



Contrasting metacognitive profiles and their association with negative symptoms in groups with schizophrenia, early psychosis and depression in a Russian sample.

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ABSTRACT

Research has suggested that negative symptoms in psychotic disorders may be in part fueled by deficits in metacognition or the ability to form integrated ideas about oneself and others. One limitation of this work is that it has largely come from North America and Western Europe. To further the literature, we assessed symptoms using the Positive and Negative Syndrome Scale and Metacognition using the Metacognitive Assessment Scale - Abbreviated in a sample of outpatients with prolonged schizophrenia ($n = 41$), early episode psychosis ($n = 37$) and major depression ($n = 30$) gathered in Moscow, Russia. Verbal memory was assessed for use as a potential covariate. ANOVA revealed the two groups with psychosis had significantly poorer metacognitive function in terms of self-reflectivity and awareness of the other, than the group with depression. In both psychosis groups negative symptoms were more robustly related to metacognition than other forms of symptoms after controlling for neurocognition. Results support the possibility that metacognitive deficits are a psychological factor which cross culturally contributes to negative symptoms and point to metacognition as a potentially important target for intervention.

1. Introduction

Research carried out by both clinical scientists as well as persons with first person experience, has confirmed long standing assertions that the way persons with schizophrenia spectrum disorders make sense of mental health challenges has a deep influence over how well they can manage those challenges (Leonhardt et al., 2017; Lysaker and Lysaker, 2017). One factor which has a lasting effect on persons abilities to make sense of mental health challenges is metacognition (Lysaker et al., 2019a). Metacognition has been examined in studies within the fields of educational, developmental, cognitive, and abnormal psychology (e.g. Semerari et al., 2003; Taricone, 2011), and refers to a broad set of processes which allow persons to be aware of what is happening in their minds, reflect upon those activities and use that to monitor and change their own behavior (Moritz and Lysaker, 2018). In what has been referred to as the integrative model of metacognition, metacognition has been conceptualized as a capacity

which allows for the integration of cognition, emotion and embodied experiences into a larger sense of oneself and others. This larger sense of oneself and others then allows for interpretations of novel experience within the flow of life and determination of what is uniquely adaptive for oneself (Lysaker et al., 2019b).

Applied to schizophrenia, decrements in metacognitive capacity have been suggested to limit how well persons can form an integrated sense of the problems posed by schizophrenia, leaving them less able to find effective ways to overcome them. Evidence supporting this includes findings that persons with schizophrenia experience relatively greater deficits in metacognition and that greater metacognitive deficit predicts poorer outcome (c.f. Lysaker et al., 2019a). Notably, metacognition has not just been linked to concurrent function, but in several studies it has also been linked to prospective levels of negative symptoms (Austin et al., 2019; Hamm et al., 2012; McLeod et al., 2014; Lysaker et al., 2015). This has led to the tantalizing possibility that the paucity of internal experience and expression of affect which

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characterize negative symptoms are in part a function of the loss of the kinds of larger sense of self which serve as the context which imbues specific experiences with unique meaning (Lysaker et al., 2019a).

As these advances have spurred the development of metacognitive treatment approaches (de Jong et al., 2019; Lavi-Rotenberg et al., 2020; Lysaker and Klion, 2017; Vohs et al., 2018), one limitation is that since most of the work has come from North America, the Middle East or Western Europe the possibility has been left open that observed findings were influenced by cultural factors (e.g., Austin et al., 2019; Bröcker et al., 2017; Inchausti et al., 2017; Lysaker et al., 2019a; Popolo et al., 2017). Further, few comparisons have been made between the relationship of metacognitive capacity with negative symptoms across different phases of schizophrenia as well as in other forms of serious mental illness, in particular depression. Research is thus needed with more diverse samples that include individuals from other cultures, where linguistic differences and cultural history may influence how persons integrate and use information about themselves and others.

To study this issue, we assessed metacognitive capacity and symptoms in three groups gathered in Russia. The three groups were comprised of patients with confirmed diagnoses of prolonged schizophrenia, early episode psychosis or major depression. We predicted that both psychosis groups would demonstrate poorer overall metacognition than the depression group. While no study has previously directly compared these groups, the mean metacognitive scores reported by Ladegaard et al. (2014) for participants with major depression are numerically higher than those reported in most schizophrenia samples (e.g., Hasson-Ohayon et al., 2015). We further predicted that metacognition would be significantly related to negative symptoms in both psychosis groups but not necessarily in the depression group. We anticipated this given the theoretical possibility that negative symptoms in psychosis may arise or be sustained by metacognitive deficits as well as previous empirical research suggesting that anhedonia is uniquely related to poor metacognition in schizophrenia in the absence of depressed mood (Buck et al., 2014).

While our predictions concerned overall metacognitive capacity, we planned to analyze specific elements of metacognition for exploratory purposes. These included scores that measure metacognitive capacities for self-reflection, reflection about others, decentration (i.e., reflection about one's place in one's community) and mastery (i.e., the use of this knowledge to respond to psychosocial challenges). Given research has distinguished between experiential and expressive negative symptoms, and suggested metacognition is more closely related to the latter (Austin et al., 2019) we also planned exploratory analyses to determine whether metacognitive capacity was more closely related to one of these forms of negative symptoms. To rule out the possibility that any findings might be the result of general associations with psychopathology we included assessments of other forms of symptoms including positive symptoms. Lastly, to rule out the possibility that results may reflect general neurocognitive compromise we included assessment of verbal memory, one of the most affected of neurocognitive abilities in schizophrenia (Saykin et al., 1991).

2.1. Participants

Participants were adults diagnosed with prolonged schizophrenia ($n = 41$), early psychosis ($n = 37$), or major depression ($n = 30$). All were recruited from the out-patient departments of Alexeev mental-health clinic No.1 in Moscow. Diagnoses were determined according to ICD-10 by the treating medical staff following a routine diagnostic clinical interview that included personal, clinical and medical history and chart review. The interview contained detailed questions about the onset, course and notable episodes of symptoms of psychosis and depression as well as other features which might rule out these diagnoses including mood elevation, medical, behavioral and substance use symptoms. Early psychosis was defined as psychotic symptoms

beginning for the first time no more than 5 years earlier with no more than three distinct psychotic episodes occurring since then. Prolonged schizophrenia was defined as meeting criteria for schizophrenia for a minimum of 6 years as determined during the clinical interview. Exclusion criteria included a cognitive impairment severe enough such that informed consent could not be attained, current alcohol or drug addiction, neurological disorders, or hospitalizations in the last month, all determined by the clinical interview and thorough chart review.

2.2. Instruments

2.2.1. Indiana psychiatric illness interview (IPII; Lysaker et al., 2002)

The IPII is a semi-structured interview that asks participants to describe their understanding of their mental illness and psychological challenges. First, participants are asked to offer a narrative about their lives and then asked whether they believed they have a mental illness. Next participants are asked about what has changed since having a mental illness, and how they controlled their mental illness versus what ways it controlled their lives. Participants are then asked how their condition both affects and is affected by others. Finally, participants are asked what they expect will be the same or different for them in the future. Interviews are audiotaped at the time of the interview and are later transcribed. Interviews generally take 20 to 50 min and are conducted by trained interviewers.

2.2.2. Metacognition assessment scale-abbreviated (MAS-A; Lysaker et al., 2019a)

The MAS-A is a rating scale used to evaluate that which enables an integrated sense of oneself and others to be available to persons. The MAS-A was developed following the original Metacognitive Assessment Scale (Semerari et al., 2003). The MAS-A retains the original four subscales created by Semerari et al. (2003): Self-reflectivity (S), Understanding other's minds (O), Decentration (D), and Mastery (M). In contrast to the MAS, however, the MAS-A is an ordinal scale and items are arranged such that each item of each scale describes a more complex metacognitive activity than the item numerically before it. In the MAS-A each item, therefore, requires the integration of a kind of information that was not integrated in the previous lower item (e.g., level "5" would require the integration of a form of information not found in level "4"). Accordingly, metacognition is conceptualized and operationalized as a series of hierarchical steps and the score for a given scale then is the number of contiguous items successfully achieved on that scale. Evidence of reliability and validity have been reported elsewhere (Lysaker and Dimaggio, 2014). A Russian version of the IPII along with the MAS-A codebook for scoring metacognition were translated by the authors and used in the current study.

2.2.3. Positive and negative syndrome scale (PANSS; Kay et al., 1987)

The PANSS assesses multiple dimensions of symptoms of schizophrenia as well as other forms of serious mental illness. It contains 30 items. In this research we used a five-factor solution (Bell et al., 1994) which produces five component symptom scores: Positive, Negative, Cognitive, Excitement/ Hostility, and Emotional Discomfort. To explore the two forms of negative symptoms, experiential and expressive, we used the formula proposed by Khan et al. (2017) in which expressive symptoms are estimated as the sum of blunted affect, poor rapport, lack of spontaneity, and motor retardation and experiential symptoms as the sum of emotional withdrawal, passive/apathetic social withdrawal, and active social avoidance.

2.2.4. Luria 10 word test (Rubinstein, 2010)

The Luria 10 word test consists of 5 trials in which 10 unrelated words are read to the participant who then is asked to repeat as many as they can remember. The score used here is the total number of correct responses across all trials.

All procedures were approved by the local ethics committee at the

Alexeev mental-health clinic No.1. Following informed consent and evaluation of inclusion and exclusion criteria, diagnoses were confirmed by senior clinicians, according to clinical interviews. The IPII, PANSS and Luria 10 word test were completed by a trained interviewer with a degree in medical psychology. IPII interviews were transcribed and rated by raters trained by the author of the MAS-A (PL). MAS-A and PANSS raters were blind to other scores.

2.4. Data analysis

Analyses were conducted in five steps using SPSS version 24. First, we planned to compare the demographic characteristics, PANSS, and Luria 10 word memory scores of the three groups in order to characterize them. Second, we planned to compare the MAS-A scores between groups using an MANOVA with Fischer Least Squared Difference tests to compare individual groups on individual measures. Third, we planned to correlate the MAS-A with the PANSS and Luria 10 item memory scores for the three groups separately. Given the likelihood that MAS-A scores would not be normally distributed we planned to use Spearman correlation coefficients. Fourth, in case the MAS-A total was related to the PANSS Negative component, we planned to explore the relationship of MAS-A scores with the two different dimensions of negative symptoms: experiential and expressive symptoms. Given the large number of correlations we planned to first consider whether there was a significant correlation between symptoms and the MAS-A total and then only consider the MAS-A subscales for exploratory purposes when that overall relationship exists. Finally, in a case of positive relationships found in the fourth step we planned to calculate partial correlations between the MAS-A scores and negative symptoms in general as well as the expressive and experiential negative symptoms controlling for potential covariates.

3. Results

To characterize each group, age, gender, education and key test scores are presented in Table 1. This table reveals that multivariate and univariate tests found that the early psychosis and depression groups were significantly younger than the prolonged psychosis group. Education level was not significantly different across groups. Proportions of men and women were equivalent across groups. Both psychosis groups performed more poorly on the Luria memory test than the depression group. Considering overall psychopathology, the prolonged schizophrenia group had higher symptom scores on the PANSS than the early psychosis group which had higher symptom scores than the depression group.

Next as revealed in Table 1, ANOVA followed by Fischer Least Difference tests indicated that the prolonged schizophrenia group had significantly lower MAS-A total scores than the depression group with the early psychosis group having a MAS-A total score that was not significantly different than either group. When subscales were examined, however the prolonged psychosis group had significantly lower self-reflectivity and awareness of other than both the early psychosis and depression groups. The early psychosis group further had significantly lower decentration scores than the prolonged schizophrenia and depression groups. The prolonged schizophrenia group had uniquely poor levels of mastery compared to the other two groups.

To explore the link of metacognition with PANSS component scores and Luria 10 word memory test, Spearman correlations were next calculated separately per group. As revealed in Table 2, multiple MAS-A scores were significantly correlated with the negative symptom component in both the prolonged schizophrenia and early psychosis groups. No other relationships were found between the MAS-A total and PANSS components. When we examined the MAS-A subscales it appears that the self-reflectivity subscale had the strongest numerical relationship with negative symptoms. The Luria 10 word test and MAS-A total were

Table 1
Comparisons of demographics, metacognitive function, symptoms and memory across three groups.

| | Group 1 Prolonged Schizophrenia (n = 41) M (SD) | Group 2 Early Psychosis (n = 37) M (SD) | Group 3 Depression (n = 30) M (SD) | F/ X ² | Fischer LSD Post-Hoc P < .05 |
|---|--|--|---|-------------------|--|
| Age | 37.41 (10.46) | 28.65 (6.28) | 24.27 (6.94) | 15.91*** | 1 > 2,3 |
| Education ¹ | | | | 7.37 | - |
| 0 | 17.1 | 5.4 | 6.7 | | |
| 1 | 17.1 | 27.0 | 20.0 | | |
| 2 | 19.5 | 18.9 | 36.7 | | |
| 3 | 46.3 | 48.6 | 36.7 | | |
| Gender (Male/Female) | 46.3/53.7 | 51.4/48.6 | 33.3/66.7 | 2.28 | - |
| MAS-A Total ² | 5.78 (2.66) | 7.00 (1.83) | 7.30 (1.56) | 3.610* | 3 > 1 |
| MAS-A Self-reflectivity ² | 1.82 (0.91) | 2.78 (0.75) | 2.40 (0.50) | 10.558*** | 2,3 > 1 |
| MAS-A Other ² | 1.71 (0.86) | 2.14 (0.42) | 2.30 (0.54) | 5.462** | 2,3 > 1 |
| MAS-A Decentration ² | 1.26 (0.53) | .459 (0.56) | 1.03 (0.56) | 15.527*** | 1,3 > 2 |
| MAS-A Mastery ² | 1.00 (0.79) | 1.62 (0.59) | 1.57 (0.57) | 7.125*** | 2,3 > 1 |
| PANSS Positive ³ | 12.68 (4.39) | 6.95 (1.47) | 6.557 (0.78) | 36.032*** | 1 > 2,3 |
| PANSS Negative ³ | 23.78 (7.36) | 18.27 (4.69) | 9.53 (1.72) | 41.370*** | 1 > 2 > 3 |
| PANSS Cognitive ³ | 18.29 (4.78) | 11.86 (2.87) | 7.73 (1.23) | 58.151*** | 1 > 2 > 3 |
| PANSS Hostility ³ | 7.41 (3.15) | 4.70 (1.13) | 4.83 (0.91) | 13.553*** | 1 > 2,3 |
| PANSS Emotional Discomfort ³ | 9.54 (2.75) | 7.54 (1.68) | 5.17 (1.93) | 30.523*** | 1 > 2 > 3 |
| Luria Ten Words | 31.88 (7.08) | 35.46 (6.51) | 43.01 (4.68) | 17.737*** | 3 > 1,2 |

¹Coded for four levels “0” = 0-12 years of compulsory education; “1” = 1-3 years of mid level technical courses; “2” = incomplete higher education; and “3” = completed higher education degree; ²MAS-A = Metacognitive Assessment Scale- Abbreviated; ³ PANSS = Positive and Negative Syndrome Scale; * P < 0.05; ** P < 0.01; ***P < 0.001.

Table 2
Spearman correlations of MAS-A with PANSS and Luria 10 word scores.

| MAS-A Scores | Prolonged Schizophrenia (n = 41) PANSS Subscales | | | | | Early Psychosis (n = 37) PANSS Subscales | | | | | Depression (n = 30) PANSS Subscales | | | | | | | |
|--------------|--|-----------|----------|--------|---------|--|----------|----------|----------|--------|---|----------------|--------|--------|--------|---------|--------|----------------|
| | P | N | C | H | D | Luria 10 words | P | N | C | H | D | Luria 10 words | P | N | C | H | D | Luria 10 words |
| Total | -0.082 | -0.442** | -0.263 | -0.081 | -0.192 | 0.469** | -0.261 | -0.428** | -0.276 | -0.004 | -0.185 | 0.341* | -0.354 | 0.280 | 0.257 | 0.250 | 0.079 | 0.064 |
| S | -0.206 | -0.541*** | -0.409** | -0.219 | -0.344* | 0.411** | -0.418** | -0.539** | -0.501** | 0.019 | -0.249 | 0.392* | -0.173 | 0.209 | 0.211 | 0.291 | 0.119 | -0.044 |
| O | -0.094 | -0.366* | -0.257 | -0.110 | -0.199 | 0.400** | -0.108 | -0.262 | -0.114 | 0.071 | 0.046 | 0.204 | -0.262 | 0.198 | 0.216 | 0.125 | 0.158 | -0.236 |
| D | 0.251 | -0.247 | 0.092 | 0.162 | -0.031 | 0.429** | -0.196 | -0.367* | -0.171 | -0.207 | -0.233 | 0.320 | -0.112 | 0.55** | 0.423* | 0.504** | 0.287 | 0.121 |
| M | -0.101 | -0.263 | -0.238 | -0.015 | 0.003 | 0.357* | -0.065 | -0.181 | -0.022 | -0.079 | -0.114 | 0.182 | -0.316 | 0.043 | 0.038 | -0.030 | -0.100 | 0.307 |

*P = Positive; N = Negative; C = Cognitive; H = Hostility; D = Emotional Discomfort; ²T = MAS-A total; S = Self-reflectivity; O = Awareness of the other; D = Decentration; M = Mastery; * P < 0.05; ** P < 0.01; ***P < 0.001.

significantly and negatively correlated in both the psychosis samples. Given the link of MAS-A total with the PANSS negative symptom component we next explored whether the MAS-A total was more closely linked with experiential vs expressive negative symptoms on the PANSS. Spearman correlations revealed that the MAS-A total was significantly related to both experiential and expressive negative symptoms in the prolonged ($r = 0.34, p < .05$; $r = 0.47, p < .01$ respectively) and early episode psychosis groups ($r = -0.38, p < .05$; $r = -0.40, p < .05$ respectively).

Finally, to rule out the possibility that any observed relationships were the results of demographic or other relevant symptom variables we conducted two stepwise regressions. For each, we created an equation to predict the PANSS negative symptom total first allowing age, and then the Luria memory score to enter, and then in a second step finally allowing MAS-A total to enter. For the prolonged schizophrenia group this revealed a significant predictor equation ($F(2,40) = 5.20; p < .01$) in which 12% of the variance was explained in the first step by the Luria score, and 9% in the second step by the MAS-A total. For the early episode psychosis group, this revealed a significant predictor equation ($F(2,34) = 6.40; p < .01$) in which 18% of the variance was explained in the first step by the Luria score, and 5% in the second step by the MAS-A total. Finally, we repeated the correlations between the MAS-A total the experiential and expression PANSS negative symptom scores as partial correlations, controlling for age and the Luria memory scores. For the prolonged sample, the relationship of experiential and expressive negative symptoms with MAS-A total both remained significant ($r = -0.35, p = .03$; $r = -0.40, p = .01$). For the early psychosis group, the relationship of experiential and the MAS-A total remained significant ($r = -0.35, p = .03$) while the relationship of expressive symptoms and the MAS-A total became non-significant ($r = -0.29, p = .09$).

4. Discussion

In this study we sought to expand previous research by exploring the relationship between metacognition and negative symptoms among adults with mental illness in a setting outside of North America and Western Europe in order explore whether similar relationships would be observed. We also examined the same phenomenon in a control group not previously directly compared with persons with psychosis, namely depression. First, generally consistent with our predictions, we found that the patients with prolonged schizophrenia had significantly greater deficits in metacognitive function than the depression group. Both the prolonged schizophrenia and early psychosis groups were less able to form complex integrated ideas about themselves and others relative to the depression group. The prolonged schizophrenia group had significantly greater difficulties than other groups using that metacognitive knowledge to characterize and respond to psychological problems. This study is thus the first to replicate a range of previous studies (Lysaker et al., 2019b) in a Russian sample and is the largest and only the third study (after WeiMing et al., 2015a, 2015b; Lysaker et al., 2018) to be conducted outside North America, the Middle East or Western Europe. Given that self-experience, the experience and expression of internal states and manifestations of psychopathology are all in part influenced by multiple factors including culture (Dimasio, 2010; Alarcon, 2009; Vermeiden et al., 2019), it is possible that previous associations between negative symptoms and metacognition were specific to the cultures in which they were studied. This study thus offers important new evidence suggesting that a relationship between metacognition and negative symptoms may extend beyond the cultures so far studied. This study was also the first to directly compare major depression with schizophrenia and so also provides further confirmation of uniquely severe levels of metacognitive impairments that may be present in schizophrenia across our world.

Second, as predicted, we found greater impairments in overall metacognition in both psychosis groups were related to negative symptoms

in general as well as lesser abilities in the metacognitive domains of self-reflectivity and awareness of the other. These relationships persisted when controlling for deficits in memory which were also linked with metacognition in both groups. Concerning subtypes of negative symptoms, we found overall metacognition was linked with experiential and expressive negative symptoms in both psychosis groups. When memory and age were controlled for statistically, metacognition remained significantly correlated with experiential symptoms in both groups and with expressive symptoms only in the prolonged schizophrenia group.

While the cross-sectional nature of this study precludes drawing any causal conclusions, results may point to important hypotheses which could be tested in future research. For one, results may suggest that negative symptoms are not entirely a primary phenomenon, but consequences of compromises in the ability to integrate information and derive the kinds of meanings which make certain experiences more salient and so privilege certain motivations above others. For example, with a profoundly fragmented experience of oneself in the world it would seem likely that any number of activities would have the same relative and limited meaning and there would be no reason to pursue one course of action over the other. If certain goals did not stand out with highly personal meaning, there might also be less of a reason to persist when facing challenges. There might also be less effective expression of emotion if with metacognitive deficits persons found it relatively difficult to know how to characterize and express their experiences in a way that others could understand. This may be consistent with a range of older psychodynamic accounts of psychosis in which the processes by which persons and others are unique beings are damaged and with the loss of genuine uniqueness, nothing is left to meaningfully distinguish the larger meaning of one activity from another. Examples of this include the work of Matte-Blanco's as presented by Saks and Tsepilovan Edman, (2019) and Arieti's (1955) characterization of schizophrenia as a disorder of symbolization. Of note, rival hypotheses cannot be ruled out including the possibility that negative symptoms cause metacognitive deficits or that both are the result of underlying psychophysiological processes not assessed here.

There were unexpected findings. The early psychosis group had lower decentration than either of the other two groups. This is consistent with Vohs et al. (2014) who reported particularly low levels of decentration in a early episode compared to a prolonged psychosis sample. It also raises the question, for further study, of whether there are particular psychopathological processes (e.g. related to grandiosity) which may be linked to these unique decrements in decentration early on in psychosis. Yet mastery in the early episode group was higher than in the prolonged schizophrenia group. This may suggest that perhaps Mastery was yet to be as degraded as it was in the prolonged group, perhaps secondary to demoralization. The MAS-A total of the early episode group was not significantly lower than in the depression group. This may suggest as just noted that not all metacognitive abilities become compromised simultaneously. With further study one potential implication of this is that early interventions in psychoses may explore their potential to prevent or slow the erosion of mastery in the course of schizophrenia. As with all unexpected findings, replication is needed and hypotheses should be taken only as motivation for future research.

There are limitations to this study. Sample sizes were modest and participants were groups recruited to be enrolled in treatment. Results may therefore not be generalizable to groups of persons who decline treatment or participation in research. Variables were assessed at one time point and so conclusions regarding causality and the nature of the relationship of metacognition and symptoms cannot be drawn. Additionally, factors not assessed here may contribute to the phenomena observed, including history of trauma, disturbance in underlying brain function and degree of internalized stigma. Research is needed in the future that considers a broader sample and longitudinal designs. We also utilized only one measure of metacognition and neurocognition. Future research is needed which deploys a wider set of

assessments. Finally, this is the first study to use the Russian translation of the MAS-A and more work is needed to explore its psychometric properties

Finally, with replication in ever broader samples, results may have clinical implications. If metacognitive capacities contribute to the development of negative symptoms and a route to recovery cross-culturally, integrative interventions that target metacognition might be worthy of further exploration. To date one of these interventions, has been found to be acceptable by Dutch (de Jong et al., 2018), French (Dubreucq et al., 2016) and Hebrew (Hasson-Ohayon et al., 2017) speaking patients as well as English speaking patients in Australia (Bargenquast and Schweitzer, 2013) with psychosis (Lysaker & Klion, 2017). It may also be that other treatments which similarly address metacognition may also potentially impact negative symptoms as well.

Declaration Competing of Interest

None.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.psychres.2020.113177](https://doi.org/10.1016/j.psychres.2020.113177).

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