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Exploring the Role of Social Anhedonia in the Positive and Negative Dimensions of Schizotypy in a Non-Clinical Sample

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ABSTRACT

Introduction: The present study aimed to investigate the role of social anhedonia, defined as the lack of ability to feel pleasure from interpersonal relationship, in a multidimensional model of schizotypy and to determine the psychometric properties of the Turkish version of Chapman's Revised Social Anhedonia Scale (SAS) in a non-clinical sample.

Methods: Second-grade students of Ankara University Medical Faculty were recruited (n=266, Mage=20.28). Confirmatory factor analysis was performed to test schizotypy dimensions. The Cronbach's alpha internal consistency value, test–retest reliability and congruent validity of SAS were calculated.

Results: The model in which social anhedonia was allowed to load on both schizotypy dimensions fit the data set better than the model in which social anhedonia was allowed to load on negative dimension alone. The internal consistency assessed with Cronbach's alpha was .84, test–retest reliability was r=.76 and the congruent validity of SAS was r=.55.

Conclusion: The results of current study were consistent with those of earlier studies showing that social anhedonia was related to both schizotypy dimensions. Furthermore, the psychometric properties of the Turkish Version of SAS revealed that it is a reliable and valid measurement to assess social anhedonia in a non-clinical population.

Keywords: Social anhedonia, schizotypy dimensions, reliability, validity

INTRODUCTION

The term "schizotypy," which was first used by Rado, describes schizophrenia-like symptoms in people who do not develop schizophrenia (1). The North American approach pioneered by Meehl emphasizes a neurodevelopmental disorder in the framework of stress–diathesis model, where approximately 10% of schizotaxic individuals who are genetically susceptible may develop schizophrenia if they suffer environmental trauma but will only have schizotypal features if they are not traumatized (2,3,4). The notion that schizotypy and schizophrenia have similar clinical profiles have resulted in the adaptation of schizophrenia dimensions to studies aiming to define and quantify schizotypal features. The study of the multidimensional structure of schizotypal features was expected to support us in understanding the etiology of schizophrenia spectrum disorders but the results turned out to be diverse in the number and contents of these dimensions (5). Reviewing factor analytic studies assessing the multidimensional structure of schizotypy in healthy subjects, Vollema and van den Bosch (6) reported that in most studies, schizotypy was reported as a structure with 3 or 4 dimensions: first, *the positive dimension* with perceptual aberration and magical ideation and the second, *the negative dimension* with social withdrawal and social–physical anhedonia. The other 2 dimensions, though having lower levels of structural validity, are reported as *nonconformity* including impulsivity, eccentric behavior and atypical asocial thoughts and *social anxiety/cognitive disorganization.*

Negative schizotypy seems to have an advantage over other dimensions with the propensity to be seen together with other supposed genetic markers and ability to predict clinical psychosis (7,8). Accepted as one of the essential symptoms of schizophrenia by Bleuler and Kraepelin, anhedonia can be defined as the inability to derive pleasure from pleasurable activities (9,10). *Physical anhedonia* denotes inability to derive pleasure from physical experiences such as eating, touching, sexual activity, warmness, movement, smell, or sound, whereas *social anhedonia* is related to interpersonal relations (11). There are some studies supporting Rado and Meehl in that social anhedonia has a central importance in the development of schizotypy as well as schizophrenia and schizophrenia spectrum disorders (1,2,4). In family studies, social anhedonia was more frequent in relatives of schizophrenia patients (12) and could differentiate relatives of schizophrenia patients' from the relatives of patients with affective psychosis (13). Assessing this relationship the other way around, cluster A personality disorders (schizoid, schizotypal and paranoid) are reported to be 2 times more frequent in the families of socially anhedonic subjects compared with control families (14) and mothers of anhedonic subjects more frequently display *interpersonal eccentric behaviors* in comparison with control subjects families (15). Twin studies indicate a specific, medium-level heritability (H^2=.32–.67)

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for social anhedonia (15). Besides family studies, both cross-sectional and longitudinal community studies have reported that persons with higher levels of social anhedonia also have higher levels of psychosis-like experiences (16,17,18). Similar to schizophrenia patients, subjects with high social anhedonia levels have displayed deficits in visuospatial memory and low scores on working memory (19,20).

As stated before, schizotypy represents a group of clinical features with multiple factors. This is one of the reasons why studies assessing the comparability of assessment questionnaires have given valuable results.

Wisconsin Schizotypy Scales

Wisconsin Schizotypy Scales, developed by Chapman based on Meehl's concept of schizotypy (21), are considered as "psychosis proneness" scales and schizotypal traits are assessed in 4 different scales. These are the Magical Ideation Scale (MIS), Perceptual Aberration Scale (PAS), Physical Anhedonia Scale (PhAS) and Social Anhedonia Scale (SAS). Wisconsin Schizotypy Scales on anhedonia, even though they may be considered a little "old" in terms of content validity, can be accepted as the leading scales for the evaluation of anhedonia (22). SA scores at the beginning of the follow-up were associated with incident psychosis in the 10-year follow-up period in both Chapman's first study (23) and Kwapil's replication study (24). SAS was instrumental in both case-control discrimination and prediction of clinical psychosis in Miettunen et al.,'s birth cohort of 4926 persons, whereas the Hypomanic Personality Questionnaire had the best performance in cross-sectional case-control discrimination and PAS in predicting hospitalization for psychosis. Studies examining the relationship between different Wisconsin scales report PhAS to have a positive correlation with SAS and negative or no correlation with others (21) and report MIS and PAS to be the most closely related scales. In addition, SAS is reported to be related to PAS and MIS and most strongly to PhAS (25). Studies assessing the relationship of SAS with negative and positive dimensions report a better explanation power for the models representing both positive and negative dimensions than for those representing the negative dimension only (5,26). Almost all studies mentioned above were conducted in Western countries. Experiences that individuals find pleasurable may show large differences between cultures; thus, the present study aimed to investigate the role of social anhedonia in a multidimensional model of schizotypy and to determine the psychometric properties of the Turkish version of Chapman's Revised SAS) in a non-clinical Turkish sample.

METHODS

Participants

Second-year medical students from Ankara University School of Medicine participated in the study (n=266, 54.5% females) after the approval of Ankara University Ethics Committee. The mean age of the participants was 20.28±1.02 years (range=18–24 years). The mean age difference between females (20.21±1.01 years, range=18–24 years) and males (20.36±1.01 years, range=19–24 years) was not significant. They were informed about the study via oral and written forms and provided informed consent. The participants completed the survey package in one session in small groups. Participation in the study was voluntary and the participants did not get any financial compensation or extra credit for participation. Of the participants, 91 (50 females) completed the same questionnaires 3 weeks after their first sessions. The mean age of the retest sample was 19.2 years. The mean age of the large sample (20.28 years) was higher than that of the retest group (19.23 years), [$t(264)=-4.52$, $p<.001$], whereas there was no difference in gender distribution between the samples [$\chi^2(df=1, n=266)=.010$, $p=.918$].

Measurements

Demographic information form: Age, gender and grade information of the participants were obtained by the demographic information form.

Magical Ideation Scale: A 30-item MIS of Eckblad and Chapman was used to measure magical thoughts of the participants. The participants responded as "Yes" or "No" to the statements in all Wisconsin Schizotypy Scales (27). The internal consistency (Cronbach's alpha=.78) and test–retest reliability (r=.84) of the scale was sufficient (28).

Perceptual Aberration Scale: The scale was constituted by Chapman et al. (29) and consisted of 35 items. The Turkish version indicated adequate reliability characteristics (Cronbach's alpha=.90, retest reliability r=.60) (30).

Physical Anhedonia Scale: A 50-item version (Turkish version) of the original 61 items was used in this study (11). Cronbach's alpha was found to be .84 and the retest reliability was .60 in the Turkish version (31).

Revised Social Anhedonia Scale: The scale was developed by Chapman, Chapman and Raulin (11) with 48 items to assess social pleasure and anxiety. Then, items that refer to social anxiety and avoidant behavior were replaced with schizotypal avoidance statements to increase the scale's predictive power for psychosis (32). Psychometric properties of the final version with 40 items were tested by Mishlove and Chapman (33). SAS was translated to Turkish by the authors of this study and back translation to English by a native speaker (see Appendix 1 for the Turkish version of the scale).

Four scales (with 155 items) were applied to the participants because presenting Wisconsin Schizotypy Scales alone can increase motivations toward hiding symptoms (34). The scales were randomly arranged into a different form to change their order.

Statistical Analysis

Statistical Package for the Social Sciences (SPSS Inc., New York, USA) (35) and student version of LISREL 8.80 (36) were used to analyze the data. A series of independent sample t-tests were conducted to determine the mean gender differences in Wisconsin Schizotypy Scales. Simple regression analysis was performed to investigate the predictive role of age on schizotypy. Pearson's correlation analyses were conducted to test the congruent validity of SAS and relationships between all scales. The internal consistency of SAS was tested via Cronbach's alpha scores; factor loadings of items for 1 factor were also stated. Confirmatory factor analysis (CFA) was performed to investigate the place of the scales among positive and negative schizotypy dimensions. Some commonly used goodness-of-fit indices were investigated to specify the fitness of the proposed model. In particular, the chi-square goodness-of-fit, RMSEA, NNFI, CFI, GFI and AGFI parameters were examined to determine model fit. The significance of these indices was evaluated according to the values compiled by Sümer in the "Structural Equation Modeling" article (37). Considering that there is a high probability to get a significant chi-square value in large samples because of larger degrees of freedom, non-significance of the chi-square value of the models was not examined. Instead, the chi-square to degrees of freedom ratio was

expected to be below 3. In addition, any RMSEA value below 0.05 was evaluated as a perfect fit and scores up to .08 were considered as criteria for moderate fit. Finally, estimated parameters between .90 and .95 for the rest of fit indices were considered as criteria considering the sample size and complexity of the model.

RESULTS

Effects of Demographics on Wisconsin Schizotypy Scales

Statistically significant gender difference were found in social [$t(264)=-3.75$, $p<.001$] and physical [$t(264)=-4.60$, $p<.001$] anhedonia. In both dimensions, males ($m_{sa}=10.61$, $m_{pha}=15.31$) got higher scores than females ($m_{sa}=8.02$, $m_{pha}=11.73$).

Among all Wisconsin scales, age was significantly associated with PAS scores and 2% variance in PAS was accounted for by the age of the participants [$F_{pa}(1.264)=4.30$, $p=.04$] [$\beta_{pa}(264)=-.13$, $t=-2.07$, $p=.04$]. The results implied that PAS scores decreased by the age of the participants.

Psychometric Properties of the Turkish Version of Revised SAS

Validity analyses

SAS scores were positively correlated with PhAS scores ($r=.55$, $p<.001$), which provided evidence for the congruent validity of the scale (Table 1 for correlations with other scales).

Reliability analyses

The mean score of SAS in the retest sample was 9.74±6.43 (range: 1–34). There was no gender difference. The correlation ($r=.76$, $p<.001$) between scores obtained from the first and second survey showed that the scale had good test–retest reliability.

The internal consistency of the scale was measured using Cronbach's alpha values and was found to be .82 for the entire sample, .78 for females and .83 for males. Nonetheless, the 4th, 19th, 24th, 27th and 30th items had low item–total correlation values ($r<.14$). Although the 19th item was one of the reverse-coded items in the scale, it showed a positive correlation with total scores only for females, whereas for both males and entire sample, this relationship was in the opposite direction. Thus, the 19th item was associated with social anhedonia characteristics in females more than that in males. Furthermore, when all items were forced to one factor, the 4th, 19th, 24th and 27th items had low factor loadings (ranging from .04 to .11). These items were considered as unrelated to the whole scale and insufficient to measure social anhedonia in this sample. After removing these 4 items, Cronbach's alpha value of the scale increased to .84 for the entire sample and males and .81 for the females.

Investigating the responses to all items revealed that the 4th, 10th, 13th and 27th items were rated toward social anhedonia (55%, 52%, 53% and 74%, respectively). Considering the reasons depicted in Table 2, the 10th and 13th items were not removed from the scale but were evaluated as low functioning items.

Social Anhedonia and Schizotypy Dimensions

CFA was performed to test whether social anhedonia can be classified under positive or negative schizotypy dimensions. Each scale was divided into 3 parcels, because using 155 items in the analysis at once would increase the error variance of the model. To parcel the scales, the factor loadings of each item for one factor were estimated and items that had equal or similar loadings were distributed among each parcel (38). Cronbach's alpha value of each parcel ranged from .51 to .73 and their mean values were between 1.96 and 4.76.

Table 1. Correlations between all scales and internal consistency values

	SAS	PAS	MIS	PhAS
SAS	.84	.37**	.23**	.55**
PAS		.90	.60**	.15*
MIS			.82	-.03
PhAS				.82

*p<0.05, **p<0.001. The values represent Cronbach's alpha. SAS: revised Social Anhedonia Scale; PAS: Perceptual Aberration Scale; MIS: Magical Ideation Scale; PhAS: Physical Anhedonia Scale

Multidimensional structure of schizotypy was tested across 2 different models. In the first model, schizotypy was allowed to be represented only with a negative dimension, whereas in the second model, it was allowed to load on both positive and negative dimensions. Modification indices revealed that the error between the first and second parcels of PhAS and each parcel of MIS could covariate. The correlation with the first and second parcels of the PAS was higher ($r=.64$) than that with the third parcel, which mostly comprised sexuality items. Thus, this difference was probably a result of the parceling process. Furthermore, the reason for higher error correlations in MIS was believed to be the scale's low reliability and validity characteristics. Thus, these error covariances were added into the model in order. After adding each covariance, the fitness of the model improved significantly. Examining chi-square differences between the 2 models with 4 error covariances, the model in which social anhedonia was allowed to load on both schizotypy dimensions (Model 2) fitted the data better than the model in which it was allowed to load only on the negative dimension (Model 1) [$\Delta\chi^2(\Delta df=3, n=266)=13.54$, $p<.01$]. The chi-square to its degrees of freedom ratio in Model 2 was below 3 and its RMSEA value was less than .08. As indicated in Table 3, other fit indices were between .90 and .95. Thus, Model 2 with 4 error covariances had good fit indices and was better than Model-1. Standardized beta coefficients among parcels ranged from .20 to .24 for social anhedonia in the negative schizotypy dimension and from .69 to .75 in the positive dimension. Furthermore, standardized beta coefficients ranged from .81 to .82 for PAS, .53 to .56 for MIS and .48 to .61 for PhAS (Figure 1).

DISCUSSION

Social Anhedonia: Positive and Negative Schizotypy

Dimensional approach is one of the most suitable methods for understanding schizophrenia, which is a heterogeneous disorder and has an important impact. In this study, we first aimed to investigate the role of social anhedonia across different schizotypy dimensions. Social anhedonia was measured using revised SAS, which is one of the Wisconsin Schizotypy Scales. It was developed by Chapman and his colleagues to measure the risk of psychosis among normal population. The results were consistent with the findings of previous studies (5,25,26) and revealed that SAS scores were positively associated with other scales in the positive dimension of schizotypy. In addition, the results of CFA showed that the model in which social anhedonia was allowed to load

Table 2. Low functioning items in the Turkish version of the revised Social Anhedonia Scale

Item		Justification
*4.	A car ride is much more enjoyable if someone is with me.	A+B
10.	People sometimes think that I am shy when I really just want to be left alone	B
13.	My emotional responses seem very different from those of other people.	B
*19.	Knowing that I have friends who care about me gives me a sense of security.	A
*24.	I feel pleased and gratified as I learn more and more about the emotional life of my friends.	A
27.	I am usually content to just sit alone thinking and daydreaming.	A+B
30.	It made me sad to see all my high school friends go their separate ways when high school was over.	A

A: Low item–total correlation (<0.14), B: Items were rated by most of the participants with tendency toward social anhedonia. *reverse-coded items

Table 3. Alternative models for the multidimensional structure of Wisconsin Schizotypy Scales

	χ^2	SD	χ^2/df	RMSEA	GFI	AGFI	CFI	NNFI
1. Social anhedonia: negative schizotypy	118.96	49	2.43	.07	.93	.89	.95	.94
2. Social anhedonia: positive–negative schizotypy	105.42	46	2.29	.07	.94	.90	.96	.94

SD: standard deviation; RMSEA: root mean square error of approximation; NNFI: non-normed fit index; CFI: confirmatory fit index; GFI: goodness-of-fit index; AGFI: adjusted goodness-of-fit index

on both schizotypy dimensions fitted the data better than the model in which it was allowed to load only on the negative dimension. These findings indicated that social anhedonic characteristics were associated with both dimensions of the schizotypy. Because SAS was created to measure social withdrawal, its link to positive schizotypy is worthy of discussion.

First, loading of social anhedonia on both negative and positive dimensions of schizotypy was an unexpected result and was considered to be a methodological problem (5). However, Lewandowski et al argued that these findings resulted from the nature of the social anhedonia items, as they correspond not only to social withdrawal but also to social anxiety and discomfort (26). They suggested that these additional characteristics could be related to "affect regulation," which is associated with positive schizotypal properties. Their suggestion is consistent with Meehl's empirically supported idea that social anhedonia has a central role in development of schizotypy (12,13,39). The findings of this study confirmed the association of social anhedonia with both dimensions of schizotypy in our culture, supported its universality and undermined the methodological problems. Furthermore, this evidence may be associated with the multidimensional structure of social anhedonia.

Revised Social Anhedonia Scale

The psychometric properties of SAS revealed a high internal consistency (Cronbach's alpha value=.84) and good test–retest reliability (r=.55). Its negative association with PhAS evidenced congruent validity. These results suggest that the Turkish version of SAS is a reliable and valid scale to assess social anhedonia in Medical students.

The lowest score above the 1.96 standard deviation over the mean was estimated as the cut-off point for SAS (for 40 items). It was 25.11 for males, 20.11 for females and 22.71 for the entire sample. It was 28 for males and 20 for females in a US study (34). The difference in the cut-off points for males could be related to restrictions in the cultural adaption of the translated items and the culture specific nature of social abilities.

For the effects of demographics, Cronbach's alpha values for each gender were consistent with those in the original study (28). In parallel with a previous study (30), male participants reported higher scores for both social and physical anhedonia. These findings can be associated with the relatively higher risk of negative symptoms in males (40). Within the context of Turkish culture, this result may also be related to the gender roles in society, where it is easier for women than men to express their pleasure and feelings.

In the Turkish version of SAS, 7 items were considered as low functioning because they may be less understood or did not correspond to social anhedonia in the Turkish student sample. In addition, analyses were performed after omitting the 4th, 19th, 24th and 27th items, which were not loaded on to social anhedonia factor. However, because this adaptation study did not include a patient group with higher levels of social anhedonia and was not a population-based study, these items were retained in the final version of SAS. Clinicians should be mindful of these low functioning items when using SAS in their research and clinical practice.

Previous studies have found strongest associations between PAS and MIS (21). Moreover, PAS was strongly associated with and representative of the positive dimension of schizotypy. Nonetheless, different from previous findings, PhAS was positively correlated with PAS in this study. The reason for this result can be the increased functioning of PhAS after omission of 11 items in the Turkish version (31). Moreover, deep examination of the PAS and PhAS items revealed that the face validity of these 2 scales may be increased because of PAS items including "my body" expression, which can resemble physical anhedonia items in general. Finally, this result can also be explained by cultural differences in the expression of physical anhedonia.

The study had several limitations. First, the sample was not representative of the entire population with its higher education and income level and general political orientations, although university students are considered as a risk population for developing psychosis (which is one of the strengths of the study) (40). Second, the data used in the adaptation study of SAS was also used to investigate the role of social anhedonia in schizotypy dimensions. The structure of items before the cultural adaptation study may have affected the relationship between social anhedonia and schizotypy. However, still there is chance to associate constructs if they are irrelevant in reality. Third, although SAS is not a diagnostic scale, future studies should include a representative sample for social anhedonia to determine the criterion-related validity of the scale. Therefore, interpreting the results of this study with regard to age group and education level is highly recommended.

In conclusion, although previous studies have explored the multi-dimensional facets of schizotypy in different cultures, this study was the first to

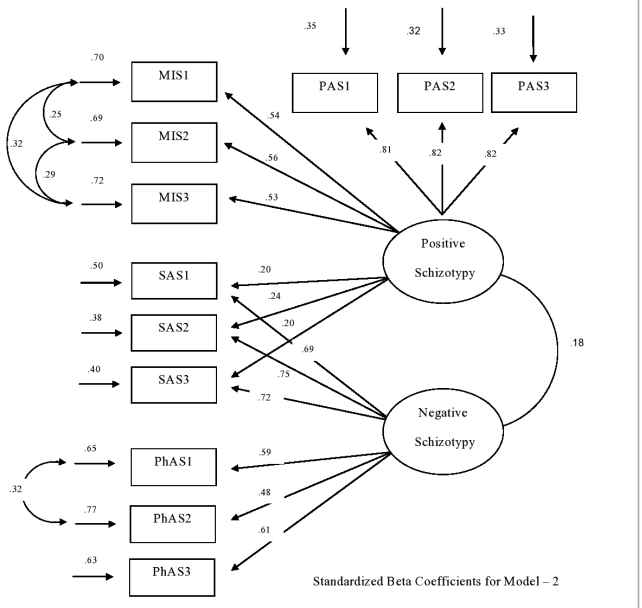

Figure 1. The Model of Social Anhedonia with Positive and Negative Schizotypy
SAS: Revised Social Anhedonia Scale, PAS: Perceptual Aberration Scale, MIS: Magical Idetaion Scale, PhAS: Phvical Anhedonia Scale

be conducted in Turkish culture. In this context, it was interesting to represent social anhedonia with both positive and negative schizotypy parallel to previous studies. Similarly, how much pleasure would be experienced from social activities can be transferred through social learning in a culture. Consequently, our results support the idea that social anhedonia is a crucial factor for schizotypy. Finally, adaption of the widely used SAS into Turkish is an important contribution of this study to Turkish literature.

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Appendix 1: Turkish version of the revised Social Anhedonia Scale

Revised Social Anhedonia Scale		
Select "yes" or "no" depending on whether the statements are appropriate to you. There are no true or false answers.		
1. Having close friends is not as important as many people say.	Yes	No
2. I attach very little importance to having close friends.	Yes	No
3. I prefer watching television to going out with other people.	Yes	No
4. A car ride is much more enjoyable if someone is with me.	Yes	No
5. I like to make long distance phone calls to friends and relatives.	Yes	No
6. Playing with children is a real chore.	Yes	No
7. I have always enjoyed looking at photographs of friends.	Yes	No
8. Although there are things that I enjoy doing by myself, I usually seem to have more fun when I do things with other people.	Yes	No
9. I sometimes become deeply attached to people I spend a lot of time with.	Yes	No
10. People sometimes think that I am shy when I really just want to be left alone.	Yes	No
11. When things are going really good for my close friends, it makes me feel good too.	Yes	No
12. When someone close to me is depressed, it brings me down also.	Yes	No
13. My emotional responses seem very different from those of other people	Yes	No
14. When I am alone, I often resent people telephoning me or knocking on my door.	Yes	No
15. Just being with friends can make me feel really good.	Yes	No
16. When things are bothering me, I like to talk to other people about it.	Yes	No
17. I prefer hobbies and leisure activi¬ties that do not involve other people.	Yes	No
18. It is fun to sing with other people.	Yes	No
19. Knowing that I have friends who care about me gives me a sense of security.	Yes	No
20. When I move to a new city, I feel a strong need to make new friends.	Yes	No
21. People are usually better off if they stay aloof from emotional involvements with most others.	Yes	No
22. Although I know I should have affection for certain people, I don't really feel it.	Yes	No
23. People often expect me to spend more time talking with them than I would like.	Yes	No
24. I feel pleased and gratified as I learn more and more about the emotional life of my friends.	Yes	No
25. When others try to tell me about their problems and hang-ups, I usually listen with interest and attention.	Yes	No
26. I never had really close friends in high school.	Yes	No
27. I am usually content to just sit alone, thinking and daydreaming.	Yes	No
28. I am much too independent to really get involved with other people.	Yes	No
29. There are few things more tiring than to have a long, personal discussion with someone.	Yes	No
30. It made me sad to see all my high school friends go their separate ways when high school was over.	Yes	No
31. I have often found it hard to resist talking to a good friend, even when I have other things to do.	Yes	No
32. Making new friends isn't worth the energy it takes.	Yes	No
33. There are things that are more important to me than privacy.	Yes	No
34. People who try to get to know me better usually give up after a while.	Yes	No
35. I could be happy living all alone in a cabin in the woods or mountains.	Yes	No
36. If given the choice, I would much rather be with others than be alone.	Yes	No
37. I find that people too often assume that their daily activities and opinions will be interesting to me.	Yes	No
38. I don't really feel very close to my friends.	Yes	No
39. My relationships with other people never get very intense.	Yes	No
40. In many ways, I prefer the company of pets to the company of people.	Yes	No