restructuring.* Likewise, this profile showed higher levels of wishful thinking, self-criticism, and emotional concealment. Considering that these differences were characterized by small effect sizes, it can be interpreted that none of these factors had a particularly considerable impact on *hostility*, but rather their joint occurrence.

Although these factors could have influenced the development of increased *hostility*, these arguments seem to be insufficient to explain such a considerable effect size. According to Brodsky (2011), *hostility* comprises a cognitive schema of strong disapproval toward others. When reviewing the SA-45 items that correspond to *hostility* ("Outbursts of anger or fits of rage that you can't control", "Feeling the urge to hit or hurt someone.", "Feeling like breaking something", "Having frequent arguments", "Shouting or throwing things"), we noticed that most of them describe more an emotional reaction or behavioral response and not a cognitive or behavioral aspect comprising the antagonistic view of the world and other people. Even in describing *hostility* on the SCL-90-R, Derogatis et al. (1976) referred to characteristic thoughts, emotions, or actions that represent a state of anger. Due to the difficulties encountered by psychometric instruments to differentiate between both constructs (Eckhardt et al., 2004), we decided to

approach the discussion from the concept of anger as an emotion (Fernandez et al., 2015).

Kassinove and Tafrate (2011) analyze anger episodes as a unit. In their model, there is a circular relationship between (1) anger triggers, (2) cognitive appraisal, (3) internal experience of anger, (4) (external) expression of anger, (5) outcomes of anger expression, and finally (6) return to anger triggers. Furthermore, the authors suggest analyzing the effects of anger episodes in the short and long term. Although anger is related to coronary heart disease (Siegman, 1994), possible deterioration of interpersonal relationships (Tafrate et al., 2002), and many psychopathologies (Novaco, 2010), anger episodes may also have positive effects in the short term. Fifty-five percent of individuals who participated in a study in the United States of America and Russia perceived positive outcomes following an anger episode (Kassinove et al., 1997). After an anger episode, many individuals perceived a sense of relief (Tafrate et al., 2002), and angry negotiators tend to perform better than calm negotiators (van Kleef et al., 2004). Anger has the functionality to suppress fear and pain, to reduce perceived vulnerability or loss of control, and facilitates maintaining a certain distance from those perceived as threatening (physically and psychologically), so it also has a defensive functionality (Novaco, 2010). Thus, Kassinove and Tafrate (2011) affirm that the positive effects in the short term could increase the resistance to anger episodes being extinguished.

In conclusion, Novaco (2010) warned that, on too many occasions, anger is treated with psychotropic medication. This could be an explanation for the fact that, in the present study, most of the individuals who used psychotropic drugs also belonged to the P3 profile.

Global differences

Whereas, in the comparison between P2 and P3 profiles, only *hostility* showed a large effect size, in the overall comparison between the 5 latent

profiles, all symptoms were found to have large effect sizes, especially *hostility* (φ_c = .43), *psychoticism* (φ_c = .33), *paranoid ideation* (φ_c = .33), and *personal sensitivity* (φ_c = .33).

In a way, these results are in line with previous studies: there is a relationship between *hostility*, anger, and aggressiveness (Berkout et al., 2019), and already Eysenck (1995) attributed the following characteristics to people with a high level of *psychoticism*: criminal, impulsive, hostile, aggressive, psychopathic, schizoid, unipolar depressive, affective disorders, schizoaffective and schizophrenic traits. Furthermore, in a meta-analysis assessing the relationship between violent behavior and *paranoid ideation*, it was found that associations between psychotic-like experiences and violence were explained by *paranoid ideation* (Coid et al., 2016).

Despite the consonance with previous studies, it is emphasized that Figure 1 graphically represents how *hostility* appears to create a certain nexus between profiles with low and high symptomatology. Numerous studies have shown the associations that *hostility* has with other mental conditions and Novaco (2010) produced a comprehensive summary of these. In turn, he also highlights the normality with which anger is perceived as a human emotion and states that the classification of anger as a pathological condition is very complex. Novaco (2010) states that this is because anger, unlike *depression* and *anxiety*, does not stop the patient because, in certain situations, it can have positive effects (Kassinove et al., 1997; Kassinove & Tafrate, 2011; Novaco, 2010; Tafrate et al., 2002; van Kleef et al., 2004).

The aforementioned "non-arrest" of an angry patient can be transferred to the results of the present study: if we consider that the *hostility* of the P3 profile appeared to create a certain link between the P2 profile (with mild psychological issues) and the P4 profile (with considerable psychological issues with a pronounced level of *psychoticism and phobic anxiety*), the conceptualizations of certain psychological symptoms could be modified. This statement would apply, above all, to *psychoticism, personal sensitivity,*

and *paranoid ideation* and would include a possible causal relationship that would start from high levels of hostility. In this way, *hostility* could be conceptualized not as a component of the aforementioned mental conditions, but as a possible catalyst of them. Even so, it is important to emphasize that the present analysis and observational study cannot support causal statements, so future research is needed to investigate the relationships described.

Especially in the study of post-traumatic stress disorder (PTSD), the bidirectionality of *hostility* has already been shown: On the one hand, *hostility* is a key long-term symptom that can arise after numerous events, such as sexual assault (Feeny et al., 2000), traffic accidents (Ehlers et al., 2003), domestic violence (Jarvis et al., 2005). On the other hand, *hostility* can also operate as a predictor of PTSD, for example, in war veterans (Koenen et al., 2003), victims of sexual assault (Feeny et al., 2000), or traffic accidents (Ehlers et al., 2003). These results reaffirm the aforementioned circular relationship between anger triggers, cognitive appraisal, internal experience of anger, (external) expression of anger, outcomes of anger expression, and, finally, return to anger triggers (Kassinove & Tafrate, 2011).

It was observed that *extraversion* and *emotional expression* did not exhibit significant differences in the three comparisons carried out. Considering the magnitudes of the effect sizes regarding symptoms, the latter finding could be qualified as relevant. Although extreme introversion might represent a major component of schizoid, schizotypal, and avoidant personality disorders (Skodol et al., 2011), people with extreme *extraversion* are also characterized by certain maladaptive behaviors: They tend to be sexually promiscuous, emotionally intrusive, and engage in excessive self-disclosure and thrill-seeking behaviors (McCrae et al., 2005). In addition, high levels of *extraversion* are also related to substance abuse (Atherton et al., 2014). These ambiguous characteristics could have notably influenced that, among the profiles assessed in this study, no significant

differences were found concerning *extraversion.* Thus, it can be deduced that *extraversion* itself does not serve as a variable to differentiate between individuals with high or low levels regarding the symptomatology analyzed in the present study.

Differences using age, educational level and personality traits as control variables

Finally, an overall comparison was conducted including the 5 profiles and *age, educational level,* and personality traits as control variables. After introducing these control variables, we observed that only *hostility* (φ_c = .35) and *psychoticism* (φ_c = .27) continued to exhibit large effect sizes and all remaining symptoms medium effect sizes.

Of the disengagement coping strategies, *wishful thinking* (φ_c = .07), *emotional concealment* (φ_c = .06), and *problem avoidance* (φ_c = .06) had small effect sizes, and *self-criticism* did not meet the established significance level. Several meta-analyses found high associations between certain symptoms, emotional concealment, and *problem avoidance* (Compas et al., 2017; Dempster et al., 2015; Gilhooly et al., 2016; Kvillemo & Bränström, 2014), but only one meta-analysis found associations between *wishful thinking* and dementia (Gilhooly et al., 2016). Considering the results of these meta-analyses, the effect sizes found in the present study are not entirely in line. It is intuited that this incongruence could be due to the inclusion of *neuroticism* as a control variable, as this personality trait has shown significant correlations with all disengagement coping strategies (Arumuganathan et al., 2020; Menon et al., 2018; Pearson et al., 2014).

Regarding engagement coping strategies, we noted that they did not meet the established significance level and that the dimensions of social support showed small effect sizes: *perceived comprehension* (φ_c = .10), *emotional support received* (φ_c = .08), and *availability of emotional support* (φ_c = .06). In this regard, it is important to note that these 3 dimensions of social

support showed significant differences, whereas *social support seeking*, as a coping strategy, did not meet the established significance level. This result led to the interpretation that, independently of adaptive coping behavior in stressful situations, the existence of a close person who provides *emotional support* could have greater effects in reducing certain symptoms. The findings of previous studies that evaluated these relationships are in line with the results of the present study (Budge et al., 2013; Lin, 2016; Zeidner et al., 2016), although it should be cautioned that these used regression models and not LPA to obtain their results.

According to these results, what appears to be elemental is not the active behavior of *social support seeking* in stressful situations, but the existence of a close person from whom to receive emotional support. Thus, these results support Bowlby's (1988) concept of *safe haven*, which is provided by a close person through attachment behavior. In their conceptual framework of social support, Feeney and Collins (2015) included the concept of *safe haven* and described supportive behaviors that involve entering into an intimate relationship to seek comfort, reassurance, and help in times of stress.

It should also be noted that no significant differences were found regarding *cognitive restructuring.* In the study of emotion regulation, Gross and John (2003) showed that (1) *cognitive restructuring* was associated with better interpersonal functioning and (2) that the use of *cognitive restructuring* was positively related to well-being. At this point, it should be noted that, in assessing associations with well-being, the aforementioned authors did not statistically control for having intimate friendships. According to the results of the present study, it is worth questioning whether the origin of the greater well-being found by Gross and John (2003) could not be based on *cognitive restructuring* per se, but on the fact of having close friendships.

Perceived comprehension, emotional support received, and *availability*

of emotional support showed significant differences, whereas engagement strategies did not. Still, it should be considered that the use of a higher number of positive coping strategies led to a more positive adjustment than the use of a lower number of positive coping strategies (Heffer & Willoughby, 2017). The present study did not evaluate the number of strategies used, but rather the frequency of use so that the count-based approach could have provided different results.

5. Limitations

Although the present study delved into the analysis of social support, coping strategies, personality traits, and certain symptomatology, it should be noted that, due to the non-probability sampling, the values of the descriptive statistics are not representative, so any conclusions based on these are only permissible to a limited extent. This is based on the fact of self-selection by the participants and because the sample was taken during the restrictions of the coronavirus pandemic, which must be interpreted as an important influencing factor. In addition, the present study had a cross-sectional design and, to evaluate the variables, self-reported measures were used. These circumstances lead to the need for future research to validate the results.

6. Conclusions

According to the results of the present study, three essential factors should be considered to differentiate between individuals with high or low levels regarding the symptomatology analyzed in this study: (1) future research should delve deeper into the assessment of *hostility* as a link between high and low levels of the symptoms analyzed, (2) *extraversion* per se does not serve as a variable to determine whether an individual could

have symptoms that are in clinically relevant ranges (3) although Lazarus (1993) stated that social characteristics are mostly immutable and therefore other variables should be examined, it is precisely the dimensions of social support that most differentiated the subgroups with different levels of the symptomatology analyzed.

Thus, it can be concluded that it is necessary to broaden the focus of the assessment of coping strategies: Not only what people are actually doing and saying to themselves in an effort to cope with a stressful situation should be assessed, but in an effort to increase *perceived comprehension, emotional support received, and availability of emotional support*. This possible complement to Lazarus (1993) transactional model is based on the fact that the absence of a *safe haven* could also be considered as a stressor (Bowlby, 1988). Also, this complement should always be understood under the umbrella of *hostility*, interpreting it as an outcome and as a predictor variable of other mental conditions (Ehlers et al., 2003; Feeny et al., 2000; Kassinove & Tafrate, 2011), and its negative effects on social relationships (Tafrate et al., 2002).

Considering that hostility could be the link between low and high levels of psychological symptoms, the need to increase the focus on hostility treatment is emphasized. As for the treatment of hostility, it is worth mentioning that cognitive-behavioral interventions have the greatest efficacy (Novaco, 2010) and that behavioral rehearsal may have more positive effects than treatment aimed at cognitive changes (Lee & DiGiuseppe, 2018).

Data Accessibility Statement

The data that support the findings of this study are openly available at: https://osf.io/2ucfq/?view_only=9147ea41694042dbb3fe3a545afc3f85

Declarations

Ethics Approval This research was approved by the Committee on the Responsible Conduct of Research of the University of Buenos Aires, Argentina.

Consent to Participate and Consent for Publication Data collection was done with signed consent from the participants for participation and publication.

Conflict of Interest The authors declare no competing interests.

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