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# **Prevalence and implications of Truman symptoms in subjects at Ultra High Clinical Risk for psychosis**

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## **Abstract**

**Background:** Preliminary qualitative research has suggested that patients with early stages of psychosis and those at Clinical Risk (here and after HR) may experience “Truman symptoms” (TS). However their prevalence and clinical features in UHR population are unknown. This study is an exploratory investigation of the prevalence of TS in a sample of UHR subjects and matched controls (HC). We further explored the clinical construct of TS, investigating derealisation, depersonalization and basic self-disturbances in the same sample.

**Methods:** Our sample consisted of 26 UHR and 14 HC recruited from three prodromal and early intervention clinics in South London, West London and Cambridge. TS were assessed through a semi-structured clinical interview. Clinical features of UHR were assessed with the Comprehensive Assessment of At-Risk Mental States (CAARMS), Social and Occupational Functioning Assessment Scale (SOFAS), the Positive and Negative Syndrome Scale (PANSS), the Cambridge Depersonalization Scale (CDS) and the Examination of Anomalous Self Experiences (EASE) checklist.

**Results:** In our sample TS were specific (TS absent in HC) and highly prevalent (50%) in UHR subjects. UHR were also associated with self-disorders. EASE scores differed across the three groups (HC, UHR with TS (UHR-TS+) and UHR without TS (UHR-TS-)) (EASE,  $H(2)=31.128$ ,  $p<0.001$ ). However, post hoc-analyses showed that EASE scores were similar irrespective of the presence of Truman symptoms in the UHR sample (adjusted  $p>0.05$ ) with the exception of higher scores in UHR-TS+ in Existential Reorientation ( $p=0.014$ ) and Demarcation/transitivism ( $p=0.025$ ) EASE subscales. Furthermore, in our sample TS were not associated with specific CAARMS symptoms, CDS scores or functional level as measured on the SOFAS, but the Ultra

High Risk Group with no TS showed lower PANSS general psychopathology subscale scores as compared with subjects with TS ( $t(24) = -2.260, p = 0.033$ ).

**Discussion:** This initial study of TS in UHR subjects suggested that they might be highly prevalent and specific of this population.

### **Keywords**

At risk mental state, psychosis, anomalous self experiences, Truman symptoms, depersonalization, derealization

### **Abbreviations**

Comprehensive Assessment of At-Risk Mental States (CAARMS); Cambridge Depersonalization Scale (CDS); Examination of Anomalous Self Experiences (EASE); Matched healthy controls (HC); Ultra High Clinical Risk (UHR); Positive and Negative Syndrome Scale (PANSS); Social and Occupational Functioning Assessment Scale (SOFAS); Truman symptoms (TS); Ultra High Risk subject with Truman symptoms (UHR-TS+); Ultra High Risk without Truman symptoms (UHR-TS-)

## **1. Introduction**

Early psychiatric literature portrays the features of impending psychosis as arrangements of depersonalization and derealization (Binswanger, 1957; Conrad, 1958; Matussek, 1952). These have been described as changes in the perception of reality, in the understanding of subject's own experiences and in detachment from experience (see a detailed account in (Mishara, 2010)) and can be measured on specific psychometric scales such as the Cambridge Depersonalization Scale (CDS) (Sierra and Berrios, 2000). These phenomena have been recently symbolized into a new clinical construct denominated "Truman symptoms" (TS) (Fusar-Poli et al., 2008) stressing the sense that the ordinary is changed or different and leading towards a "Truman explanation". It refers to the famous 1998 Peter Weir's movie, in which Truman, the protagonist, has lived his life unaware of being in a constructed reality television show and gradually starts to become suspicious of his world (Fusar-Poli et al., 2008). TS might be particularly relevant to the psychopathology of UHR group as they: a) are in tune with the dimensional model of psychosis and the possibility of attenuated psychotic symptoms (Fusar-Poli et al., 2008) and b) they might apprise the cultural expression of a psychopathological phenomena in this group at young age (familiar with the internet and the virtual reality).

On a psychopathological level, TS are characterized by a profound change of the subjective experience and of self-awareness, resulting in an unstable first-person perspective with varieties of derealization, disturbed sense of ownership, fluidity of the basic sense of identity, distortions of the stream of consciousness and experiences of disembodiment (Fusar-Poli et al., 2008). A subject with TS focuses on his sense of self as if ruminating on altered subjective phenomena to which he was previously oblivious. By increasing his self-awareness he focuses and constantly monitors the what, how and why he experiences subjective phenomena. Then, keeping the "as if"

component (not a delusion), he might reach a “Truman explanation” . Examples of patient quotes can be found in Box 1. TS are conceptually close to the alterations of “basic sense of self” which also include, along others, distortion of first-person perspective, changes in process of thought, the loss of “natural evidence”, increased reflexivity and derealization and depersonalization experiences. All the latter have been comprehensively addressed in recent years with detailed descriptions of each of phenomena (Fusar-Poli et al., 2015; Kircher and David, 2003; Sass, 2013; Sass and Parnas, 2003; Zahavi, 2000). The disturbances of basic-self also seem to support modern accounts of delusion formation in prodromal and early phases of psychosis that point to a neurobiological underlying alteration in salience processing of stimulus (Mishara and Fusar-Poli, 2013; Roiser et al., 2013; Winton-Brown et al., 2014).

Despite the above observations, that suggest a potential key role of TS in subjects at

Ultra High clinical risk for psychosis (HR), particularly the attenuated psychosis symptoms group, their validity as a clinical construct is unknown. First, their occurrence with respect to the UHR state as compared to HC has never been investigated. Second, their impact on presenting UHR symptoms is undetermined. Here, we address these issues in UHR subjects. Our first aim was to measure the prevalence of TS in UHR subjects and matched HC.

Box 1: Patient Quotes on Truman symptoms

- “I’m constantly worrying about me. I wouldn’t say I’m persecuted but everything feels oppressive. Take this table or these walls – they’re strange. I guess everything looks phony! But its not only here, the walls in my living room also feel paper-like as if I was in a set.”
- “This started with me thinking rather than feeling. Thinking go the best of me and I started to find it hard to sleep. You can’t imagine what is like to know everything is simulated. Having dinner – even at my grandma house! – seems faked!”
- “my life feels like a computer game, I know the variables within but I can’t set them, surely someone is setting them.”
- “like The Matrix. Oh... so many times I felt that someone was controlling my world and it was definitely not god. The feeling that things in my world were strangely man-made.”
- “for the last two years I started this feeling of constant preoccupation. This worrying... is like a permanent dull pain and when I look to others I feel that they know what is happening to me. So many eyes looking at me, you know – like a Big Brother!”

Our second aim was to investigate if TS status affected clinical characteristic of HR, including (i) disturbance of basic self-experiences (EASE), (ii) derealisation and depersonalization phenomena (CDS), (iii) functional status (SOFAS), (iv) UHR symptoms (CAARMS, PANSS). Our final aim was to test correlation between these latter items following a recent research track (Sass et al., 2013) suggesting that the constructs of derealisation and depersonalization and basic self-disturbances could overlap.

## **2. Material and methods**

### **2.1. Setting and Sample**

Participants with Ultra High Clinical Risk for psychosis were enrolled from OASIS (prodromal clinic, SLAM NHS Foundation Trust, London (Fusar-Poli et al., 2013)), West London Early Intervention and CAMEO (Cambridge Early Onset", Cambridge University, Cambridge, UK) Teams. These are well-established prodromal and early intervention clinics for young adults with early symptoms of psychosis. Subjects included in the study were between 18 and 35 years of age. Participants undertook a detailed multidisciplinary assessment including combined review of clinical judgment, screening instruments and semi-structured clinical interviews (Fusar-Poli et al., 2013). The UHR group was defined by High-Risk criteria derived from Comprehensive Assessment of At Risk Mental State (CAARMS) (Yung et al., 2005) and the Social and Occupation Functioning Assessment Scale (SOFAS) (Goldman et al., 1992). In respect to the use of drugs, 65% had never used recreational/illicit drugs, 12.5% had experimented while 15% had moderate to severe use. Our UHR sample received medication that included antidepressants (22,5%) and antipsychotics (7,5%). Because of the limited sample size we could not formally compare these groups. The naturalistic impact of medication on the long term outcomes of our patients has been

fully addressed in a separate publication by our group (Fusar-Poli et al., 2015). In their follow-up so far, which ranged from 24-32 months, two of the sample subjects transitioned to a psychotic episode. Healthy controls were recruited locally via advertisement and matched for age and gender. They had no present or past personal psychiatric history and negative family history for psychiatric disorders. The study received ethical approval and all the subjects participated after signing a written voluntary informed consent form.

## **2.2. Procedure**

Two psychiatrists (LM and IB) with strong psychopathological training (including expertise in the EASE checklist) performed the interviews with the instruments detailed below. LM was blind to clinical diagnosis. Inter-rater reliability on the EASE measure was ensured through proper training and combined scoring of tape-recorded interviews. If contrasting scores were recorded at the end of the interviews the final results were obtained through consensus discussion.

## **2.3. Sociodemographics**

Information was collected from the subjects' clinical file on age, gender, country of birth, employment (full time students were considered employed), education, history of psychiatric treatment, family history of psychiatric disorder and duration of symptoms prior to clinic entry, in line with previous OASIS studies (Fusar-Poli et al., 2013). Healthy controls were subject to the same clinical enquiring in a research setting. The sample was recruited between August 2013 and November 2013.

## **2.4. Clinical Measures**

*Truman symptoms (TS)* (Fusar-Poli et al., 2008)

The prevalence of TS in UHR and HC subjects was evaluated clinically as follows. TS were considered present if the following three features were described during the clinical interview i) a sense that the ordinary is changed or different, ii) the subject



describes that there is a particular significance leading to ‘Truman explanation’ all of which is accompanied by one or more of the following iii) a profound alteration of subjective experience and of self-awareness, resulting in an unstable first-person perspective with varieties of derealization, disturbed sense of ownership, fluidity of the basic sense of identity, distortions of the stream of consciousness and experiences of disembodiment. The clinical definition used here is in line with previous account of the TS (Fusar-Poli et al., 2008; Mishara and Fusar-Poli, 2013). The interviewers solicited patients with open questions on changes on the experience of their world and then directly inquired on all the three criteria above whilst administering the EASE or CAARMS assessment. The third criterion is further detailed in the EASE in the self-awareness and presence domain and the reader can refer to the seminal paper to find a detailed explanation and patient examples of each of the items (see reference below).

*Comprehensive Assessment of At-Risk Mental State (CAARMS)* (Yung et al., 2005)

This is a semi-structured clinical interview designed to assess attenuated psychotic symptoms (including perceptual and thought disturbances) and represents the core part of the initial assessment of OASIS and CAMEO teams. It consists of 28 items divided through 7 subscales: 4 Positive Symptom items, 2 Cognitive and 3 Emotional Disturbances items, 3 Negative Symptoms items, 4 Behavioral Change items, 4 Motor/Physical Changes items, and 8 General Psychopathology items. The scores were used as a measure of the UHR presenting symptoms. The scores include rating of the severity and frequency of the symptom in a 6 point assessment (from 0 absent/never to 6 psychotic and severe/continuous).

*Social and Occupation Functioning Assessment Scale* (Goldman et al., 1992)

This scale is a modified version of the Global Assessment of Functioning (GAF) scale separating the measures of social and occupational functioning from the measures of

symptoms and psychological functioning. Its scores range from 0 to 100. Scoring is according to information obtained in the psychiatric interview.

*Positive and Negative Syndrome Scale (PANSS)* (Kay et al., 1987)

This is a seven point assessment (from absent to extreme) of 30 items across three domains: 7 positive, 7 negative and 16 general psychopathology items. It was used in our study to assess general psychopathology and positive and negative symptoms. It was part of the assessment at admission in the OASIS and CAMEO teams.

*Examination of Anomalous Self Experiences checklist (EASE)* (Parnas et al., 2005b)

This is a checklist for a semi-structured interview of anomalous subjective experience with 57 items (88 if sub-items are included) and a Cronbach  $\alpha$  of 0,87 (Moller et al., 2011). It is divided into 5 domains: a) 28 sub-items on cognition and stream of consciousness; b) 36 sub-items on self-awareness and presence; c) 16 sub-items on bodily experiences; d) 6 sub-items on demarcation/transitivity; e) 8 sub-items on existential reorientation. We rated the overall score dichotomously in accordance with presence (1) or absence (0) of items. It has been shown to be a reliable instrument (Moller et al., 2011) measuring anomalous experiences of the “pre-reflective” sense of first-person perspective or basic self. These abnormalities of self-awareness have then been shown as promising in the conceptualization of those at risk of psychosis (Nelson et al., 2008) and in schizophrenia-prone individuals (Nelson et al., 2013; Parnas, 2005). Also, they have been empirically substantiated in a) early psychosis (Parnas et al., 2005a), b) prodromal phases of psychosis (Nelson et al., 2012; Parnas et al., 1998; Zahavi, 2000) and c) in the silent side of spectrum of schizophrenia (Raballo and Parnas, 2011).

*Cambridge Depersonalization Scale, (CDS)* (Sierra and Berrios, 2000)

This is a 29 item self-report scale to be used in assessing depersonalization and derealisation experiences including frequency and duration ( $\alpha$  0,89). Frequency of

phenomena is rated from 0 (never) to 4 (all the time), while duration is rated from 1 (few seconds) to 6 (more than a week). It was used as an indirect measure and proof of external validity for the “Truman symptoms”. We then tested whether TS were correlated with the overlapping construct of CDS and EASE (as shown below).

## **2.5. Statistical Analysis**

Descriptive analysis included t-tests for continuous variables and Fisher exact test for categorical variables. We tested inter-rater reliability by independent reevaluation of the tape recording of the first 6 interviews (three interviews performed by IB and three by LM which were subsequently evaluated by the other interviewer).

Our first aim was to measure the prevalence of TS in UHR subjects and matched HC. So in our first analysis we compared the prevalence of TS in UHR subjects and HC. Our second aim was to investigate if TS status affected clinical characteristic of HR, including: a) disturbance of basic self-experiences (EASE); b) derealisation and depersonalization phenomena (CDS); c) functional status (SOFAS); d) UHR symptoms (CAARMS, PANSS). Regarding the first three measures, since the assumption of normality and homogeneity of variance were violated (Shapiro-Wilk test significant in at least one group for each variable,  $p < 0.05$ ; Levene test significant in every variable but EASE Existential Reorientation subscale,  $p < 0.05$ ), we decided to perform Kruskal-Wallis non-parametric test. We further performed post-hoc pairwise analysis accounting for multiple comparisons. CAARMS and PANSS scores were compared using t-tests as normality assumption was retained. When not otherwise specified, two-side  $p < 0.05$  was considered significant and Bonferroni’s correction for multiple comparisons was applied. Our last aim was to test correlation between CDS and EASE total score in the UHR group. Again, since the normality assumption was not retained, we performed bootstrap (10000 iterations) to compute 95% CI, after

visual inspection of scatter plots to exclude potential outliers. All the analyses were performed under SPSS IBM 22.

### **3. Results**

#### *3.1. Sociodemographic characteristics*

The interviews in HC took on average 58 (SD 10) and 134 min (SD 40) in UHR subjects. The overall inter-rater correlation of EASE total score was 0.90 ( $p < 0.001$ ). Our sample consisted of 26 UHR subjects with mean age of 23.73 (SD 4.35) years and of which 57% males. The matching sample of HC participants did not differ in baseline demographics, accounted in **Table 1**, but healthy controls had a higher employment rate than UHR ( $p = 0.037$ ).

#### *3.2. Prevalence of TS in HR*

TS were absent from all subjects in HC group and present in 50% of the subjects in UHR group. Hereinafter, the acronym UHR-TS+ represents subjects that referred TS, while UHR-TS- represents those that did not.

#### *3.3. CDS, EASE, SOFAS, CAARMS and PANSS scores across groups*

There were statistically significant differences in EASE and CDS scores ( $H(2) = 31.1$ ,  $p < 0.001$  and  $H(2) = 20.4$ ,  $p < 0.001$  respectively) across the three groups of HC, UHR-TS+ and UHR-TS-. According with post-hoc tests (adjusted for multiple comparisons), HC scored lower than UHR-TS- and UHR-TS+ in CDS and EASE, including subscales, with the exception of Existential Reorientation ( $H(1) = -5.6$ ,  $p = 0.591$ ) and Demarcation/transitivism subscale ( $H(1) = -5.7$ ,  $p = 0.396$ ) in which there were no significant difference between HC and UHR-TS-. There was no significant difference between UHR-TS- and UHR-TS+ in EASE ( $H(1) = -10.3$ ,  $p = 0.074$ ), CDS ( $H(1) = -5.7$ ,  $p = 0.453$ ) and EASE subscales with two exceptions: UHR-TS- showed lower scores than UHR-TS+ on Existential Reorientation ( $H(1) = -12.5$ ,  $p = 0.014$ ) and Demarcation/transitivism subscales ( $H(1) = -10.2$ ,  $p = 0.025$ ). The three groups also

differed for SOFAS scores on functioning with overall impairment in the two UHR groups as compared with HC ( $H(2) 22.875, p<0.001$ ) but no difference emerged between UHR-TS- and UHR-TS+ ( $H(1)=-3.5, p=1.000$ , adjusted for multiple comparisons). Regarding psychotic and general psychopathology, UHR subjects with and without TS were compared using t-test since the sample distribution approximate normality for the scales adopted. No significant difference emerged in the CAARMS (UHR-TS- $=33.85\pm 16.42$ , UHR-TS+ $=43.54\pm 21.64$ ,  $t=-1.286 (24)$ ,  $p=0.211$ ) and PANSS total scores (UHR-TS- $=48.31\pm 11.72$ , UHR-TS+ $=57.31\pm 16.90$ ,  $t=-1.578 (24)$ ,  $p=0.128$ ). however the UHR-TS- group scored lower on PANSS general psychopathology subscale when compared with UHR-TS+ group ( $t(24)= -2.260$ ,  $p=0.033$ , Hedges'g= 1.39 indicating large effect size). **Table 2** portrays CDS, EASE and SOFAS scores across the three groups while **Table 3** details the differences in the CAARMS and PANSS subscales between UHR-TS- and UHR-TS+. The sample distribution of EASE and CDS total scores in three groups is additionally illustrated in **figure 1 and 2**.

\*\*\* TABLE 2 ABOUT HERE \*\*\*

\*\*\* TABLE 3 ABOUT HERE \*\*\*

\*\*\* FIGURE 1 ABOUT HERE \*\*\*

\*\*\* FIGURE 2 ABOUT HERE \*\*\*

#### *3.4. Correlation between CDS and EASE in HC and HR*

We further tested the relationship between EASE and CDS scores within our sample and found a significant correlation between scores ( $r=0.902$ , 95% CI 0.834 - 0.960,  $p<0.001$  bootstrap method applied). Figure 3 represents the correlation between CDS and EASE total scores.

\*\*\*FIGURE 3 ABOUT HERE\*\*\*

#### **4. Discussion**

To our best knowledge this is the first original study to investigate the prevalence of TS in UHR subjects. In this seminal exploration TS appear to be specific and highly prevalent in our UHR sample, as 50% of our UHR subjects experienced TS. Furthermore, in our sample, TS were exclusive to the UHR group empirically suggesting that they might be a phenotypic marker of this state. If the relatively high prevalence of TS found in our UHR subjects was replicated in other UHR samples, the idea that TS might be related to vulnerability to psychosis could be supported. However, as half of our UHR subjects did not present TS they might characterize experiences of a specific subgroup. This would go along with the fact that the UHR group is heterogeneous (Nelson et al., 2013), with high degree of comorbidity (Fusar-Poli et al., 2014b) and pluripotent and diverse diagnostic and functional outcomes (Carrion et al., 2013; Fusar-Poli et al., 2014b).

The presence of TS in the UHR sample was associated with higher PANSS general psychopathology scores. As with the previous heterogeneity claim, if replicated in larger and longitudinal studies, this result would add clinical value to this cluster suggesting that it might be a “symptom”. That is, to hypothesize that TS could be not only a phenomenon occurring in the UHR subjects but also a protagonist in identifying a subgroup of UHR subjects that have higher psychopathology. Contrary to our expectations none of the other clinical measures were impacted by the presence of TS. Indeed there was no statistical difference in SOFAS, PANNS positive symptoms and CAARMS scores in our sample UHR subjects with or without TS. These results diverge from the clinical consideration that TS matures with a severe

disruption of engagement (connection) and enactment (understanding) of reality and is associated with diminished functioning and a change in overall contact with reality (engagement and meaning). Most of these changes would be contained in the PANSS positive symptoms domain which include questions on perception of reality, derealization and perplexity (see relevant conceptualization of delusional mood and perceptual anomalies in (Fuchs, 2005)). The first possible speculation is that all of our negative findings are due to a type II error. An alternative hypothesis, stands upon the possible lack of sensitivity of the PANSS to measure attenuated and moderate psychotic symptoms sufficiently which distress the UHR subjects (Fusar-Poli et al., 2014a). However the latter explanation is weakened as the CAARMS and the SOFAS are specific instruments for the UHR psychopathology and the TS status did not differentiate the UHR group in any of the CAARMS specific domain scores neither in their SOFAS scores. However, we may argue that the CAARMS is focused on positive symptoms and does not investigate abnormalities of self-awareness, therefore such non-psychotic alterations may not be reflected in the instrument's scores.

We also investigated basic self-disturbances, as assessed by the EASE total score that had been shown to be relevant for the overall risk of psychosis in the UHR group (Nelson et al., 2009; Nelson et al., 2013; Nelson et al., 2012). In our UHR sample similar scores of basic self-disturbances were found in subjects with or without TS. These results might represent a false negative due to the small sample size as we were expecting higher overall scores in subjects with TS. We had envisioned the group with TS as having more severe self-awareness impairment and thus more prone to a disruption of engagement and understanding of reality. Yet these findings also allow the understanding in which TS and basic self-disturbances constructs occur in specific and not overlapping cohorts of UHR subjects. Our assessment showed that scores of the demarcation/transitivism and existential reorientation EASE subscales were higher

in subjects with TS. Only longitudinal studies could sustain this relation and if a specific combination of basic self-disturbances occur in subjects with TS. However, even if we could eventually ascertain this, extra care must be taken as the existential reorientation domain of the EASE scale includes items that are similar to the TS construct.

Another unexpected result was the average CDS score in the UHR risk group across their TS status. We expected higher scores in the subjects with TS due to the overlap of many of CDS items with the TS construct – e.g. “what I see looks 'flat' or 'lifeless', as if I were looking at a picture” or “my surroundings feel detached or unreal, as if there was a veil between me and the outside world” (Sierra and Berrios, 2000). Again if we do not interpret these results as false negative, we can hypothesize that derealization and depersonalization experiences could lead to other subjective interpretations than the TS cluster. Indeed this would support the idea that TS are singular (and therefore clinically relevant) and that they are not just non-specific depersonalization and derealization experiences found in anxiety (Sierra et al., 2012), depression (Mula et al., 2007) or even trauma in general (Ludwig, 1983).

Our third aim was to examine the correlation between the CDS and EASE scores to better understand the relation between derealization and depersonalization experiences and basic self-disturbances in the UHR population. Whilst derealization and depersonalization are taken to be non-specific, basic self-disturbances have been conceptualized as the core feature of the schizophrenic spectrum, and are therefore useful in distinguishing diagnostic outcomes (Nelson et al., 2013; Parnas et al., 2011). In the whole UHR sample these two domains were closely related. This finding adds up to the idea that there could be an overlap in the portrayal of these phenomena. Indeed our results emphasize the word of caution which was recently put forward regarding the lack of phenomenological detail to separate “true basic self



disturbances” from otherwise unspecified depersonalization and derealization experiences (Sass et al., 2013). At a phenomenological level, a full overlap would render narratives of general derealization and depersonalization experiences an important confounding factor to narratives suggesting disturbances of “basic-self” (and schizophrenia proneness). A partial overlap, where a specific domain of CDS experiences is more prevalent in those describing high levels of “basic-self” disturbances, would maintain the idea that there is something particular to the derealization and depersonalization occurring in schizophrenia. Further studies might help clarify this question including those investigating the occurrence “basic-self” disturbances in other clinical populations (e.g. anxiety disorders) and their overlap with general derealization and depersonalization experiences.

#### **4.1. Limitations**

This study is limited by the small sample size and it should be considered exploratory. We list several major limitations: (1) we cannot dismiss these results being false negatives or false positives due to the sample size; (2) there is a conceptual and empirical heterogeneity of the UHR construct (Fusar-Poli et al., 2013) that can further impair the use of our results for other UHR populations (3) the assessment of TS needs to be replicated in other UHR findings to allow generalizability of results; (4) the differences in employment rates are a possible confounding factor to our results, yet they seemed to us represent an artefact of the process of selection of the UHR group (the use of SOFAS for functioning); (5) we have no follow up results, which would help to better define the clinical relevance of TS - they could clarify if TS are general experiences (accounting for anxious and depressive symptoms) or indeed associated with specific experiences at the core of psychosis proneness, (6) the lack of a clinical control group (e.g. affective, anxious or personality disorders); (7) although the use of prescribed drugs and of illicit substances was systematically appraised,

their effect on our results could not be determined due to small numbers (we have fully investigated these issues in a separate publication (Fusar-Poli et al., 2015)); (8) we did not analyse TS in light of cultural influences. For example the Truman explanation could be a modern way to conceptualize the experience influenced by social media or TV - an analysis of these factors could perhaps allow us to understand if TS are specific to a subset of UHR subject intensely using social media and watching TV shows; (9) only two UHR clinics were used and the prevalence of UHR in our population might be limited by the specifics of our population.

## **5. Conclusions**

This is the first study to explore the prevalence and implications of Truman symptoms in a UHR population. TS was relatively highly prevalent in in our UHR sample and was absent in matched HC's. The UHR subjects with TS had similar scores to the UHR without TS in the EASE, SOFAS, CDS, CAARMS, PANSS, with the exception of higher score on Existential Reorientation and Demarcation/transitivism EASE subscales and General Psychopathology PANSS subscale in the UHR-TS+ group. Within the whole UHR sample, EASE and CDS scores were correlated. Future studies, both prospective and with larger samples, are fundamental to endorse our considerations and to test if TS predicts clinical outcomes or treatment response in UHR subjects.

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**Table 1:** Sociodemographic and Clinical characterization of sample

	Total sample (N=40) mean±SD or n (%)	UHR (n = 26)			F or Fisher's	p*
		HC (N=14) mean±SD or n (%)	TS- (N=13) mean±SD or n (%)	TS+ (N=13) mean±SD or n (%)		
<b>Age at inclusion</b>	23.9±3.9	24.21±3.22	24.46±4.61	23.00±4.02	0.508	p=0.606
<b>Country of Birth</b>						p=0.648
United Kingdom	38 (95)	13 (92.9)	12 (92.3)	13 (100)		
Other	2 (5)	1 (7.1)	1 (7.7)	-		
<b>Gender</b>					3.190	p=0.217
Male	19 (47.5)	4 (28.6)	7 (53.8)	8 (61.5)		
Female	21 (52.5)	10 (71.4)	6 (46.2)	5 (38.5)		
<b>Ethnicity</b>					1.954	p=0.421
White British	24 (60)	10 (71.4)	6 (46.2)	8 (61.5)		
Other	15 (37.5)	4 (28.6)	7 (53.8)	4 (30.8)		
Missing	1 (2.5)	-	-	1 (7.7)		
<b>Employed/ Studying</b>					6.310	p=0.037
Yes	27 (67.5)	13 (92.9)	8 (61.5)	6 (46.2)		
No	12 (30)	1 (7.1)	5 (38.5)	6 (46.2)		
Missing	1 (2.5)	-	-	1 (7.6)		
<b>Mean n° years of Education (years)</b>	14.79±2.90	16.14±3.44	14.38±2.18	13.67±2.46	2.783	p=0.075

number of subjects or Mean ± SD. Percentages under parenthesis.

\* p-values refer to ANOVA and Fisher's Exact Test between HC, UHR-TS- and UHR-TS+ group for continuous and categorical values respectively

**Table 2:** Between groups differences in CDS, EASE and SOFAS scores

	HC (N=14) median (range) mean rank	UHR-TS- (N=13) median (range) mean rank	UHR-TS+ (N=13) median (range) mean rank	<i>H</i> (2)	<i>p</i>
CDS score	0.00 (0-10) 6.41	33.00 (3-84) 17.39	82.00 (35-160) 23.11	20.359	<0.001
EASE score	0.50 (0-9) 7.68	19.00 (6-32) 22.27	36.00 (18-83) 32.54	31.128	<0.001
EASE Cognition and Consciousness	0.00 (0-5) 7.75	7.00 (2-15) 23.81	14.00 (5-23) 30.92	28.604	<0.001
EASE Self-awareness and Presence	0.00 (0-4) 7.68	12.00 (3-19) 23.58	15.00 (7-31) 31.23	29.559	<0.001
EASE Bodily experiences	0.00 (0-1) 9.82	2.00 (0-4) 21.88	3.00 (1-15) 30.62	23.588	<0.001
EASE Demarcation/transiti vism	0.00 (0-0) 13.50	0.00 (0-1) 19.19	1.00 (0-6) 29.35	17.910	<0.001
EASE Existential Reorientation	0.00 (0-5) 12.79	1.00 (0-7) 18.38	4.00 (2-8) 30.92	18.144	<0.001
SOFAS score	91.00 (90-100) 30.00	60.00 (51-69) 14.41	52.00 (40-70) 10.88	22.875	<0.001

Median (with range) and mean rank for each group are reported. Three groups were compared and considering the non-normal distribution of data and heterogeneity of variance, we adopted the Kruskal–Wallis non-parametric test.

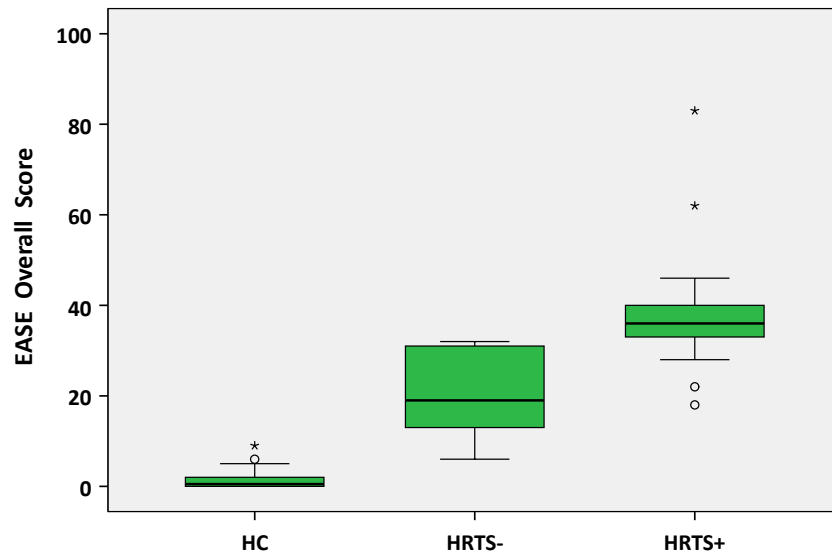
**Table 3:** Impact of Truman symptoms on the PANSS, CAARMS scores

	UHR-TS- (N=13) mean±SD	UHR-TS+ (N=13) mean±SD	t (24)	p value
PANSS Positive symptoms	11.31±3.09	14.23±4.36	-1.971	p=0.060
PANSS Negative symptoms	12.62±4.71	11.69±5.04	0.482	p=0.634
PANSS General Psychopathology	24.31±6.40	31.38±9.31	-2.260	p=0.033 *
CAARMS Positive symptoms	7.15±4.24	9.00±3.42	-1.223	p=0.233
CAARMS Cognitive Disturbances	3.0±2.31	2.31±1.70	0.870	p=0.393
CAARMS Emotional Disturbances	3.00±3.06	3.00±3.06	0.000	p=1.000
CAARMS Negative symptoms	4.85±3.05	5.38±3.93	-0.390	p=0.700
CAARMS Behavioral Changes	4.69±4.05	6.85±4.51	-1.282	p=0.212
CAARMS Motor/Physical Changes	1.23±2.20	2.31±4.15	-0.826	p=0.417
CAARMS General Psychopathology	10.00±6.31	14.62±7.05	-1.758	p=0.091

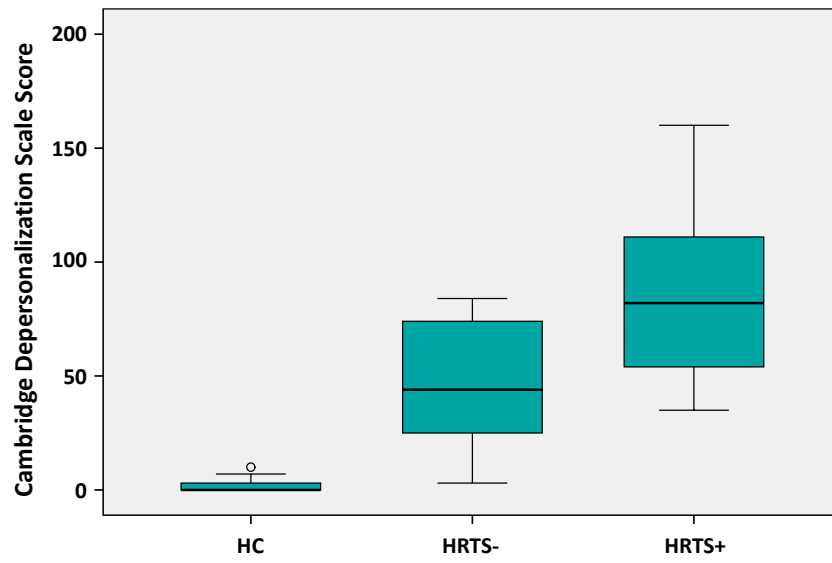
We present the comparison between UHR-TS- with UHR-TS+. \* Significant difference (2-sided p<0.05)

**Figure 1: Examination of Anomalous Self Experiences Scores HC, UHR-TS- and UHR-TS+ groups.**

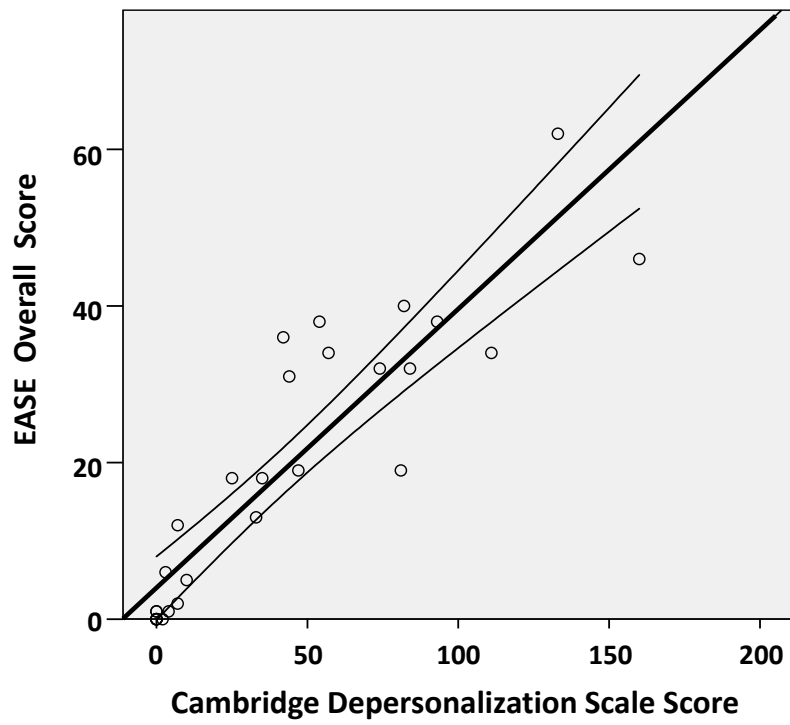
The three groups differed for total EASE score ( $N=40$ ,  $H(2)=31.128$ ,  $p<0.001$ )



**Figure 2: Cambridge Depersonalization Scale scores across HC, UHR-TS- and UHR-TS+ groups**  
The three groups differed for total EASE score ( $N=29$ ,  $H(2)=31.128$ ,  $p<0.001$ )



**Figure 3: Correlation between EASE and CDS score in the HC and UHR sample ( $r=0.902$ , 95% CI 0.834-0.960,  $p<0.001$  bootstrap method applied)**





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