

ON THE IMPORTANCE AND DETECTION OF PRODROMAL SYMPTOMS FROM THE PERSPECTIVE OF CHILD AND ADOLESCENT PSYCHIATRY

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Abstract

The early detection and treatment of persons at-risk for the development of psychosis is currently regarded a promising strategy in fighting the devastating consequences of this disorder. The two current sets of at-risk criteria, i.e., the ultra high risk' (UHR) and the 'basic symptom' criteria, were developed on mainly adult samples, and there is little empirical evidence that they can simply be transferred to children and adolescents. Regarding UHR-criteria, there is indication of some attenuated psychotic symptoms being potentially non-specific in adolescents and brief limited intermittent symptoms being difficult to clinically classify in children when observable behavioural correlates are missing. For basic symptoms, preliminary results indicate that, similar to results in adult populations, cognitive basic symptoms may be promising candidates for at-risk criteria. Yet, as some developmental peculiarities in children have to be considered in the assessment of basic symptoms, a child and youth version of the Schizophrenia Proneness Instrument (SPI-CY) has been developed and is described in this review. However, it must be kept in mind that the current at-risk criteria for the prediction of transition to psychosis and their assessment instruments have not been sufficiently validated for use in children and adolescents.

Thus, research is needed to examine if current at-risk criteria have to be tailored to the special needs of children and adolescents. If a Prodromal Risk Syndrome for psychosis is included in DSM-V, it will be indispensable to highlight that its suitability for children and adolescents is not yet known.

Key Words: prodrome, schizophrenia, adolescence, early diagnosis, early intervention, psychosis

Declaration of interest: none

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Introduction

Four of the six leading causes of the years lived with disability are due to neuropsychiatric disorders - one of them is schizophrenia that is also among the disorders with the highest economic impact (WHO 2004). The devastating consequences are aggravated when the disorder has an early onset before the age of 18 (Adam & Lehmkuhl 2002, Resch 2008); early-onset psychoses (EOP) are not as rare as previously supposed and comprises roughly a quarter of the lifetime incidence of schizophrenic psychosis, i.e., of 0.23% in the general population (Gillberg 2001). Compared to adult-onset psychoses (AOP), EOP more frequently display adverse prognostic criteria: for example, more pronounced deficits in neurological development

(Asarnow et al. 2001), lower premorbid adjustment (Hollis 1995), more negative symptoms at the onset of psychosis (Yung & McGorry 1996) and more severe cognitive impairments (Basso et al. 1997). However, it has been suggested that the worse outcome of EOP might, at least in part, be due an even more delayed treatment onset than in AOP (Schimmelmann et al. 2007, 2008). In a recent comparison of the course of 118 EOP and 518 AOP cases, a significantly longer duration of untreated psychosis (DUP) in EOP accounted for their worse course after controlling for type of psychosis, level of premorbid functioning, family support and psychiatric history (Schimmelmann et al. 2007, 2008). Hence the negative effects of DUP that had been reported for adult samples (Marshall et al. 2005, Perkins et al. 2005) may even be aggravated

SUBMITTED APRIL 2010, ACCEPTED APRIL 2010

Table 1. Cognitive-Perceptive Basic Symptoms (COPER): At least one of the following basic symptoms with at least weekly occurrence within the last 3 months (i.e., SPI-A score ≥ 3) and first occurrence at least 12 months ago

Basic Symptom	Definition	Examples of statements
Thought interference	The interference, intrusion of thoughts (ideas, impressions, impulses) that do not belong to the current train of thought; they can rarely be traced back to external stimuli and disturb the child's or adolescent's intended thought process. These disruptive, intruding thoughts are emotionally neutral and have no affective content.	<p>"When I am trying to concentrate on something, some other thoughts come into my head that have nothing to do with it. Then, I wonder why that even occurred to me."</p> <p>"If I don't make an effort, other thoughts sneak in. They just show up and don't have anything to do with whatever I am currently doing."</p>
Thought perseveration	A disruptive adherence to specific, unimportant and emotionally neutral thoughts, which could pertain to any irrelevant and arbitrary past activity. Everyday incidents, conversations, etc. are ruminated on repeatedly. These repeating thoughts intrude, and it takes an effort to stop them. The persistent thoughts mainly relate to the past, less frequently to the present. At the same time, they can feature contents of consciousness relating to the past and the present.	<p>"When I have been talking to someone - even if it is just about something trivial - I often get stuck on the conversation and the mental image of this person. And if I talk to someone else, I can't concentrate on the new conversation, because I still have the earlier conversation in my head, which keeps repeating itself and can't be shut off, or barely."</p> <p>"When I relax at the end of the day, unimportant conversations or events that happened that day often pop into my head and keep repeating themselves. Eventually, I start to wonder what might be so important about them."</p>
Thought pressure	Many thoughts or impressions, the contents of which vary, enter and leave the mind in quick succession. The child or adolescent has no influence over the appearance and disappearance of these thoughts, nor can he control them.	<p>"Sometimes it is really chaotic in my head, and a lot of different thoughts buzz around."</p> <p>"I can't reign in my thoughts. Sometimes I feel smothered by all of them. I jump from one thought to the next."</p>
Thought blockages	A self-perceived and -reported blockage of the current train of thought, which can also be described as one's mind suddenly going blank, one's thoughts breaking off, or losing the thread of thoughts.	<p>"Sometimes a thought just suddenly stops; it's just gone."</p> <p>"Sometimes, when I want to say something, it just disappears, completely gone. Sometimes it occurs to me again, but sometimes not."</p>
Disturbance of receptive speech	A disruption in the ability to recognize spoken or written words, series of words and/or sentences that the children or adolescents know or are familiar with and to discern their meaning, such as during a conversation, in a film, on television, or on the radio.	<p>"When I am reading something, I often find myself wondering about an everyday word and have to think about what it means."</p> <p>"More often than not, I read the words without knowing what I have read, although I fully concentrate on reading."</p>
Decreased ability to discriminate between ideas and perception, fantasy and true memories	Reduced ability to differentiate between 1. current mental impressions and sensory perception, or 2. purely imagined impressions and memories of actual events or experiences that occurred previously.	<p>"Sometimes I see something, but then a little while later, I am not sure if I just imagined it."</p> <p>"I keep thinking that I we went to Tunisia last year. I know that is nonsense, but then the thought suddenly pops up again - just like a real memory."</p>

Table 1 continued

<p>Unstable ideas of reference</p>	<p>A subjective, subclinical experience of self-reference, in which the affected person has the vague feeling that certain events in his environment are directed toward him, although realizing (at the same time or very shortly thereafter) that this is not likely or not possible.</p>	<p>"When I listen to the radio, a thought keeps popping up that something is being said to me directly, even though I also know that is just nonsense." "Sometimes, when I am walking down the street and hear someone laugh from far away, I have the fleeting feeling that someone is laughing at me. But I realize right away that this cannot be true, that the person is laughing at something else." "My surroundings often seem unfamiliar to me, somehow unreal. I have thought about it a lot, and I don't think it was like that earlier." "I keep having the feeling that I am in a film, as if everything around me is not real, is only staged." "I watched the kittens playing, and suddenly, I felt very much drawn in to the scene, couldn't really detach myself from it and was very much emotionally involved in a weird way."</p>
<p>Derealization</p>	<p>A change in one's emotional connection to one's environment that can occur either as an alienation from the visual world or as a new appreciation for a particular, isolated aspect of one's environment, which now appears exceptionally impressive. In the first case, the environment appears unreal, changed, or alien in a way that is difficult to describe; in the second case, the emotional distance between the affected person and the environment is reduced, usually in connection with positively accentuated feelings.</p>	<p>"Everything appeared as being so far away, way off in the distance from me." "The furnishings suddenly seemed to be very small and distorted, and the room seemed long and wide." "All at once, some objects looked strangely distorted and changed." "Suddenly, it seemed as if I were looking at everything through yellow glasses. Then it all turned dark red."</p>
<p>Visual perception disturbances, excl. hypersensitivity to light and blurred vision</p>	<p>Disturbances in visual perception refer to a misperception of the environment or of certain aspects of the environment. The child or adolescent is aware of the environment's real form and ascribes the change to a change in his visual acuity or a problem with his vision or his eyes. Unlike with hallucinations, the changes are not considered real and projected into the external world. And unlike with illusions, an object is not temporarily believed to be a different object; rather, it is recognized as being itself.</p>	<p>"When I am under a lot of stress, I can't hear for a little while." "I can't hear properly anymore. Speech sounds so muffled and music so dead." "Everything that people around me are saying sounds so ugly, as if it were being distorted with something."</p>
<p>Acoustic perception disturbances, excl. hypersensitivity to noises</p>	<p>A self-perceived impairment and/or change in the quality of acoustic stimuli that cannot be attributed to external factors, acousms or maintenance of acoustic stimuli perceived earlier.</p>	<p>"When I am under a lot of stress, I can't hear for a little while." "I can't hear properly anymore. Speech sounds so muffled and music so dead." "Everything that people around me are saying sounds so ugly, as if it were being distorted with something."</p>

Table 2 . Cognitive Disturbances (COGDIS): At least two of the following basic symptoms with at least weekly occurrence within the last 3 months (i.e., SPI-A score ≥ 3)

Basic Symptom	Definition	Examples
Inability to divide attention	Difficulties in managing two or more demands that involve different senses. It is no longer possible to integrate sensory data from more than one sense, for example, visual and acoustic signals. The affected children or adolescents no longer feel able, e.g., to listen to their teacher and take written notes at the same time without losing track of the subject of the lesson. See Table 1	"I can't do two things at once anymore, not even something like preparing a sandwich while talking to my friend." "I can't pay attention in class and take notes at the same time anymore." "I can no longer accomplish two things at once. I can concentrate on only one thing at a time or make mistakes."
Thought interference	See Table 1	
Thought pressure	See Table 1	
Thought blockages	See Table 1	
Disturbance of receptive speech	See Table 1	
Disturbance of expressive speech	A self-experienced impairment of the ability to verbally express, including deficiencies in producing the appropriate words. The child or adolescent registers the difficulties with word choice, precision and fluency. The right words are not readily available or recalled only vaguely and imprecisely. See Table 1	"Currently, I am communicating at a lower level. I cannot formulate words and sentences as precisely anymore." "My answers are not as clear as they were earlier. I often hem and haw for a long time before I can find the right words."
Unstable ideas of reference	See Table 1	
Disturbances of abstract thinking	An impairment in the recognition of abstract, metaphorical or symbolic contents, including phenomena reported by the child or adolescent related to concretism (the concrete understanding of abstract contents). The child or adolescent is no longer capable of making an internal adjustment to that which is abstract or virtual and to work with this to reach a performance goal.	"I can no longer recognize the literal and symbolic meanings of a saying (for example) or a parable." "I am no longer able to recognize the meaning of abstract things." "Recently, I have been having difficulty understanding signs and symbols."
Captivation of attention by details of the visual field	A small, random detail within the person's visual field dominates his perception and captivates the attention. A completely normal visual stimulus appears to partially or completely stand out, almost in isolation from its surroundings and is emphasized to the point that this single aspect draws and holds the complete attention of the affected person against his/her will. It is difficult for him to avert the gaze or to look elsewhere.	"I was so mesmerized by one of the teacher's buttons that I had to keep looking at it, and it was hard to look at or think about anything else."

in EOP, possibly because more pronounced neurodevelopmental and cognitive deficits, the insidious onset of less pronounced positive symptoms and/or the atypical clinical picture of the beginning EOP – potentially misinterpreted as ‘adolescent crisis’ - act as further delaying factors (ibid.). Thus, early detection and treatment of persons with first signs of the emerging disorder, which is currently regarded as one promising strategy in fighting the devastating consequences of psychosis (WHO 2004), may face different or additional challenges in EOP as compared to AOP (Resch 2008). In addition, AOP with an onset of the illness, i.e., the prodrome, in childhood or adolescence might as well be affected by potential developmental or age-related particularities that would have to be accounted for in prevention efforts.

For an early detection of psychoses, two complementary approaches are mainly followed currently: (1) the ‘ultra high risk’ (UHR) criteria of an imminent risk including attenuated psychotic symptoms (APS), brief limited intermittent psychotic symptoms (BLIPS) and a combination of a genetic risk factor and a recent persistent significant decline in functioning (Phillips et al. 2000); depending on the centre, the assessment scale and/or the time of their assessment, however, the exact definition of UHR criteria can vary considerably between studies (see Schultze-Lutter 2004 for an example); (2) the basic symptom criteria ‘cognitive-perceptive basic symptoms’ (COPER; *Table 1*) and ‘cognitive disturbances’ (COGDIS; *Table 2*) that partially overlap but delineate risk of different imminence (Klosterkötter et al. 2001; Schultze-Lutter et al. 2006, 2007a, b). These at-risk criteria, however, were developed solely (Klosterkötter et al. 2001) or predominately in adult samples (age 16 and above; Phillips et al. 2000).

First studies of these at-risk criteria – again conducted in predominately adult samples - have shown conversion rates in thus defined, help-seeking clinical at-risk samples that by far exceed the general incidence of first-episode psychosis of about 0.03% (Baldwin et al. 2005): whereas the annual conversion rate for not specifically or untreated UHR samples was around 38% on average, it was around 25% in samples meeting basic symptom criteria (Salokangas & McGlashan 2008). In recent studies, however, first-year conversion rates decreased to around 20% (Cannon et al. 2008, Schultze-Lutter et al. 2007b). This considerable drop had been argued to possibly result from changed service use with patients coming in at an earlier stage of their illness and less pre-selected for the clinical impression of beginning psychoses (Yung et al. 2006a). It had also intensified the search for additional predictors and measures that improve risk stratification; and, in two large longitudinal studies (Cannon et al. 2008, Ruhrmann et al. 2010a), regression equations and prognostic scores respectively have been reported based on sociodemographic and clinical variables, which allow a more detailed risk estimation in at-risk samples. These models include the total of positive syndrome items of the Structured Interview for Prodromal Syndromes (SIPS; Miller et al. 1999, 2002) and its single positive syndrome items ‘unusual thought content’ and ‘suspiciousness/paranoid ideation’ as well as schizotypal personality, ‘bizarre thought content’ and

‘sleep disturbances’ according to the SIPS, current social functioning, highest level of global functioning within the pre-baseline year, years of education and presence of any drug abuse (ibid.). Further, at-risk patients most frequently present with more than one of these five at-risk criteria (Schultze-Lutter et al. 2009, Ruhrmann et al. 2010a), and there is first evidence that particularly the combination of APS and COGDIS might further improve detection of an imminent risk for psychosis (Ruhrmann et al. 2010a, Schultze-Lutter 2007b).

Though these are promising results in general, first reports on exclusively child and adolescent samples meeting at-risk criteria indicate that these can be transferred to children and adolescents only with reservations.

I. Early diagnosis in child and adolescent psychiatry

While several studies have examined the course of genetic high risk samples and birth cohorts as well as unselected child and adolescent psychiatric samples, only three work groups have especially focussed on an early detection and related indicated prevention of first-episode psychosis in children and adolescents: the Emory University adolescent Development (EUAD) project, the Recognition and Prevention (RAP) programme and the Vienna and Heidelberg basic symptom studies.

Ultra-High Risk (UHR) criteria

As for UHR criteria, a naturalistic intervention study with a variable two- to 88-month follow-up of 48 12-18 (exceptionally up to 22) year old adolescents with APS according to the SIPS participating in the RAP programme (Cornblatt 2003, Lencz et al. 2004) indicated a more insidious onset of frank psychoses, i.e., a longer interval between study intake and conversion, than reported from adult or mixed samples (Cornblatt et al. 2007): of the 12 patients (25%) with a transition to psychosis, only three (6.3%) had made the transition in the first year. Six (12.5%) developed a psychosis in the second, two (4.2%) in the third and one (2.1%) even only after 5.5 years.

Further, the predictive value the APS ‘suspiciousness, persecutory ideas’ was questioned in this age group, as this had been the most frequently displayed of all SIPS items including negative, disorganized and general symptoms and had undergone similar substantial improvement for both antipsychotic and antidepressive medication (Cornblatt et al. 2007). Thus it was concluded that “suspiciousness may be an adolescent tendency that is quite treatable and of unclear significance as a predictor of future psychopathology” (ibid., p. 554).

Contrariwise, Meyer et al. (2005) reported this particular APS at an only moderate incidence rate of 54% in an adolescent at-risk sample of 24 12- to 19-year olds while the most frequent APS according to the SIPS were ‘perceptual abnormalities’ (83%) and non-paranoid ‘unusual thought content, delusional ideas’

(75%). Thus, the prevalence and predictive values of single APS in children and adolescents are hitherto unclear but clearly require special attention as these may be influenced by developmental characteristics of this young age-group.

The same appears to be true for BLIPS, i.e., transient, yet already frank psychotic symptoms. Children's reports about psychotic experiences may be rather difficult to clinically classify when observable behavioural correlates are missing, thus probably leading to an overestimation of psychotic symptoms in children in structured interviews (Hlastala & McClellan 2005). And atypical psychotic symptoms, which could well meet BLIPS criteria, were reported to be relatively frequent in children and adolescents. They often occurred with other psychiatric disorders, were fleeting and/or closely context-related experiences, showed a high degree of complete remission and, in a first study of 20 7- to 17-year olds, no conversion to psychosis within two years (*ibid.*). Thus, the authors concluded that, contrary to adult samples, atypical or transient psychotic symptoms may not be qualified predictors of psychosis in children and adolescent samples (*ibid.*).

Contrary to this, in the Dunedin birth cohort study (Poulton et al. 2000), a high predictive validity of psychotic symptoms reported at age 11 for a schizophreniform or – though less so – an anxiety disorder at age 26 was detected. Of the 12 children (1.6%) reporting at least two likely or one definite symptom of five psychotic symptoms (delusion of reference, mind reading, paranoid delusion, acoustic and somatic hallucinations as assessed with Diagnostic Schedule for Children for DSM-III by a child psychiatrist), three (25%) had developed a Schizophreniform disorder (Odds Ratio=16.4). Of the 95 children (12.5%) exhibiting only one likely psychotic symptom, only 9.5% (n=9) exhibited a Schizophreniform disorder 15 years later (Odds Ratio=5.1).

Basic symptom criteria

The basic symptom concept was first described by Gerd Huber (Huber 1966, Huber & Gross 1989, Gross & Huber 2005, Söllwold & Huber 1986, Schultze-Lutter 2009). Basic symptoms are subtle, subclinical self-experienced disturbances in drive, stress tolerance, affect, thinking, speech, perception and motor action, which are phenomenologically clearly distinct from psychotic symptoms. These symptoms were first operationalized in the semi-structured clinical interview measure, the Bonn Scale for the Assessment of Basic Symptoms, BSABS (Gross et al. 1987), and a self-rating measure, the Frankfurt Complaint Questionnaire, FCQ (Söllwold 1986, 1991), that, despite their parallel development, generate quite different results even for corresponding items (Maß et al. 1997). Basic symptoms can be present before the first psychotic episode, between and after psychotic episodes, even during psychotic episodes themselves. They were thought to be the most immediate psychopathological expression of the somatic disturbance underlying the development of psychosis – thus the term 'basic'.

Basic symptoms are phenomenologically different from mental states known to the patient/subject from

what s/he considers his/her 'normal' self and thus are clearly distinguishable from subtle disturbances described as traits in those at genetic high-risk (Parnas & Carter 2002, Jones 2002). In addition, basic symptoms are phenomenologically clearly distinct from APS and BLIPS as they are not necessarily observable by others as are odd thinking and speech, negative symptoms and formal thought disorders. They are regarded by the patients as having originated in themselves, unlike schizotypal perceptual disturbances and hallucinations, and do not primarily affect thought content as do magical thinking, ideas of reference, paranoid ideation and delusions.

As yet, basic symptom criteria have not been explicitly studied for their psychosis-predictive value in child and adolescent samples. A 5-year follow-up of a clinical child and adolescent sample revealed no association between the presence of 'level 2' basic symptoms, i.e., those that, in the original basic symptom concept, had been theorized as being specific to psychosis, at baseline and diagnosis of a psychotic disorder at follow-up (Poustka et al. 2007). Yet, 'level 2' basic symptoms include a great number of unspecific symptoms not considered in COPER or COGDIS, e.g., concentration and memory problems, body perception and cognitive motor disturbances, which could have well accounted for this result.

Further research on basic symptoms in children and adolescents, predominately cross-sectional comparisons of their presence across different clinical and non-clinical groups, has previously been carried out with the BSABS (Koch et al. 2001; Poustka et al. 2007; Resch 1992, 2008; Resch et al. 1998, 2002a, b, 2004). Similar to research on adults (Klosterkötter et al. 1996), basic symptoms in children and adolescents were reported across all diagnostic groups (Koch et al. 2001). However, schizophrenic adolescents – like schizophrenic adults – had significantly more basic symptoms when compared to other diagnostic groups (Resch et al. 2002a). Further, single-item analyses indicated that cognitive basic symptoms might also play an important role in the prediction of psychoses in children and adolescents. The five basic symptoms best discriminating psychotic from non-psychotic psychiatrically ill adolescent were thought interference (risk ratio=2.96), decreased ability to discriminate between ideas and perception (risk ratio=2.89), thought perseveration (risk ratio=2.59), slowed-down thinking (risk ratio=3.08) and difficulties concentrating (risk ratio=4.92) (Resch et al. 2002a). Similarities in clinical samples of adults and adolescents were also found when considering depersonalization and derealization with experiences of autopsychic depersonalization being observed much more frequently than experiences of derealization in both age groups (Koch et al. 2001, Schultze-Lutter 2001).

In a German–Austrian–Swiss multicenter study (VESPA) on the prevalence of basic symptoms as assessed with the BSABS, i.e., for presence only irrespective of frequency, in a representative random sample of adolescents from the general population (Meng et al. 2009), it was shown that the 96 adolescents from the general population reported basic symptoms significantly less frequently than adolescents with psychotic or non-psychotic disorders. Thereby,

cognitive basic symptoms best discriminated between the two clinical samples. From this, it was concluded that “particularly cognitive ‘basic symptoms’ may be a valuable criteria to be included in future ‘at risk’ studies in adolescents” (Meng et al. 2009, p. 32). With regard to COPER and COGDIS, these rarely showed in the general population sample: 3.1% reported COGDIS, 8.0% COPER symptoms in sufficient number. These low rates, however, are probably even an overestimation of the true 6-month prevalence of these criteria in adolescents as their time and frequency requirements were not observed in this study. Thus the relevant basic symptoms actually might have been present in subthreshold forms only in some of these already few subjects, thereby indicating that these basic symptoms should be regarded as infrequent experiences not commonly occurring in adolescence and, consequently, might possess psychopathological significance.

II. The Schizophrenia Proneness Instrument, Child and Youth version (SPI-CY)

Besides the still unclear transferability of at-risk criteria predominately developed on adult samples, another, yet related problem in the early detection of psychoses in children and adolescents concerns the assessment of criteria itself. Most instruments that were specially developed for an early detection, e.g., the SIPS as well as its Australian counterpart, the Comprehensive Assessment of At-Risk Mental States (CAARMS; Yung et al. 2006b), had not only not been adapted to the potential special needs of young age groups, but compiled on theoretical and clinical grounds and were not psychometrically validated.

An exception to this is the Schizophrenia Proneness Instrument – Adult version (SPI-A; Schultze-Lutter et al. 2007a), whose subscales or dimensions were generated and validated based on longitudinal and cross-sectional BSABS data of truly prodromal patients of the Cologne Early Recognition study (Klosterkötter et al. 2001) using cluster and Faceted Smallest Space analyses (Schultze-Lutter et al. 2008). In Procrustean Individual Differences Scaling (PINDIS) analyses, the generated six basic symptom dimensions in adult samples proofed a rather robust structure across different stages of the illness, i.e., between prodromal and frankly psychotic, yet non-chronic states. This structure even remained largely unchanged when a basic symptom assessment was switched from a binary assessment of presence to an ordinal assessment of severity. Thus, it had been concluded that these dimensions that seemed to be inherent to schizophrenia across different stages of the illness, could offer a good starting point for the development of an instrument for the assessment of prodromal symptoms that occur early in course of the illness, thereby serving as valid and reliable subscales (ibid.).

However, when the stability of this structure was tested using confirmatory Faceted Smallest Space Analysis in an EOP sample, it could not be replicated (Schultze-Lutter et al. 2010). In this study, a sample of 32 inpatients with first-episode EOP (66% male, mean age 16, SD=1.2, Md=16 yrs.) of the Child and Adolescent Psychiatric Department of the University

of Heidelberg had been assessed with the BSABS after the remission of frank psychotic symptoms for the presence of basic symptoms within the months preceding their admission. Showing an absolute insufficient separation index of only .25, the dimensional structure of adult samples could not be replicated in the EOP sample. Further analysis of the EOP data, however, revealed a four-dimensional structure based on 49 items of the BSABS (separation index of .957): ‘Adynamia’, ‘Perception Disturbances’, ‘Neuroticism’ and ‘Thought and Motor Disturbances’:

- Adynamia comprising 17 items of decreased drive and stress tolerance, affective changes incl. an increased emotional reactivity as well as unspecific concentration, memory and thought disturbances. These had mainly been assigned to the dimensions Overstrain and Emotional Deficits in the adult structure, but comprised lack of energy, persistence and drive, exhaustibility and depressive episodes in addition.
- Perception Disturbances including 13 disturbances in visual, acoustic and body perception as well as derealization, unstable ideas of reference, disturbances in the apprehension of perceptions and decreased ability to discriminate between ideas and perception. Thus, this dimension mainly included items of the two adult dimensions Perception and Motor Disturbances and Body Perception Disturbances.
- Neuroticism containing reduced desire for social contacts, increased emotional reactivity in response to misfortune to strangers, irritability, obsessive-compulsive and phobic phenomena, depersonalization and bodily malsensations of circumscribed pain or touching being unpleasant. This dimension is rather unique for the EOP sample, as none but malsensations of circumscribed pain had been considered in the adult structure.
- Cognitive Disturbances comprising 6 rather unspecific thought and memory disturbances as well as 8 thought disturbances that are part of the basic symptom at-risk criteria COPER and COGDIS, 3 cognitive motor disturbances, increased reflexivity/decreased spontaneity and disturbances in interpersonal skills. This dimension mainly comprised items of the adult dimensions Cognitive Impediments and Cognitive Disturbances as well as some thought and motor disturbances of Perception and Motor Disturbances.

A further structural difference to the adult sample structure was that Adynamia appeared to play an important role as indicated by its centre position in the generated circumplex structure; this position is held in the final adult sample structure by cognitive disturbances.

When the totals of these dimension in the EOP sample were compared to those of a non-psychotic adolescent inpatient sample (n=76), all but Neuroticism (p=.207) were significantly more pronounced in the EOS sample (Mann-Whitney, p<.000) with Thought and Motor Disturbances discriminating best. This was confirmed by ROC analyses that showed areas under the curve between .582 (95% CI: .468/.697) for

Neuroticism ($p=.193$) and $.905$ (95% CI: $.846/.964$) for Thought and Motor Disturbances ($p<.000$).

From these analyses, it was concluded that basic symptoms that can occur as part of the prodrome of first-episode psychosis seem to cluster differently in children and adolescents compared to adults with a psychotic disorder. Modelled on the Schizophrenia Proneness Instrument, Adult version (SPI-A), the four dimensions that had shown in the child and adolescent sample were therefore used to develop an instrument for the quantitative rating of basic symptoms fitted to younger age groups. Besides putting emphasis on the differentiation between basic symptoms and symptoms inherent to other child and adolescent psychiatric disorders, this instrument, the Schizophrenia Proneness Instrument, Child and Youth version (SPI-CY; Schultze-Lutter & Koch 2010), also allows the inclusion of parents' reports where considered appropriate, although remaining its focus on the self-perception of the patient. With this, the SPI-CY that will have to be further validated in prospective studies is hitherto the only early detection instrument especially designed for use in children and adolescents, although, for the time being, the criteria COPER and COGDIS have remained unchanged.

Based on earlier experiences with BSABS assessments in children, the majority of SPI-CY items are thought to be applicable for children aged eight and older, because, according to Piaget's theory of developmental stages, a child should be able to consider experiences and relationships from different points of view from this age onwards. This is also the age from that on the child will understand that feelings can be triggered by external and/or internal occurrences. Before age eight, the child continuously stabilizes his personality and his self-esteem within his family and his peer group by comparing different characteristics and achievements. Therefore, it seems rather unreliable to use the SPI-CY with much younger children because of lack of a sufficiently mature command of social perspective taking. A certain command of social perspective taking is necessary to ensure that the child is sufficiently capable of self-reflection that only enables the detection of basic symptoms as self-experienced aberrations from the child's 'normal' mode of experience.

Starting at about thirteen years of age, the child or adolescent will have acquired self-reflective abilities and higher level metacognitive processes (Piaget 1973) that allow the more differentiated reflective engagement with himself, even from the point of view of others, i.e., social perspective taking. Cognitive developments include the ability to make abstractions, to think in terms of possibilities and hypothetical mental constructs as well as to reference time and make long-term plans. Further, coping strategies from this age on are increasingly characterized by a variety of different strategies and the ability to flexibly employ them. As some of the basic symptoms included in the SPI-CY require these abilities, e.g., 'autopsychic depersonalization' or 'disturbances of emotional responsiveness as characterized by a decrease in facial expression, intonation and communication gestures', the applicability of some items is therefore explicitly restricted to children on this developmental level, i.e.,

roughly 13 years and older.

III. Clinical applicability of current at-risk criteria in children and adolescents

Particularly in light of first promising results on UHR criteria, an inclusion of a 'Prodromal Risk Syndrome' for first psychosis (Woods et al. 2009) based on APS into the Diagnostic and Statistical Manual of Mental Disorders (Fifth Edition; DSM-V) had been proposed, because such an inclusion would greatly stimulate future research on the psychosis prodrome and, thereby, continuously enhance the benefits and reduce the risks of such a prodromal diagnosis. This proposal, however, has since been heatedly discussed (e.g., Carpenter 2009, Corcoran et al. 2010, Drake & Lewis 2010, Frances 2010, McGorry 2010, Ruhrmann et al. 2010b, Yang et al. 2010, Yung et al. 2010), and critics mainly argue with the still high rate of false-positive predictions even in (predominately) adult samples. For example, Frances (2010) points out to a possible rate of 70 to 75% false positives in specialist clinics and expects a rate of over 90% in general outpatient clinics. For this reason, an early detection of psychosis along the lines of a Prodromal Risk Syndrome would pose one of the largest challenges in psychiatry in general and in child and adolescent psychiatry specifically (ibid.). Further, the inclusion of a Prodromal Risk Syndrome should be accompanied by the provision of adequate treatment strategies. Yet, preventive intervention studies, mostly anti-psychotic medication and/or cognitive behavioral therapy, have hitherto mainly failed to produce satisfying long-term results (Correll et al. 2010), and, despite the encouraging results on active treatment, the lower risk for transition to psychosis compared to the control condition was not maintained in three of the four studies on mixed adolescent and adult samples with available longer-term data (Philips et al. 2007, McGlashan et al. 2006, Morrison et al. 2007). Rather, patients who had been on treatment tended to catch up with the control groups, whereas transition rates in patients who originally had been randomized to the control group did not increase to a relevant degree after end of the active treatment condition (6-12 months). The only study where a maintenance effect over nine months has been described is a twelve-week acute trial with long-chain omega-3 polyunsaturated fatty acids (Amminger et al. 2010).

In summary, research on early detection and intervention in psychosis has hitherto been carried out predominately in adults without consideration of possible special requirements in children and adolescents. Hence, neither the rates as well as timing of conversion to psychosis in children and adolescents fulfilling current at-risk criteria nor the prevalence rates of at-risk criteria in clinical and general population samples are known – presumptions to estimate their predictive accuracy and to determine their pathologic nature, respectively. Thus research is needed to examine if current at-risk criteria have to be tailored to this age-group. If a Prodromal Risk Syndrome for psychosis is included in DSM-V, it will be indispensable to highlight that its suitability for children and adolescents is not yet known.

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