Validation of the Italian Version of the Aberrant Salience Inventory (ASI): a New Measure of Psychosis Proneness

Validazione della Versione italiana dell'Aberrant Salience Inventory (ASI): una nuova misura per la vulnerabilità alla psicosi

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Summary

Objectives

Aberrant salience is the unusual or incorrect assignment of significance or importance to otherwise innocuous stimuli and is thought to have a crucial role in the onset of psychosis. Aberrant salience inventory (ASI) is the only self-reported questionnaire for the assessment of aberrant salience. Accordingly, the main aim of the present paper was to validate the Italian Version of the ASI.

Methods

The Italian Version of the ASI was administered to a group of 112 subjects (48 psychiatric outpatients and 64 subjects from the general population). Comparisons between patients and controls at two different times (baseline and after 15 days) were made. The relationship between ASI and the presence of psychotic symptoms, internal consistency and test-retest reliability of the Italian version of the ASI were analysed.

Results

Patients reported a higher ASI total score than controls ($p < 0.001$), while the difference in ASI total score between baseline and after 15 days was not significant. Patients with psychotic symptoms showed higher ASI total score than patients without them ($p < 0.001$). The Italian Version of the ASI showed high internal consistency (Cronbach's alpha = 0.89) and good test-retest reliability ($r = 0.96$, $p < 0.001$).

Conclusions

The Italian Version of the ASI was shown to be a valid and reliable instrument with good psychometric properties. Its usefulness in investigating aberrant salience and psychosis proneness was confirmed.

Key words

Aberrant salience • Psychotic proneness • Psychotic symptoms • Validation study

Introduction

Delusions and hallucinations are psychotic symptoms and represent a common experience, not only in people with schizophrenia-spectrum disorders, but also in those at risk for psychosis [1]. Previous research reported that the onset of psychotic disorders is often slow and gradual, with a prodromal period ranging from several weeks to several years or longer [2-5].

In this prodromal phase, patients report an unusual or incorrect assignment of salience or significance (aberrant salience) to innocuous stimuli, and this has been hypothesised to be a central mechanism in the development of psychosis [6 7]. Salience can be defined as a process whereby objects and representations, through the process of association, come to be attention-grabbing and capture thought and behaviour. During the process of "attribution of salience or significance", the features of stimuli are compared to their context and, depending on their level of "saliency", demand attention, drive action and influence goal-directed behaviour due to their association with reward or punishment [3-5].

Frequently, during the prodromal phase, stimuli that ordinarily might be considered insignificant, become much more salient and relevant. In these circumstances, salience is defined as "aberrant" [3 4]. Situations where a stimulus may be valued as salient are: feature novelty (e.g. a new object in an otherwise familiar environment); contrast (e.g. an intense light flashing in a dark room) and emotional/motivational association (e.g. a previously neutral stimulus that has been linked with reward or punishment). In particular, "motivational salience" seems to be relevant to psychosis. Actually, when a neutral stimulus is pervaded by an emotional quality, due to its associa-

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tion with primary reinforcement, influence on behaviour and cognitive functions may occur [5 6]. In 2003, Kapur [7] proposed the "aberrant salience" hypothesis of psychosis, linking the aberrant signalling of motivational salience to psychotic symptoms. Under normal circumstances, the context driven activity of the dopamine system mediates the experience of novelty and, thus, the acquisition of appropriate motivational salience [5 8-10].

It has been hypothesised that in schizophrenia, genetic predispositions and environmental perturbations (i.e. pre- and perinatal adverse events) [11] facilitate an alteration in the dopamine system, causing dopamine release, which is independent from the context. Accordingly, in the prodromal phase, a context-independent or context-inappropriate firing of dopamine neurons and dopamine release has been reported [2]. The normal process of context-driven novelty and salience attribution, mediated by dopamine, is exchanged with an aberrant and endogenously driven assignment of salience to stimuli [7].

This hypothesis is supported by a consistent body of research and is in favour of an association between psychosis and increased subcortical dopamine [12 13]. For example, brain imaging studies have reported irregular dopamine activity in people with schizophrenia, either during the active phase of psychosis [14] or in the prodromal phase of the disorder [15]. Therefore, both phenomenological and neurobiological studies sustain a role for aberrant salience in psychosis.

For these reasons, the evaluation of aberrant salience can be useful for early diagnosis, but until recently few instruments have been developed to measure it and there is only one self-report questionnaire: the aberrant salience inventory (ASI). The ASI [16] is a valid and reliable tool which measures aberrant salience in people at risk for developing psychosis. It represents a specific instrument, highly correlated with other measures of psychotic-like experiences, such as the perceptual aberration [17] and magical ideation scales [18]. Moreover, the ASI is correlated with behavioural activation, which seems to reflect increased subcortical dopamine, and is less strongly correlated with social anhedonia [16].

The ASI items were created by David C. Cicero and John G. Kerns considering phenomenological descriptions of the initial experience of psychosis [7 19-21], reports of the prodromal phase of schizophrenia [2 4 22] and transcripts of interviews of people with schizophrenia [23 24]. The language used for the item construction is simple and appropriate for the target population; double-barrelled items were avoided. A series of four studies were designed to develop and validate the questionnaire [16]. Study 1 showed that ASI is composed of five factors: feelings of increased significance, sense sharpening, impending understanding, heightened emotionality and heightened cognition. The first factor (feelings of increased significance) represents the core of Kapur's theory, relative to the increased salience to otherwise innocuous stimuli, and may be the process that drives the experience of the other four factors. The second factor includes anomalies of perception, such as subjective feelings of sharpening of senses, and aberrant salience could have a role in determining this experience [16]. The third factor, the impending understanding, indicates the experience of increased feelings of salience that lead to a breakthrough in understanding. The fourth and fifth factors, heightened emotionality and heightened cognition, are relative to the attempts of a person to understand the emotions and cognitions that accompany an aberrant salience experience, but could be more generally pre-psychotic experiences [16].

The moderate to high correlation of the above-mentioned factors was demonstrated in Study 2, where a second-order model led to the conclusion that a single second-order factor (i.e. ASI total score) conceptualises the construct of aberrant salience [16]. Study 2 reported that the ASI is correlated with many constructs, hypothesised to include its nomological network, involving magical ideation, referential thinking, perceptual aberration, dissociation and absorption. Furthermore, Study 2 supported the scale score's convergent validity, as the ASI is strongly associated with psychosis-proneness and dissociation measures, and moderately correlated with measures associated with dopamine levels [16]. This study also provided results for its discriminant validity, as the ASI is only weakly associated with social anhedonia. Study 3 reported that participants with elevated psychosis proneness had an increase in ASI scores, but, in contrast, people with high social anhedonia had scores that were similar to comparison participants [16]. Study 4 showed that subjects with a history of psychosis had elevated ASI scores in comparison with a psychiatric control group. The mean score of the ASI for patients with a history of psychosis was 15.17, while patients without a history of psychosis showed a mean of 11.50 [16]. The research also provided support for the internal consistency reliability of ASI scores (Cronbach's alpha 0.89) and demonstrated that ASI has valid psychometric properties. The ASI had a Cronbach's alpha of 0.91 in the history-of-psychosis group and 0.80 in the comparison group [16]. Thus, ASI may be useful in evaluating aberrant salience and psychosis proneness, in both clinical and nonclinical samples. No test-retest reliability was performed in the original validation study [16].

As aberrant salience has a crucial role in psychosis and an Italian Version of the ASI is lacking, the aim of this work was to translate and verify the psychometric properties of the Italian version of the ASI in a clinical sample and a healthy control group. Internal consistency, test-

retest reliability and discriminant validity have been specifically addressed.

Materials and Methods

The present study included 112 subjects, 48 consecutive psychiatric outpatients (13 with schizophrenia, 12 with major depression, 12 with bipolar disorder, 7 with anxiety disorder and 4 with eating disorder) and 64 subjects recruited from the general population.

Outpatients were attending the Psychiatric Outpatient Service of the Department of Neuroscience, Psychology, Drug Research and Child Health at the University Hospital in Florence (Italy), between September 1, 2013 and October 31, 2013. Inclusion criteria were as follows: age 18-65 years, DSM-IV-TR diagnosis [25] of any mental disorder except for mental retardation, clinically stable condition of the mental disorder in the last 3 months, no changes in pharmacotherapy in the last 3 months and no start or interruption of psychotherapy in the last 3 months. Sociodemographic data were assessed by an expert psychiatrist (A.B.) at the beginning of the visit, together with the anamnestic data. In this clinical interview the previous or present history of psychotic symptoms (hallucinations and/or delusions) was thoroughly investigated. The presence of psychotic symptoms was defined as "detected", and the absence was defined as "undetected".

Diagnosis was made with DSM-IV-TR criteria using a face-to-face interview (Structured Clinical Interview for DSM-IV-TR, SCID-I/P) [26]. Exclusion criteria were as follows: mental retardation, age < 18 years or > 65 years, severe phase of disorder with unstable clinical condition in the last 3 months, or changes in pharmacotherapy or psychotherapy in the last 3 months.

A group of 64 individuals, drawn from the general population living in the same catchment area, composed the controls and were recruited from the lists of the Italian National Health System (NHS) (99.7% of citizens are included in the list of the NHS). Controls were aged 18-65 years and did not meet DSM-IV-TR criteria for any mental disorder (evaluated by the SCID-I/NP) [27].

The Italian Translation of the ASI was carried out separately by two different official mother-tongue translators. The two Italian translations were revised and merged in order to create a final version which was back-translated in English by a third official translator. This back-translated version was compared with the original version by Cicero to verify the good quality and adequacy of the final Italian version. The ASI is a 29-item yes-no questionnaire that has five subscales measuring different aspects of the experience of aberrant salience including feelings of increased significance (e.g., Do certain trivial things suddenly seem especially important or significant to you?), sharpening of senses (e.g., Do your senses ever seem especially strong or clear?), impending understanding (e.g., Do you sometimes feel like you are on the verge of something really big or important but you aren't sure what it is?),heightened emotionality (e.g., Do you go through periods in which you feel over-stimulated by things or experiences that are normally manageable?), and heightened cognition (e.g., Do you ever feel like the mysteries of the universe are revealing themselves to you?). A Yes answer corresponds to 1 at scoring, while a No answer corresponds to zero, and thus the maximum total score is 29.

The Italian Version of the ASI was administered to all subjects at baseline (test-T0) and after 15 days (retest-T1).

The current research protocol was approved by the Ethics Committee of the Institution and the study was performed in accordance with the principles of the 1983 Declaration of Helsinki. All participants provided informed consent prior to completing the study.

Statistical analysis

Continuous variables were reported as mean ± standard deviation, whereas categorical variables were reported as percentage. For assessment of between-group differences (psychiatric patients vs. controls and patients with psychotic symptoms vs. patients without psychotic symptoms), chi-square and independent measures t-test were applied for categorical and continuous variables, respectively. A paired t-test was used to compare ASI total score at T0 and at T1.

Pearson's correlation analyses were performed to assess the test-retest reliability on ASI total score, while Spearman's rank correlation coefficients of individual ASI items were calculated at T0 and at T1. In order to measure the internal consistency of the ASI scale, Cronbach's alpha was calculated at T0 and at T1.

Statistical analyses were carried out using the Statistical Package for the Social Sciences, version 20.0 (SPSS Inc., Chicago, IL., USA).

Results

The mean age of the sample was 34.40 ± 13.27 years (controls: 31.92 ± 10.93; patients: 36.56 ± 13.96; $t = -1.90$; $p = 0.06$) and 38.4% were males (controls: 39.1%; patients: 37.5%; $\chi^2 = .03$; $p = 0.08$). Mean years of education were 13.44 ± 3.97 (controls: 14.75 ± 3.42; patients: 11.61 ± 3.92; $t = 4.43$; $p < 0.05$) and 54.20% of the sample was single or divorced (controls: 76.5%; patients: 22.7%; $\chi^2 = 41.6$; $p < 0.05$). Psychotic symptoms were detected in 62.5% (n = 30) of psychiatric outpatients (n = 13 schizophrenia, n = 12 bipolar disorder, n = 5 major depression), while they were not reported by any control subjects ($\chi^2 = 54.63$; $p < 0.001$).

ASI mean total score at baseline (T0) was 7.52 ± 4.56

for controls and 12.48 ± 7.52 for patients (t = -4.05, p < 0.001), while after 15 days, at retest (T1), controls scored 7.33 ± 4.42 and psychiatric sample scored 12.04 ± 7.76 (t = -3.77, p < 0.001). Comparing ASI total score at T0 and at T1, in both groups, no significant difference was observed (for controls, t = 1.28, p = 0.203; for patients, t = 1.29, p = 0.200).
Test-retest reliability for ASI total score was 0.97 (p < 0.001) for controls, 0.95 (p < 0.001) for patients and 0.96 (p < .001) in the total sample. Non-parametric Spearman correlations for each item showed a strong correlation between items of ASI at T0 and at T1 (r = 0.68-0.95, p < 0.001).
Cronbach's alpha coefficient was 0.89 at T0 and 0.89 at T1, meaning a high internal consistency.
Patients with psychotic symptoms (n = 30) showed higher ASI total scores than patients without such symptoms (n = 18) (T0: 14.53 ± 7.29 vs. 7.85 ± 5.11, t = -4.62, p < 0.001; T1: 14.23 ± 7.17 vs. 7.56 ± 5.21, t = -4.66, p < 0.001). Moreover, patients without psychotic symptoms did not differ from controls, in ASI total scores at both assessments.

Discussion

The main goal of the current research was to translate and verify the internal consistency and test-retest reliability of the Italian version of the self-report questionnaire ASI. The Italian Version of the ASI demonstrated good psychometric properties, showing both high internal consistency and test-retest reliability, as well as discriminant validity.
Differing from the original validation study by Cicero, we evaluated the test-retest reliability after 15 days. During this short span of time, the patient's therapy was not modified, in order to exclude a drug-induced interference with the dopamine system linked to salience. Test-retest reliability had good results. Psychometric properties had good results both in patients and the control group [16 28].
Moreover, higher mean scores of the ASI clearly distinguish between patients from controls and patients with psychotic symptoms from patients without such symptoms, demonstrating the discriminant validity of the scale. This finding is consistent with previous observations [16] and could suggest the introduction of a cut-off score that distinguishes subjects with psychosis proneness among clinical and non-clinical populations. Cicero et al. [16] reported a mean ASI score of 13.73 in a nonclinical sample, which means that participants answered Yes to 14 items, which is in line with the results of the present study. Therefore, a score of 14 is suggested as a cut-off value.
Originally, the ASI was created to measure lifetime occurrence or trait aberrant salience in nonclinical samples. In fact, it may help identify people at risk for the development of psychosis, thus improving prevention, early diagnosis and treatment [29 30]. For these reasons, according to a dimensional approach to these symptoms [31], we sustain that this questionnaire may be useful in prevention programs both in large community samples and in clinical settings, and we suggest the inclusion of the ASI in clinical assessment.
One limitation of the study is that the total sample size was small, but data on reliability provided good results. Accordingly, a wider follow-up study should be performed in the future to evaluate if salience changes across time and different clinical stages of the disorders. Moreover, validity of the scale was not addressed in the present paper, as it was previously demonstrated by Cicero et al. [16].

Conclusions

The Italian Version of the ASI was validated and showed good psychometric properties with a Cronbach's alpha coefficient of 0.89, meaning a high internal consistency, and test-retest reliability of 0.96. Moreover, higher mean scores of the ASI clearly distinguish patients from controls and patients with psychotic symptoms from patients without such symptoms, demonstrating discriminant validity of the scale and its ability to individuate psychotic patients. The reliability and validity, simple language used, ease of administration and self-reported nature of this tool, suggests that the ASI could be used with the general population.
In fact, future and wider prevention and screening programs could adopt the ASI as a useful tool to identify subjects at risk for the development of psychosis and to isolate a cluster of subjects where a deeper and more careful psychopathological assessment is needed. It could also be of interest to follow these subjects across time in a longitudinal perspective and to analyse the clinical and psychopathological course of symptoms.
A longitudinal study design could eventually confirm the prognostic value of the aberrant salience process as a predictor of the development of psychosis.

Conflict of interest

None.

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ITALIAN VERSION OF THE ABERRANT SALIENCE INVENTORY (ASI)
Istruzioni: con questo questionario intendiamo indagare le tipologie di atteggiamento e di esperienze di vita delle persone. Il seguente questionario contiene domande proprio su questi aspetti. Per favore, risponda "SI" o "NO" facendo una crocetta dopo ciascuna domanda. Quando penserà a sé stesso e alla sua esperienza, non consideri significativi quegli atteggiamenti, sensazioni o esperienze che eventualmente avesse sperimentato sotto l'effetto di alcol o altre sostanze (ad es. marijuana, LSD, cocaina).

	Sì	No
1. Le è mai capitato che alcune cose di poco conto le siano apparse improvvisamente importanti o significative?		
2. Le succede, talvolta, di sentirsi come alla soglia di qualcosa di veramente grande, ma non è sicuro di che cosa si tratti?		
3. Le capita, qualche volta, che le sue capacità sensoriali le sembrino acute?		
4. Si è mai sentito come se stesse rapidamente per raggiungere il massimo delle sue capacità intellettive?		
5. Le capita, qualche volta, di prestare attenzione a certi dettagli non notati in precedenza che vengono ad assumere un certa rilevanza per lei?		
6. Le succede di sentirsi come se ci fosse qualcosa di importante (per lei) da capire, ma non è sicuro di che cosa si tratti?		
7. Ha mai passato periodi in cui si è sentito particolarmente religioso o contemplativo?		
8. Ha mai avuto difficoltà a distinguere se si sente eccitato, spaventato, sconcertato o in ansia?		
9. Ha mai attraversato dei periodi di maggiore consapevolezza sulle cose?		
10. Ha mai sentito il bisogno di dare un senso a situazioni o avvenimenti apparentemente casuali?		
11. Qualche volta le capita di sentirsi come stesse trovando il pezzo mancante di un puzzle?		
12. A volte si sente come se potesse udire le cose con maggior chiarezza?		
13. A volte si sente come se fosse una persona particolarmente evoluta dal punto di vista spirituale?		
14. Osservazioni di norma insignificanti, a volte assumono per lei un significato infausto?		
15. Attraversa dei periodi in cui le canzoni talvolta assumono significati rilevanti per la sua vita?		
16. Qualche volta le capita di sentirsi sul punto di comprendere qualcosa di veramente grande o importante, ma non sa con certezza cosa sia?		
17. Il suo senso del gusto le è mai sembrato più fine?		
18. Ha mai avuto la sensazione che i misteri dell'universo fossero sul punto di rivelarsi a lei?		
19. Le capita di passare periodi in cui si sente eccessivamente stimolato da oggetti o esperienze che normalmente sono gestibili?		
20. Rimane spesso affascinato dalle piccole cose che la circondano?		
21. I suoi sensi le sembrano mai estremamente spiccati o chiari?		
22. Si sente mai come se un intero mondo le si stesse rivelando?		
23. Si è mai sentito come se i confini fra le sue sensazioni interne ed esterne fossero stati tolti?		
24. Qualche volta le succede di avere la sensazione che il mondo stia cambiando e che lei debba trovare una spiegazione?		
25. Ha mai percepito un significato travolgente in cose che normalmente per lei non sono significative?		
26. Hai mai sperimentato una sensazione inesprimibile di urgenza in cui non era sicuro sul da farsi?		
27. Le è mai capitato di sviluppare un particolare interesse per persone, eventi, luoghi o idee che normalmente non attirerebbero in quel modo la sua attenzione?		
28. Le capita mai che i suoi pensieri e le sue percezioni diventino troppo rapidi per essere ben assimilati?		
29. A volte nota cose a cui non aveva prestato attenzione in precedenza e che invece vengono ora ad assumere un significato speciale?		