

Brief assessment of schizotypy: Developing short forms of the Wisconsin Schizotypy Scales

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Abstract:

The Wisconsin Schizotypy Scales—the Perceptual Aberration, Magical Ideation, Physical Anhedonia, and Revised Social Anhedonia Scales—have been used extensively since their development in the 1970s and 1980s. Based on psychometric analyses using item response theory, the present work presents 15-item short forms of each scale. In addition to being briefer, the short forms omit items with high differential item functioning. Based on data from a sample of young adults ($n = 1144$), the short forms have strong internal consistency, and they mirror effects found for the longer scales. They thus appear to be a good option for researchers interested in the brief assessment of schizotypic traits. The items are listed in an Appendix A.

Highlights

Short forms (15 items each) of the Wisconsin Schizotypy Scales were developed. Based on IRT and DIF analyses, items with high discrimination but low DIF were selected. Internal consistency and intercorrelations were good and consistent with past work with the long scales. The brief scales had construct-consistent relations with measures of personality and mood disorder symptoms.

Keywords: schizotypy | wisconsin schizotypy scales | item response theory | assessment | psychology

Article:

1. Introduction

Since their development in the 1970s and 1980s, the Wisconsin Schizotypy Scales have been extensively used to assess positive and negative schizotypy in clinical and nonclinical samples. The four scales measure magical ideation, perceptual aberration, social anhedonia, and physical anhedonia ([Chapman et al., 1976], [Chapman et al., 1980], [Eckblad and Chapman, 1983] and [Eckblad et al., 1982]), and they form higher-order positive symptom and negative symptom dimensions (Kwapil, Barrantes-Vidal, & Silvia, 2008). In the present work, we use recent IRT analyses (Winterstein, Ackerman, Silvia, & Kwapil, in press) to develop abbreviated versions of the scales, and we present data from a new sample that provides early evidence relevant to the short forms.

Over the decades, the scales have been used in cross-sectional and longitudinal studies of normal, at-risk, and deviant samples, and an impressive amount of evidence has accumulated in support of their score validity (see [Chapman et al., 1995] and [Kwapil et al., 2008]). In addition to their wide use in cross-sectional studies, the Wisconsin Schizotypy Scales have been used successfully in several longitudinal studies of the development of schizophrenia-spectrum disorders (e.g., [Chapman et al., 1994], [Gooding et al., 2005], [Gooding et al., 2007] and [Kwapil, 1998]).

Because of the popularity of the Wisconsin Schizotypy Scales, recent work has examined their psychometric properties employing current measurement models ([Winterstein et al., in press] and [Winterstein et al., 2010]). The scales were originally developed using classical test theory. Since then, a variety of newer models, including item response theory (IRT) and differential item functioning (DIF), have become more readily available. In their analyses, Winterstein et al. (in press) used a sample of 6137 young adults to estimate IRT parameters. For each of the four scales, a 2PL model, containing parameters for both item difficulty and discrimination, was the most appropriate. The IRT analyses identified many strengths of the scales. First, the scales had test information functions that peaked at the high end of the latent trait. This indicates that the scales, as intended, provide the most information at the high level and are thus best at discriminating between people with high levels of the construct. Second, all the scales had many items with high discrimination and difficulty values.

At the same time, the IRT analyses revealed some weaknesses that motivated further psychometric development. Many of the items had fairly low discrimination values. Such items can be deleted with little loss of information. Furthermore, some of the scales had many items that displayed high DIF. The DIF analyses compared men to women and Caucasians to African-Americans. DIF was modest for some scales—for example, no more than 7% of the items in the Magical Ideation and Perceptual Aberration scales showed high DIF—but it was extensive for others. For the Revised Social Anhedonia Scale, 28% of the items showed high DIF; for the Physical Anhedonia Scale, 48% of the items showed high DIF. Schizotypy research has had a long interest in possible gender and racial differences (e.g., [Chmielewski et al., 1995] and [Kwapil et al., 2002]), but the prevalence of DIF suggests that observed group differences could reflect secondary factors, not true differences in the constructs of interest.

We thus sought to develop short forms with several purposes in mind. First, the Wisconsin Schizotypy Scales are long (between 30 and 61 items each), so abbreviated versions would be

more time efficient, especially for studies in which schizotypy is not the central construct of interest. Second, short forms offer an opportunity to refine the scales. Given the many items with low discrimination and high DIF, it might be possible to distill the longer forms into brief versions consisting of stronger items. In the present research, we evaluated 15-item short forms for each of the four scales using a new sample of 1144 young adults. In particular, we examined the internal consistency of the short forms, the relationships between the four traits, and relationships between the schizotypal traits and many measures of personality and individual differences.

2. Method

2.1. Participants

For the present study, we collected data from adults enrolled in psychology courses at California State University, San Bernardino and University of Nebraska at Omaha. The data were collected as part of a larger study on personality and creativity ([Silvia et al., 2011] and [Silvia et al, in press]). Undergraduate students are a common population in schizotypy research, both because of convenience and because students typically are within the window of risk for many schizophrenia-spectrum disorders. People completed the survey online and received credit toward a research participation option. People were excluded if they endorsed more than two items on an infrequency scale (Chapman & Chapman, 1983), which assesses responding in a random or fake-bad manner. The final sample consisted of 1144 people. Approximately 76% of the sample was female. According to self-reported racial and ethnic background, the sample was approximately 60% Caucasian, 24% Hispanic/Latino, 7% African American, and 5% Asian American. Age ranged from 17 to 66 ($M = 22.9$, $SD = 6.6$).

2.2. Procedure and scales

To choose items for the short forms, we used several markers from the IRT and DIF analyses of the prior dataset (Winterstein et al., in press). After dividing each scale's items into content domains, which were derived from the published literature on the Wisconsin scales as well as from subjective classifications of the items, we chose items that met several criteria. First, items were required to have high item difficulty and high item discrimination values; items with high endorsement rates and low discrimination values were omitted. Second, we omitted items with high DIF. Finally, we chose items that represented all the content domains of the original scale. (The classifications of items according to content domains are available from the corresponding author.) The short forms thus ought to be refined versions of the long scales—although shorter, they have better performing items and similar construct coverage.

The items for the short forms of the Wisconsin Schizotypy Scales are listed in Appendix A. They consisted of the following items from the original scales: Magical Ideation Scale (items 1, 2, 5, 6, 9, 12, 13, 21, 22, 23, 24, 25, 26, 27, 29), Perceptual Aberration Scale (items 8, 10, 11, 13, 16, 19, 21, 23, 24, 25, 26, 27, 29, 30, 31), Revised Social Anhedonia Scale (items 1, 3, 4, 7, 10, 13, 14, 17, 19, 21, 26, 30, 31, 35, 37), and Physical Anhedonia Scale (items 3, 10, 15, 19, 24, 29, 35, 36, 39, 42, 45, 46, 47, 54, 60). Unlike the participants in our prior studies ([Winterstein et al.,

2010] and [Winterstein et al., in press]), the participants in this sample completed only the 60 items from the four short forms.

To evaluate the validity of the short forms' scores, we measured many additional constructs. First, we assessed broad dimensions of personality using the HEXACO-60 (Ashton & Lee, 2009), which provides scores for the six major traits defined by the HEXACO model of personality trait structure (Ashton & Lee, 2007): honesty–humility, emotionality (neuroticism), extraversion, agreeableness, conscientiousness, and openness to experience. To complement the HEXACO, we included several narrow traits, particularly measures of trait curiosity (the revised Curiosity and Exploration Inventory; Kashdan et al., 2009), sensation seeking (a brief scale developed by Hoyle, Stephenson, Palmgreen, Lorch, & Donohew, 2002), and hypomania (the Hypomanic Personality Scale; Eckblad & Chapman, 1986). This set of appetitive traits ought to discriminate between positive and negative dimensions of schizotypy. Second, we included measures of depression, anxiety, and social anxiety symptoms: the 14-item Depression subscale and 14-item Anxiety subscale of the Depression Anxiety Stress Scales (DASS; Lovibond & Lovibond, 1995), and the 20-item Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998).

3. Results and discussion

3.1. Descriptive statistics

All analyses were conducted with Mplus 6.1, using maximum likelihood estimation with robust standard errors. Table 1 displays the descriptive statistics and correlations for the short forms, which are below the diagonal. As a comparison, the correlations between the full scales are presented above the diagonal, based on a sample of 6137 people who completed the full scales (Kwapil et al., 2008, p. 448). The short forms appear to capture the same pattern of relationships in the long forms.

Table 1. Descriptive statistics and correlations for the Wisconsin Schizotypy Scales short forms.

	<i>M</i>	<i>SD</i>	Variance	Mdn	Min, max	1	2	3	4
1. Magical Ideation	3.54	2.89	8.39	3	0, 13	1	.69	.22	−.10
2. Perceptual Aberration	1.32	2.27	5.17	0	0, 15	.60	1	.29	−.03
3. Social Anhedonia	2.09	2.38	5.64	1	0, 14	.14	.24	1	.42
4. Physical Anhedonia	1.92	1.92	3.69	1	0, 12	−.05	.02	.25	1

Note. $n = 1144$. Correlations below the diagonal are for the short forms used in the present sample. As a comparison, correlations above the diagonal are from a sample of 6137 people who completed the full scales (Kwapil et al., 2008, p. 448).

3.2. Internal consistency

Table 2 displays the Cronbach's coefficient alphas. As a comparison, we also report alphas for the full scales from the prior sample (Winterstein et al., in press) as well as estimates, using the Spearman–Brown prophecy formula, of what the full scales' reliability would be if they were shortened to 15 items. The full scales had higher alpha values than the short forms, which is not surprising because they have at least twice as many items. The short forms, however, had higher alpha values than would be predicted by the Spearman–Brown formula, which suggests that they retained the relatively more effective items from the full scales.

Table 2. Coefficient alphas for original scale scores, scale scores based on estimates with Spearman–Brown prophecy, and shortened scale scores.

	Original Scale: Alpha	Spearman-Brown Expected Alpha	Short Form: Alpha	Short Form: CFA Alpha
Magical Ideation	.84	.72	.74	.85
Perceptual Aberration	.88	.76	.83	.94
Social Anhedonia	.84	.67	.75	.88
Physical Anhedonia	.84	.57	.62	.82

Note. The column “Original Scale” contains the Coefficient Alpha score reliabilities of the Wisconsin Schizotypy Scales in their original form; “Spearman–Brown” contains predicted score reliabilities for 15 items; “Short Form: Alpha” contains the reliabilities calculated based on the 15-item short forms; “Short Form: CFA Alpha” corrects for the binary nature of data by estimating alpha via categorical CFA models.

One limitation of these estimates is that they presume continuous variables. Cronbach's alpha is biased downward when the items are categorical, particularly when many items have low endorsement rates and when there are only two categories ([Bandalos and Enders, 1996], [Lissitz and Green, 1975] and [Liu et al., 2010]). Both of these conditions are true of the present items, so we would expect significant downward bias. One correction method is to estimate Cronbach's alpha from a confirmatory factor analysis with binary indicators (see [Drewes, 2000] and [Hancock and Mueller, 2001]). These estimates are presented in the CFA Alpha column. Consistent with the Monte Carlo evidence, accounting for the binary scaling increased the estimated alpha values.

3.3. Relations with other constructs

[Table 3](#) displays the Pearson correlations between the short forms and other constructs. Because of the large sample size, these coefficients should be interpreted in terms of effect sizes rather than significance levels. Scores for positive symptom schizotypy were formed by averaging the magical ideation and perceptual aberration scores; scores for negative symptom schizotypy were formed by averaging the social anhedonia and physical anhedonia scores. The positive and

negative symptom dimensions correlated modestly ($r = .13$), consistent with past work on the full scales (Kwapil et al., 2008). The pattern of relations mirrors past work with the full scales. The positive symptom dimension had strong relations with affective dysregulation symptoms, such as anxiety, and with markers of approach-oriented traits, such as curiosity, sensation seeking, and hypomania. The negative symptom dimension, in contrast, had negative relations with curiosity, sensation seeking and hypomania, and strong negative relations with emotionality and extraversion, consistent with the anhedonic and asocial character of negative symptom schizotypy.

Table 3. Pearson correlations between the short forms scales and other constructs.

	Magical Ideation	Perceptual Aberration	Social Anhedonia	Physical Anhedonia	Positive Symptom Dimension	Negative Symptom Dimension
DASS Depression	.24	.25	.26	.09	.27	.24
DASS Anxiety	.30	.32	.20	-.03	.35	.13
SIAS Social Anxiety	.23	.23	.38	.10	.26	.32
Sensation Seeking	.26	.20	-.15	-.17	.26	-.20
Curiosity	.14	.07	-.17	-.21	.12	-.24
Hypomania	.40	.27	.00	-.10	.38	-.06
Honesty–Humility	-.17	-.10	-.06	-.14	-.15	-.12
Emotionality	.08	-.01	-.07	-.11	.05	-.11
Extraversion	-.09	-.15	-.38	-.19	-.13	-.37
Agreeableness	-.07	-.07	-.18	-.15	-.08	-.21
Conscientiousness	-.12	-.15	-.07	-.10	-.15	.10
Openness to Experience	.10	.08	-.03	-.27	.10	-.17

Note. $n = 1144$.

Although certainly preliminary, the evidence for the score validity of the short forms of the Wisconsin Schizotypy Scales suggests that they deserve attention in future work. Given the length of the original scales and the extensive DIF in some of them (Winterstein et al., in press), it is worthwhile for future work to pursue refined and abbreviated versions of the full scales. The present short forms are a first step in that direction. They are considerably shorter, at least half the length of the originals, and they appear to mirror findings from past work with the full scales. We thus encourage researchers seeking brief measures of schizotypy to use and evaluate these short forms.

One particularly useful direction for future research would be to evaluate the Wisconsin short scales in light of other brief measures of schizotypy, such as the SPQ-B (Raine & Benishay,

1995) and the short form of the O-LIFE (Mason, Linney, & Claridge, 2005). These scales vary in their factor structures and length, and a comparative psychometric evaluation would be valuable for researchers interested in a brief assessment of schizotypy. In addition, the present work provided early evidence concerning relations with other constructs, but this only scratches the surface concerning evidence for convergent and discriminant validity.

Appendix A

Items for the short forms of the Wisconsin Schizotypy Scales.

A.1. The Magical Ideation Scale

1. I have felt that there were messages for me in the way things were arranged, like in a store window.
2. I have occasionally had the silly feeling that a TV or radio broadcaster knew I was listening to him.
3. I have noticed sounds on my records that are not there at other times.
4. I have had the momentary feeling that someone's place has been taken by a look-alike.
5. At times I perform certain little rituals to ward off negative influences.
6. I have sometimes felt that strangers were reading my mind.
7. If reincarnation were true, it would explain some unusual experiences I have had.
8. I have sometimes had the passing thought that strangers are in love with me.
9. The hand motions that strangers make seem to influence me at times.
10. I have sometimes been fearful of stepping on sidewalk cracks.
11. Numbers like 13 and 7 have no special powers.
12. I have had the momentary feeling that I might not be human.
13. I think I could learn to read others' minds if I wanted to.
14. Horoscopes are right too often for it to be a coincidence.
15. I have worried that people on other planets may be influencing what happens on Earth.

A.2. Perceptual Aberration Scale

1. Occasionally it has seemed as if my body had taken on the appearance of another person's body.
2. I have sometimes felt confused as to whether my body was really my own.
3. I have sometimes had the feeling that my body is decaying inside.
4. Sometimes I have felt that I could not distinguish my body from other objects around me.
5. I have felt that something outside my body was a part of my body.
6. Sometimes I have had feelings that I am united with an object near me.
7. Sometimes I have had a passing thought that some part of my body was rotting away.
8. I have sometimes felt that some part of my body no longer belongs to me.
9. I can remember when it seemed as though one of my limbs took on an unusual shape.
10. I sometimes have to touch myself to make sure I'm still there.
11. I have sometimes had the feeling that one of my arms or legs is disconnected from the rest of my body.
12. I have had the momentary feeling that my body has become misshapen.
13. Sometimes I feel like everything around me is tilting.
14. Parts of my body occasionally seem dead or unreal.
15. At times I have wondered if my body was really my own.

A.3. Revised Social Anhedonia Scale

1. Having close friends is not as important as many people say.
2. I never had really close friends in high school.
3. I prefer watching television to going out with other people.

4. Just being with friends can make me feel really good.
5. I'm much too independent to really get involved with other people.
6. I prefer hobbies and leisure activities that do not involve other people.
7. I don't really feel very close to my friends.
8. People who try to get to know me better usually give up after awhile.
9. Knowing that I have friends who care about me gives me a sense of security.
10. People are usually better off if they stay aloof from emotional involvements with most others.
11. If given the choice, I would much rather be with others than be alone.
12. Although there are things that I enjoy doing by myself, I usually seem to have more fun when I do things with other people.
13. I feel pleased and gratified as I learn more and more about the emotional life of my friends.
14. When things are going really good for my close friends, it makes me feel good too.
15. Making new friends isn't worth the energy it takes.

A.4. Physical Anhedonia Scale

1. I have often found walks to be relaxing and enjoyable.
2. A brisk walk has sometimes made me feel good all over.
3. The sound of the rain falling on the roof has made me feel snug and secure.
4. After a busy day, a slow walk has often felt relaxing.
5. The beauty of sunsets is greatly overrated.
6. The sound of rustling leaves has never much pleased me.
7. It has often felt good to massage my muscles when they are tired or sore.

8. Flowers aren't as beautiful as many people claim.
9. I like playing with and petting soft little kittens or puppies.
10. I don't understand why people enjoy looking at the stars at night.
11. When I'm feeling a little sad, singing has often made me feel happier
12. Beautiful scenery has been a great delight to me.
13. The first winter snowfall has often looked pretty to me.
14. A good soap lather when I'm bathing has sometimes soothed and refreshed me.
15. Standing on a high place and looking out over the view is very exciting.

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