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Is High Schizotypy Associated with Impaired Use of Temporal Predictability in the Build-up of Auditory Grouping?

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Abstract

High schizotypy has been shown to correlate with attenuated EEG responses to violations of expectancy, mirroring neuronal differences in predictive processing in schizophrenia. However, evidence for an association between auditory prediction in mismatch negativity (MMN) studies and schizotypy is inconsistent. Following recent evidence of reduced MMN specifically to frequency deviants in high schizotypy (Bissonnette et al., 2024), we theorised an impaired use of temporal predictability in the build-up of auditory grouping (tone detection).

In a paradigm modified for online use from Sollini et al. (2022), auditory detection thresholds (ADT) for an embedded target tone were tested in an adaptive-staircase design. A background (300ms) of regular tone pips (≈ 20Hz) was preceded by a 500ms regular (predictable) or jittered (unpredictable) primer, or presented in a control condition (neutral) without precursor. Participants (N=459, 330F and 126M, 18-40yrs) also completed the O-LIFE questionnaire (Mason & Claridge, 2006) and were allocated to schizotypy groups (high, medium, low) for each of the factor-derived subscales – Unusual Experiences (UnEx), Cognitive Disorganisation (CogDis), Introvertive Anhedonia (IntAn), and Impulsive Nonconformity (ImpNon).

A large main effect of the prediction condition was found, as well as a significant overall difference between men and women, with men showing lower (better) ADT. The high UnEx and ImpNon groups scored worse overall in ADT, with the effect in the high UnEx being driven specifically by the male group. Our main hypothesis for reduced gain from predictability in the high schizotypy groups was refuted in three-way mixed ANOVAs revealing no interaction between prediction condition and schizotypy category, for any of the schizotypy subscales. This finding was further corroborated in a direct correlation analysis between raw schizotypy scores and predictability benefit. Our analysis points to a dissociation between previous observations of neuronal MMNs and active perception and processing in the click-fusion boundary timescales.

Keywords: Schizotypy, Temporal Predictability, Auditory Grouping, Detection Thresholds

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List of Abbreviations

ADT	Auditory Detection Threshold
ANOVA	Analysis of Variance
ASSR	Auditory Steady-State Responses
CI	Confidence Interval
CogDis	Cognitive Disorganisation (O-LIFE subscale)
dB	Decibel
EEG	Electroencephalography
Hz	Hertz
ImpNon	Impulsive Nonconformity (O-LIFE subscale)
IntAn	Introvertive Anhedonia (O-LIFE subscale)
ISI	Inter-Stimulus Interval
MEG	Magnetoencephalography
MMN	Mismatch Negativity
MSE	Mean Square Error
NMDA	N-Methyl-D-Aspartate (receptor)
O-LIFE	Oxford-Liverpool Inventory of Feelings and Experiences
RPS	Research Participation Scheme (University of Nottingham)
SD	Standard Deviation
SE	Standard Error
SNR	Signal-to-Noise Ratio
SPL	Sound Pressure Level
SPSS	Statistical Package for the Social Sciences
SSQ12	Speech, Spatial, and Qualities of Hearing Scale (short form)
UnEx	Unusual Experiences (O-LIFE subscale)
WEIRD	Western, Educated, Industrialised, Rich, and Democratic

Introduction

Our auditory system actively analyses temporal patterns and regularities in the environment, inferring structure and segregating streams of sounds (Bregman, 1990). Predictability effects are increasingly understood as a crucial cue that can be exploited in making sense of often ambiguous and inherently noisy stimuli (Bendixen, 2014). In predictive coding approaches our "Bayesian" brains are constantly building, and refining, internal models to predict sensory input (Furutachi & Hofer, 2026), allowing us to efficiently manage attentional resources (e.g. Large & Jones, 1999). Debates on the neurophysiology of predictive mechanisms centre on the role of neuronal oscillations – periodic changes in the excitability of neuronal populations (Keitel et al., 2025) – in shaping perception. Sensory entrainment, whereby self-sustained neural oscillations synchronise with external periodicities (Lakatos et al., 2019) has been argued to provide a neurophysiological and mechanistic framework for predictive processing (Clark, 2013).

Auditory Prediction in Schizophrenia

Predictive mechanisms in the brain have been extensively researched in mismatch negativity (MMN) studies, wherein evoked neuronal responses (EEG/MEG) to *oddball* or *deviant* events in an otherwise regular sequence of events are recorded (Garrido et al., 2009; Näätänen et al., 2007). A consistent finding in the literature (see Fong et al., 2020) has been reduced MMN responses to frequency and duration deviants in schizophrenia (Umbricht & Krljes, 2005), correlating with disease severity and cognitive dysfunction (Baldeweg et al., 2004)[1]. Beyond MMN, auditory steady-state evoked potentials (SSEPs) – the brain's ability to entrain its oscillatory activity to rhythmic click trains – are reduced in schizophrenia (see Uhlhaas & Singer, 2010). This has been most consistently reported in auditory steady-state responses in the gamma band (c. 40Hz) (Kwon et al., 1999), but also with lower stimulation frequencies (e.g. 11/22Hz; Brenner et al., 2003).

Most pertinent for the current investigation is a recent MMN study, mirroring the results of neurobiological abnormalities seen in schizophrenia, that reported attenuated MMN responses to frequency and location deviants in non-clinical populations with high schizotypy (Bissonnette et al., 2024). The evidence for a schizotypy-MMN association, however, remains inconsistent. In response to a duration deviant Donaldson et al. (2021) report reduced MMN amplitudes in high schizotypy groups, whereas Broyd et al. (2016) and Bissonnette et al. found no such association. Bissonnette et al. (2024), noting that *specific* sub-traits of schizotypy were *uniquely* related to frequency and location amplitudes in their study, suggest that these reported inconsistencies in the literature may be due to differing tone types and diverse samples.

[1] NMDA hypofunction in schizophrenia has been put forward as a potential neurophysiological account of this association. MMN has been shown to rely on NMDA receptor signalling in monkeys (Javitt et al., 1996) and humans (Umbricht et al., 2000), while pathophysiological theories of schizophrenia stress the function of the NMDA receptor in the plasticity of glutamatergic synapses (Friston, 2005). Although NMDA hypofunction has not been reported in high schizotypy populations, evidence of altered GABA and glutamate metabolite concentrations (Kozhuharova et al., 2021) is suggestive and could motivate future study on NMDA receptor function.

Schizotypy

Whereas schizophrenia constitutes a severe mental illness characterized by positive symptoms (e.g. delusions and hallucinations), negative features (e.g. amotivation, social withdrawal), and cognitive deficits in working memory and executive function (see McCutcheon et al., 2020), schizotypy describes psychotic characteristics as an inherent part of normal human personality variation, with potentially healthy or unhealthy outcomes. Although putatively indicative of a predisposition or liability to psychosis, Mason and Claridge (2006) propose a fully dimensional model of schizotypy, wherein traits are considered as a neutral, and non-clinical source of individual difference (Grant et al., 2018). The Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE) questionnaire was proposed as a self-report measure of schizotypy for use in the non-clinical population (Mason & Claridge, 2006). It describes four independent subscales that were derived from factor analysis, with the authors specifically guarding against summing results into a single score:

> **Unusual Experiences** (UnEx) - perceptual aberrations, magical thinking, hallucination-proneness (positive schizotypy).
> **Cognitive Disorganisation** (CogDis) - poor attention/concentration, social anxiety, indecisiveness.
> **Introvertive Anhedonia** (IntAn) - reduced pleasure from social/physical connection, avoidance of intimacy (negative schizotypy).
> **Impulsive Nonconformity** (ImpNon) - impulsive, antisocial, eccentric forms of behaviour (perhaps indicating a lack of self-control).

Mason & Claridge (2006) reported significant sex differences with males scoring higher on ImpNon (M = 8.55 vs 7.27) and CogDis (M = 10.81 vs 10.14), females scoring higher on IntAn (M = 7.70 vs 6.11), and no significant difference on UnEx. Age differences were also evident with UnEx, CogDis, and ImpNon all correlated negatively with age (r = -.018, -.22, and -.38 respectively), while IntAn associated positively (r = .19). The size of these age correlations was not significantly different for men and women.

Temporal Predictability and Auditory Grouping

Sollini et al. (2022) introduced a novel empirical approach to studying auditory prediction. In contrast to recording neural responses from often passive participants (e.g. MMN), they manipulated temporal predictability and coherence during a build-up period and measured objective adaptive detection thresholds (ADT) to an embedded target tone – acting as an indirect psychophysical index of auditory grouping. Participants were instructed to detect the embedded tone (1kHz, 25ms) within a 300ms window and with a background of regularly spaced (20Hz/50ms) tone pips at 0.25, 0.5, 1, 2, and 4kHz[2]. The use of temporal predictability was manipulated with a 500ms precursor that was either regular (and matched to the subsequent

[2] An inter-stimulus-interval (ISI) of 20Hz sits at the click-fusion boundary range where discrete auditory events stop being heard typically as separate pulses and start fusing into a continuous buzz or low pitch (e.g. Ungan & Yagciioglu, 2014). This marks another departure from the vast majority of MMN-based research which has focused on longer ISIs.

background) or jittered (unpredictable), and coherence was varied in the extent to which the regularity or randomness specifically of the 1 kHz range in the 500ms precursor matched the regularities in the background in the 300ms section[3] (see Methods; Figure 1). Predictability and coherence reduced listener's threshold for detecting the embedded tone, with a substantially larger effect of predictability (9.4 dB vs 3.7dB).

The current study investigated whether the effects of predictability in this paradigm – adapted for online use – are associated with Schizotypy. Are attenuated MMN responses to violations of expectancy in high schizotypy mirrored in an impaired use of temporal predictability in the build-up to an auditory grouping/detection task?

Hypotheses

We expected to replicate the overall main effect of predictability reported in Sollini et al. (2022), and, based on broad sex differences in the auditory system (see Fritzsch, 2020), to find a main effect of sex[4]. Although females typically show heightened sensitivity (Aloufi et al., 2023), males generally perform better on masking and signal-detection tasks (McFadden, 1998), so we expected men to exhibit lower (better) ADT. We also expected to observe higher (worse) ADT in high schizotypy groups due to general associations with cognitive control and executive functioning (Steffens et al., 2018). Considering the evidence for an association between impaired auditory prediction and schizotypy (see above; Bissonnette et al., 2024), our main hypothesis was for a significant interaction between prediction condition and schizotypy in relation to ADT performance reflecting a lower impact of predictability in high schizotypy groups. We further presumed a direct association between raw schizotypy subscales and the amount of benefit gained by predictability in the ADT task. We theorised, in essence, an attenuated use of temporal predictability for participants high in schizotypy in the build-up to auditory grouping, and potentially also less interference from jittered/unpredictable priming if participants are shown overall to perform worse on the ADT task in the unpredictable condition compared to neutral (as was found in Sollini et al., 2022).

[3] A neutral control condition without a precursor was also tested for a total of 5 conditions

[4] As sex differences are also evident in the distribution of schizotypy subscales (Mason & Claridge, 2006; corroborated in our sample set), it was essential to include sex as a factor in our subsequent analysis of interactions between schizotypy and ADT to avoid confounding effects.

Additional Analyses

Music and Prediction

Music is a peculiar case for auditory prediction (Koelsch et al., 2019). Specific features of a musical pulse make it a fascinating area for studying expectancy and temporal perception (Bispham, 2009, 2018, 2021). Musical training has been shown to enhance predictive processing of statistical structure across modalities (Vassena et al., 2016), and via increased anticipatory control in learning sequences (Leow et al., 2026). However, the architecturally significant temporal intervals of a musical beat (c. 100ms – 2000ms; London, 2012) are substantially longer than those considered in this current study. It was therefore of interest to investigate whether training effects of musical experience would transfer to micro-timing and the click-fusion boundary range (c. 20Hz/50ms). The analysis here is admittedly underpowered, specifically in the self-reported 'accomplished musician' group (N=13), and is therefore offered as motivation for future study, rather than confirmatory reasoning.

SSQ12 – Hearing Scale

Participants in our experiment also completed a self-report questionnaire on general hearing capacity – the Speech, Spatial and Qualities of Hearing scale (SSQ12). This was subject to a correlational analysis to confirm that ADT performance in the three auditory prediction conditions was not confounded with reported broader hearing difficulties.

Methods

Participants

We recruited a total of 529 participants prior to the application of exclusion criteria. To avoid confounding issues with hearing impairments and/or a common decline in hearing after 40 (Dawes, 2014) we restricted recruitment to people 18-40 years old with normal hearing.

Exclusions

Participants were excluded if reported age data was invalid (=0)/missing [N=13]); if their stated age exceeded 40 years [N=9]; if they reported hearing difficulties [N=6]; if trials were incomplete [N=14]; and/or if they failed two or more attention check questions in the O-life questionnaire [N=48]. (Two was decided upon to account for the fact that one of the attention check questions proved to be confusing and was answered incorrectly by roughly 2/3 of the participants). There was considerable overlap between categories with some participants excluded on multiple grounds. In total 70 exclusions were applied leaving a total sample for analysis of 459 participants (330 Female, 126 Male, 2 other, and 1 'prefer not to say').

Demographics

Following the above exclusions, demographics for the participants were as follows:
Sex**:** Female 330 (71.9%), Male 126 (27.5%), Other 2 (0.4%), Prefer not to say 1 (0.2%); Age: Mean 21.8, SD 4.6, range 18–40; Musical experience: Little/no experience 310 (67.5%), plays an instrument 136 (29.6%), accomplished musician 13 (2.8%) (For full information [incl. Handedness, Vision, Ethnicity, Education] see Appendix A, Table A1)

Recruitment

Participants were recruited in part through the University of Nottingham's Research Participation Scheme (and could receive course credits for a first-year module) and through Prolific. The majority were invited by successive cohorts of research students at the University of Nottingham. Acquaintances were asked to take part in a study on the relationship between a personality trait (schizotypy) and auditory processing capabilities (rhythm detection). They were directed to sign up and complete the study online at: https://www.nottingham.ac.uk/psychology/research/participate-in-research.aspx#Schizotypyandauditoryrhythmprocessing. Here participants received a study description (see Appendix B) and a direct link to NOTE (Nottingham Online Testing Environment), which included full information and an initial consent form. Following completion of the consent form, participants were provided with a unique participant ID and could continue to the study page. After completing the task, participants were also provided with a debrief (see Appendix C) (see Appendix B, Standard Operating Procedure).

Ethics

Ethical approval was granted by the Psychology Research Ethics Committee (REC) at the University of Nottingham (see Appendix C).

Sample Size

Following Brysbaert (2019), we aimed to achieve 80% power to detect sex differences and differences between schizotypy groups with an effect size of Cohen's D of about 0.5. A required sample size for our study was thus computed with GPower* using 80% power, medium effect (Cohen's d = 0.5), Alpha (significance level) <0.05, of 64 per schizotypy group (see Appendix D, Table D1 and Figure D1for Gpower input/output parameters and a representation of critical t, α, and β for the A Priori Power Analysis). Assuming a normal distribution, as found in Mason and Claridge (2006), of interquartile ranges for the low (25%), medium (50%), and high schizotypy groups (25%) groups we posited a required group size for testing between schizotypy categories of 256 participants (4x64 [as the medium group covers 2 quartiles]). As we wanted to analyse male and female participants separately, we therefore required a total sample size of 512 (equally distributed). Unfortunately, although our sample size for female participants exceeded requirement, we have not reached the desired sample size for male participants (N = 126).

Auditory Rhythm Task

Materials

Participants all used their own equipment (laptop, speakers) and were requested to set up a quiet environment free from distraction. They were also instructed to use the Google Chrome Browser

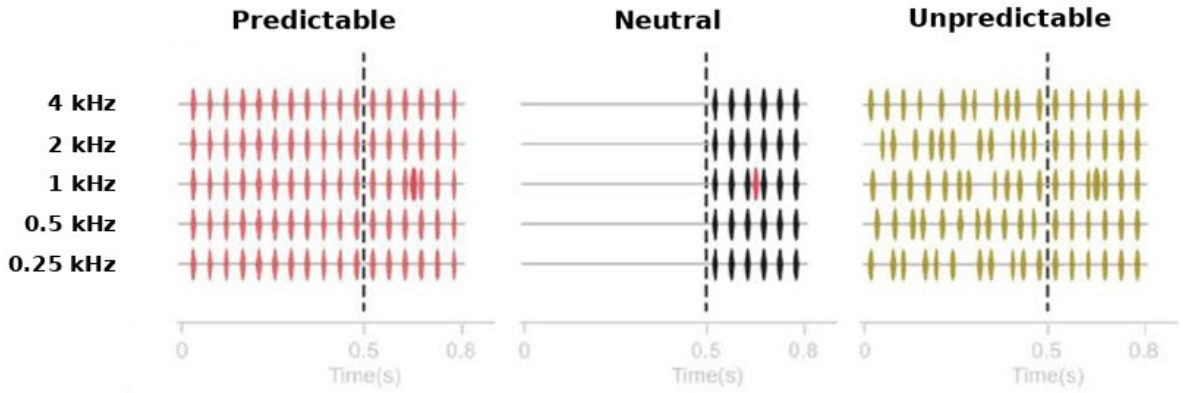
Auditory Stimuli

The auditory stimuli used were adapted for online use from the study by Sollini and colleagues (2022). In that study, participants were tested in-person affording absolute calibration of intensity/sound pressure levels (SPL) - expressed as dB SPL. To accommodate for online experimentation and varying equipment/sound levels these were transformed to signal to noise ratios (SNR) expressing the relationship between target tone and background[5].

In all conditions – predictable, neutral, and unpredictable – participants were required to listen to three sequences and identify which one included an additional short tone (1kHz, 25 ms). In all three conditions the tone was placed within a 300ms window including a background of temporally regular (and synchronous) tone pips at 0.25, 0.5, 1, 2, and 4kHz. The neutral condition contained only this short 300ms section whereas the predictable and unpredictable stimuli included a preceding 500ms in which tone pips at the same frequencies were presented regularly at 20Hz intervals (predictable) or randomly within 12.5Hz limits (unpredictable). This is depicted in diagrammatic form below. All the acoustic stimuli were presented at a 44.1 kHZ sampling rate (44,100 samples per second). This is CD-quality audio and considered standard for auditory tasks in psychological research.

[5] A further difference from Sollini and colleagues (2022) is that, as well as predictability, they also investigated 'coherence' (see Introduction).

Figure 1
Stimuli for the Auditory Task – Three Predictability Conditions



Note: Diagram adapted from Sollini et al. (2022), licensed under CC BY 4.0 (http://creativecommons.org/licenses/by/4.0/). Modified to include only the predictability manipulations and not the additional 1khz coherence conditions (see footnote[1]). The rows represent the five simultaneous frequency components comprising the tone-pip complex. The vertical dashed line (at 0.5s) marks the start of the 300ms timeframe during which the target tone could appear. The thicker pip in the 1kHz row is the added target tone participants were asked to identify.

Each section was structured as a 1-up 3-down adaptive staircase procedure (Levitt, 1971). As such the tone signal started at 40dB signal-to-noise (SNR) ratio and was adjusted with a decrease of 5 dB for a set of three consecutive correct responses and was increased by 5 dB for an incorrect response. We expected participants in this age range to exhibit auditory detection thresholds (ADT) comfortably below 10 DB SNR (e.g. Sollini & Chadderton, 2016), so to gain detailed information (without unnecessarily prolonging the task by implicating finer changes earlier on), once the tone signal had decreased to 10dB SNR, incremental changes (up or down) were reduced to 2dB SNR. Each section lasted until 10 reversals had been triggered (this improves on Sollini et al., 2022 who only used 4, which could increase inter-individual variability), meaning that the total number of trials varied between participants.

Allowing for people to get used to the task/condition, the first two reversals were disregarded in the analysis. ADTs for each participant and for each condition were calculated as the mean stimulus level over the remaining 8 reversals. This well-established design in the psychoacoustics literature converges toward a point on the psychometric function that is approximately 80% correct (i.e. we would expect individuals to give the correct response 80% of the time at their threshold) (Levitt, 1971).

O-Life Questionnaire

Participants completed the Oxford-Liverpool Inventory of Feelings and Experiences questionnaire (O-LIFE; Mason & Claridge, 2006; Mason et al., 1995) comprising 104 questions[6] (see Appendix E), 4 attention-check questions (e.g. ‘To demonstrate your understanding of this part of the experiment, answer no’) and 55 filler questions (e.g. ‘Do you like to tell jokes and funny stories to your friends?’) were also included taking the total to 163 questions. Following the approach taken

[6] This is more comprehensive and was therefore preferred over the sO-Life [short-form version] containing 43 items (Mason et al., 2005; Fonseca-Pedrero et al., 2015).

in, for example, Claridge and Broks (1984 [schizotypal personality scale]) these fillers were added to obscure the central purpose of the questionnaire and/or reduce potential demand characteristics.

The 104 items comprising the O-Life Questionnaire targeted respectively and specifically the four proposed subscales of Schizotypy (see Introduction): All questions were responded to dichotomously (yes/no) scoring +1 for "yes" or 0 for "no" for positive questions and vice versa for negative items (reverse-scored).

Table 1

O-LIFE Subscales, Item Counts, and Example Items

Scale	Items	Example Item
IntAn (Introvertive Anhedonia)	27	Do you prefer watching television to going out with other people?
ImpNon (Impulsive Nonconformity)	23	Do you stop to think things over before doing anything? (scored negatively)
UnEx (Unusual Experiences)	30	Have you ever felt that you have special, almost magical powers?
CogDis (Cognitive Disorganisation)	24	No matter how hard you try to concentrate, do unrelated thoughts creep into your mind?

In accordance with recommendations in the source papers (Mason & Claridge, 2006) against using a single composited total, subscales were summed separately and given individual scores. Internal consistency for the scale has been shown to be high (Mason et al., 1995; see also Rawlings & Freeman, 1997): UnEx a = 0.89; for CogDis a = 0.87; for IntAn = 0.82; and ImpNon a = 0.77. Test-retest reliability was also high (all four scales >0.70) in Burch et al. (1998) and confirmatory factor analysis identified reasonable goodness of fit for the four-factor solution (Mason et al., 1995).

A short form of the Speech, Spatial and Qualities of Hearing scale (SSQ12)

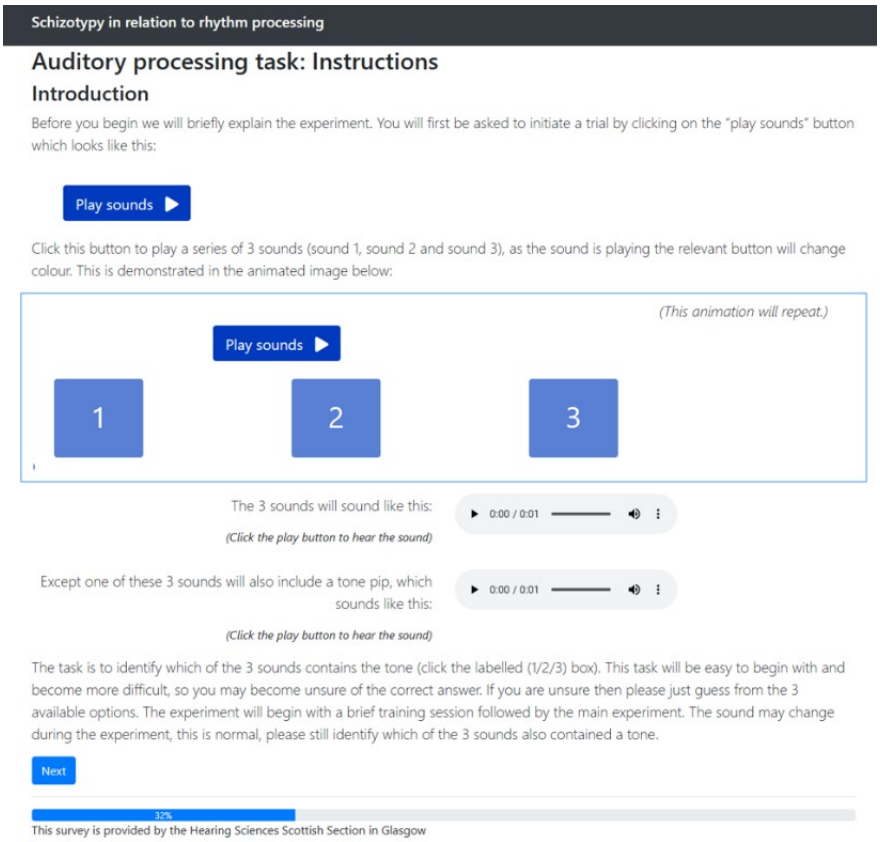
This form (Noble et al., 2013) measures self-reported ability to understand speech under different, complex acoustic conditions; how well a listener can orient themselves and locate acoustic elements in the environment; and the overall clarity of sound and auditory scene analysis (e.g. Bregman, 1990) during daily listening. Participants were required to answer 12 questions related to three distinct subscales – speech (5 items), spatial (3 items), and quality of hearing (4 items) – along a slider from 1 (not at all) to 10 (perfectly) (for example, you are listening to someone talking to you, while at the same time trying to follow the news on TV. Can you follow what both people are saying?) (See Appendix E). These answers were not a principal focus of analysis in this study but were, as a composite score and as separate subscales, subject to correlation analysis with ADT scores on the three auditory prediction conditions. This was run to check for any potential effects of broader hearing capabilities/difficulties and could provide a useful point of comparison and/or potential confound in follow-up studies, which could also extend to analysing correlations with 3 subscales of the SSQ12. For the purposes of this report, however, the SSQ12 data was not further analysed.

Procedure

Participants were directed to the following link Participate in Research – The University of Nottingham, and were given some basic instructions, a consent form to fill in, and a confirmation that they were free to withdraw from the study at any time (see Appendix B, Screenshots 1-6). For the auditory task they were given instructions on how to play each set of three sounds and were instructed to 'indicate which sound snippet sounded different from the others by clicking on the appropriate box' (see Figure 2). This was followed by 15 trial tasks. Here, and in the main tasks, continuous feedback on behavioural responses was given ('correct' or 'incorrect').

Figure 2

Auditory processing task: Instructions



The three conditions of the auditory detection task – predictable, control, and unpredictable – were presented in a random order to avoid potential order effects/confounds. Participants then completed the Speech, Spatial and Qualities of Hearing scale (SSQ12) followed by the O-Life Questionnaire (see above). Upon completion participants received a debrief of the experiment (see Appendix C).

Analysis

Auditory Prediction

Participants' auditory detection thresholds for each of the conditions described above were subjected to a mixed design two-way ANOVA – with a within-subjects factor of auditory prediction condition (3 levels) and a between-subjects factor of sex (2 levels) - to examine their main effects and their interaction on task performance (ADT). An additional ANOVA analysis was run on musical experience to see if posited enhanced rhythmic skills and temporal prediction in musicians (e.g. Vassena et al., 2016) may extend to auditory prediction in the click-fusion boundary range (c. 20Hz/50ms) (see Introduction).

SSQ12

SSQ12 scores were subject to correlation analysis with ADT performance to highlight and investigate any potential confounds in our results due to broader reported hearing difficulties

Schizotypy

Scores for the four subscales of schizotypy were collated as described (see above) and participants were allocated to interquartile groups – low, medium, or high – based on their scores (with the medium category comprising 2 quartiles [50%]). The cut-off values were calculated directly from the current sample (N=459) rather than from Mason and Claridge's (2006) data set of age and sex-specific norms, as our age range crosses their reference bands. Mean scores for each dimension were compared with those reported in Mason and Claridge (2006), a correlation analysis was run to test for relationships between schizotypy dimensions, and Chi-square tests investigated the distribution of sex across schizotypy categories. Four independent Mann-Whitney U tests (one for each schizotypy dimension) were also run, with sex as the grouping variable, to investigate potential sex differences in the raw schizotypy scores.

Is Schizotypy associated with Auditory Prediction?

To investigate potential associations between levels of schizotypy and auditory prediction a series of three-way mixed ANOVAs were conducted for each of the four O-Life subscales, using between-subjects factors of schizotypy category (3 levels), and sex (2 levels), and a within-subjects factor of prediction condition (3 levels). The condition by schizotypy category interaction tested whether the magnitude of the predictability benefit in ADT varied as a function of schizotypy level. Where a significant interaction was found, simple effects analyses were conducted to clarify the pattern. Four Spearman correlations – schizotypy subscale by predictability benefit (ADT in the neutral/unpredictable [average] minus ADT in the predictable condition) – were also run to provide a specific test of the association between raw schizotypy scores and predictability benefit.

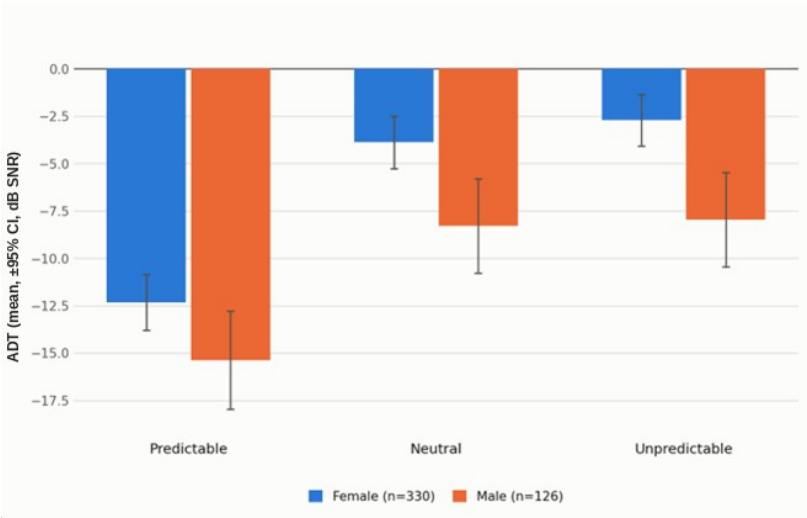
Results

Main effects of auditory prediction and sex, and their interaction, on task performance (ADT)

ADTs across the three prediction conditions suggested that performance for both men and women was substantially better (lower detection threshold) in the predictable condition, compared to neutral and unpredictable conditions, which did not substantially differ (Fig. 3). Overall, men exhibited lower thresholds than women in all three conditions. These observations were tested for statistical significance in a mixed-design two-way ANOVA.

Figure 3

Mean Auditory Detection Threshold by Prediction Condition and Sex



Note. Error bars represent 95% confidence intervals. ADT = auditory detection threshold (dB SNR); lower values indicate better performance.

Mixed-design two-way ANOVA

Significant deviations from normal distribution were exhibited in all conditions (Shapiro-Wilk Test: $p<0.05$ [0.36 - <.001). However, the W statistics are all close to 1 (0.965-0.988), and our sample sizes are large, so we would argue that that deviation was unlikely to severely bias the F-test results (see Schmider et al, 2010). The assumption of equal variance across all levels of independent variables (Levene's Test homogeneity of variance) was met for neutral ($p = .117$) and predictable conditions ($p = .100$) but violated for unpredictable ($p = .014$). F-tests are, however, considered to be robust to heterogeneity of variance in cases where group sizes are large (as is the case here) and are not too disparate (here ≈ 2.6:1) (see Blanca et al., 2018). The assumption of Sphericity (for within-subjects factor) was met (Mauchly's Test: $\chi^2(2) = 3.49$, $p = .175$). However, Box's M Test for homogeneity of covariance showed that the null hypothesis of equal covariance matrices across sex was rejected ($M = 15.421$, $F = 2.545$, $p = .018$). This could be a concern, especially given our unequal group sizes (330F/126M). However, as the assumption of sphericity was met and given our large sample sizes, we expected the F-test to remain robust. Some statisticians have notably recommended a more conservative threshold for large sample sizes of alpha <0.001 (see Tabachnick

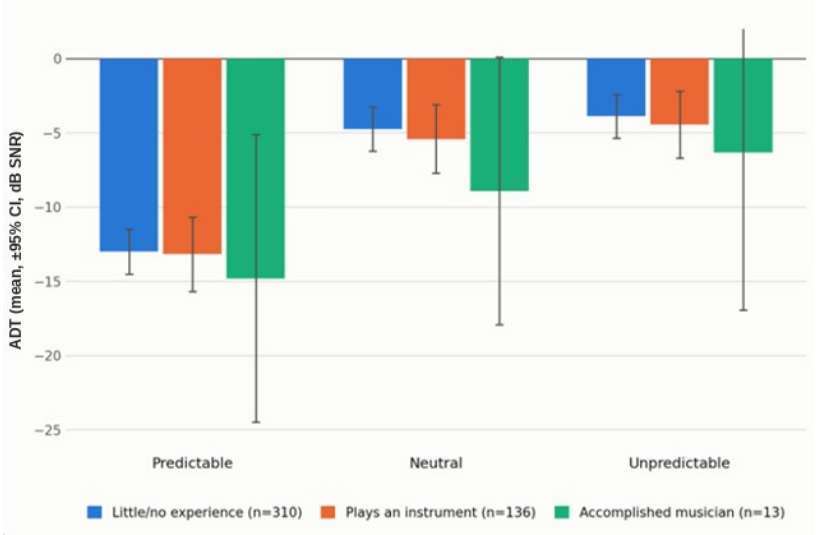
& Fidell, 2013). At p=0.18 our result would meet the assumption under this stricter measure. In terms of ensuring independence of data our two population groups are mutually exclusive; controls and the random order presenting auditory conditions guard against participant interaction or clustering effects; and any remaining dependence is explicitly modelled by the within-subjects factor. Furthermore, given the adaptive staircase design of our task and the prior screening/exclusion criteria applied, we did not expect ADT score outliers. A boxplot analysis of descriptive statistics run in SPSS (see Appendix F) confirmed no outliers (at 1.5xIQR).

Our analysis showed a large significant main effect of auditory prediction condition ($F(2, 908) = 203.38$, $MSE = 39.83$, $p < .001$, partial $\eta^2 = .309$) and a small significant main effect of sex ($F(1, 454) = 10.72$, $MSE = 458.42$, $p = .001$, partial $\eta^2 = .023$). The interaction between prediction condition and sex was close to but not significant at $\alpha = 0.05$ ($F(2, 908) = 2.81$, $MSE = 39.83$, $p = .061$, partial $\eta^2 = .006$). In post-hoc Bonferroni-adjusted pairwise comparisons the predictable condition was significantly different from neutral ($M\_diff = -7.76$, $SE = 0.45$, $p < .001$, 95% CI [−8.84, −6.69]) and unpredictable ($M\_diff = -8.51$, $SE = 0.48$, $p < .001$, 95% CI [−9.67, −7.35]) – indicating better performance (lower ADT) in the predictable condition. Neutral and unpredictable conditions were, contrary to expectation, not statistically significantly differentiated ($M\_diff = -0.75$, $SE = 0.47$, $p = .331$, 95% CI [−1.88, 0.38]). This is a notable difference from Sollini et al. (2022) who reported an interference effect for the jittered/unpredictable condition (≈ 7.1 dB higher threshold than neutral, $p < .001$).

Main effects of auditory prediction and musical experience, and their interaction with ADT

The only clear effect was the predictable-condition advantage which was already evident from the previous analysis. Although the 'accomplished musician' group performed marginally better across all three predictability conditions, there was no significant difference. We note that this analysis is considerably under-powered due to the small number of participants in the 'accomplished musician' group (N=13). The following mixed-design two-way ANOVA is therefore offered as an investigatory analysis to inspire further research hypotheses, rather than being confirmatory.

Figure 4
Mean Auditory Detection Threshold by Prediction Condition and Musical Experience



Note. Error bars represent 95% confidence intervals. ADT = auditory detection threshold (dB SNR); lower values indicate better performance. This analysis is exploratory due to the small accomplished-musician subgroup (n = 13).

The assumption of normal distribution was violated for the 'little/no experience' and 'plays an instrument' subgroups in most conditions (Shapiro-Wilk: p = .001–<.001)[7] but not for the 'accomplished musician' subgroups (p = .787–.962). The assumptions for homogeneity of variance (Levene's Test: unpredictable p = .431, neutral p = .670, predictable p = .315), sphericity (Mauchly's Test ($\chi^2(2) = 3.96$, p = .138), and homogeneity of covariance (Box's M: M = 17.89, F = 1.41, p = .152) were all met. Independence of data was ensured, and outliers were not expected as described in the previous analysis (see above).

As with the first ANOVA analysis, there was a significant main effect of auditory prediction condition ($F(2, 912) = 56.94$, MSE = 39.94, $p < .001$, partial $\eta^2 = .111$). The analysis, however, showed no significant main effect of musical experience ($F(2, 456) = 0.35$, MSE = 470.93, p = .703, partial $\eta^2 = .002$). Interaction between prediction condition and musical experience was not statistically significant ($F(4, 912) = 0.29$, MSE = 39.94, p = .882, partial $\eta^2 = .001$). For auditory prediction conditions, predictable was again significantly different from neutral (M_ diff = −7.30, SE = 0.84, $p < .001$, 95% CI [−9.33, −5.28]) and unpredictable (M_diff = −8.78, SE = 0.91, $p < .001$, 95% CI [−10.98, −6.59]). The direct comparison between neutral and unpredictable was not significant (M_diff = −1.48, SE = 0.89, p = .288, 95% CI [−3.61, 0.65]).

Correlation Analysis of SSQ12 Composite Scores with ADT Performance

SSQ12 total scores were shown to deviate significantly from normality (Shapiro-Wilk: W = .988, $p < .001$), as did all three ADT conditions (all $p < .001$), so Spearman's ρ (rho) - as a non-parametric measure – was preferred for the correlation analysis.

SSQ12 composite scores were inversely correlated significantly (at p = 0.05) with ADT in all prediction conditions. This is consistent with the expectation that better self-reported hearing associates with lower ADT across all predictability conditions (see below). It is worth noting, however, that 'ADT Predictable' is not significant at a more conservative Bonferroni-corrected α = .0167 (accounting for running 3 independent analyses). In Spearman's Rank-Order Correlations, SSQ12 composite scores associated significantly with ADTs in all three prediction conditions (all rho < -0.101, p<=0.031)[8].

Extending this correlational analysis by breaking down SSQ12 into the three subscale components indicates that this association is driven predominantly by Spatial and Quality hearing (Table 2). Perhaps surprisingly, the speech subscale is effectively uncorrelated with ADT performance across all three prediction conditions.

[7] The exception being 'plays an instrument in the unpredictable condition (p = .061).

[8] Some readers may prefer to consider a Bonferroni-corrected α of .017 given three comparisons. At this threshold SSQ12 vs ADT Predictable would not be considered significant.

Table 2

Spearman's Rank-Order Correlations between SSQ12 Subscale Scores (Speech, Spatial, & Qualities) and ADT (3 Prediction Conditions)

SSQ12 Subscale	ADT Predictable	ADT Neutral	ADT Unpredictable
Speech	ρ = −.007, p = .888	ρ = −.036, p = .446	ρ = −.019, p = .685
Spatial	ρ = −.116, p = .013	ρ = −.120, p = .010	ρ = −.116, p = .013
Qualities	ρ = −.115, p = .014	ρ = −.133, p = .004	ρ = −.138, p = .003

Note: N=459 (all correlations). All the Spatial and Qualities correlations were significant at α = 0.05 and would remain significant at a more conservative Bonferroni-corrected α for three comparisons of .017.

Of principal note for the current study is the relative stability of correlation across the three ADT conditions, suggesting that the SSQ12 subscale results do not vary systematically with performance across predictable vs unpredictable build-up. As such it does not constitute a meaningful confound for our prediction condition comparative analyses.

Schizotypy Subscales based on Interquartile Ranges – High, Medium, and Low

Participants were allocated to three schizotypy groups – high, medium, or low – for each of the four dimensions based on interquartile range (Table 3). The medium category was defined to contain the two central quartiles, so the middle 50%, leading to an overall breakdown of bottom 25% (low), middle 50% (middle), and top 25% (high). Rather than an exactly proportional distribution for the interquartile ranges, we note a typically larger percentage of participants in the low schizotypy group (27-33%), and lower in the high schizotypy group (21-23%). This may reflect simply an artifact of collecting discrete integer scores with a greater number of matched scores at the lower end of the scale clouding the divide. Table 3 provides more detail, showing the quartile cut-off scores, the numbers in each subscale (overall and males/females), and percentages.

Table 3

Interquartile Cut-Points and Resulting Group Sizes (Overall and Males/Females) for Schizotypy Categories, by O-LIFE Subscale

Subscale	**Q1 (25th pct)**	**Q3 (75th pct)**	**n Low (M/F)**	**n Medium (M/F)**	**n High (M/F)**	**% Low**	**% Medium**	**% High**
UnEx	5	15	140 (99F/41M)	216 (153F/61M)	103 (78F/24M)	31% F30% M33%	47% F46% M48%	22% F24% M19%
CogDis	10	19	125 (69F/56M)	231 (180F/49M)	103 (81F/21M)	27% F21% M44%	50% F55% M39%	22% F25% M17%
IntAn	4	11	153 (110F/43M)	202 (145M/56M)	104 (75F/27M)	33% F33% M34%	44% F44% M44%	23% F23% M21%
ImpNon	4	10	124 (100F/24M)	239 (166M/71M)	96 (64F/31M)	27% F30% M19%	52% F50% M56%	21% 19% M25%

Note. N=459 Low = bottom 25% (< Q1), Medium = middle 50%, High = top 25% (> Q3) of subscale scores, computed separately for each subscale (rounded to whole numbers [so percentages may not sum to 100%]).

Distribution of Sex across Schizotypy Categories

The Male/Female distribution (overall 71.9% Female; 27.5% Male) showed no meaningful skew for UnEx (71-77% female across Low, Medium, and High) and IntAn (72-74%). However, for ImpNon chi-square tests revealed a skew with Men disproportionately in the High category (19% in Low, 30% in Medium, 33% in High; (X^2) = 6.08, df = 2(456), p = .048) and for CogDis men were more concentrated in the Low group (45% in Low, 21% in Medium and High; (X^2) = 25.41, df = 2(456), p <.001)[9]. Four independent Mann-Whitney U tests revealed significant sex differences for CogDis (U = 14744.0, z = -4.81, p < .001, r = .23) and ImpNon (U = 24181.5, z = 2.70, p = .007, r = .13), but not for UnEx (U = 19183.0, z = -1.28, p = .201) or IntAn (U = 20882.5, z = 0.07, p = .941) – validating that men scored higher on ImpNon and women scored higher on CogDis.

Correlation analysis

All four O-LIFE subscales were found to depart significantly from normal distribution (Shapiro-Wilk p < .001 for every subscale). Therefore, the use of Spearman's ρ (rho) – as a non-parametric correlation statistic – was preferred.

All pair-wise correlations between the four subscales - except for 'IntAn-ImpNon' (ρ = .085, p = .069) - show clear association with each other (p < .001), but also a considerable degree of independence (ρ = .262 - .565). The most strongly associated pair (UnEx-CogDis ρ = .565) share only 32% variance ($.0565^2$ [=.319]) and are each therefore about 68% independent. This therefore supports the faceted approach proposed by Mason and Claridge (2006).

In general, our scores were slightly higher than those reported in Mason and Claridge (2006) (Table 4). More specifically, our scores were higher for UnEx (females only), CogDis, IntAn, and slightly lower for ImpNon. Participants in their study were considerably more widely spread in age (17-85). Schizotypy scores typically decline with age with specific sex differences across age groups, so the comparison of means reported in table 4 are age-matched (averaged across U21, 21-30, and 30-40 groups) and given by sex. The participant pool in their study was also demographically more diverse (taken from a national twin registry and various lab studies) than our sample, consisting predominantly of young adults with a disproportionate number of university students. Table 4 shows our observed means and reported mean scores in the Mason and Claridge (2006) study.

[9] This analysis also confirmed no significant association of sex and distribution across the categories for UnEx (X^2 = 1.13, df = 2(456), p =.568) and IntAn (X^2 =.091, df = 2(456), p = .955).

Table 4

Comparison of Observed and Previously Reported O-LIFE Subscale Means

Subscale	Observed M Female (N=330)	Mason & Claridge (2006) M – Female (N=720) (17-40)	Observed M –Male (N=126)	Mason & Claridge (2006) M – Male (N=364) (17-40)
UnEx	10.55	9.54	9.47	9.69
CogDis	15.12	11.66	12.08	11.25
IntAn	7.62	5.37	7.54	6.23
ImpNon	6.92	8.59	7.90	9.81

Note: Matched by sex and age to account for sex differences across specific age ranges. The reported set from Mason & Claridge (2006) is an average from 3 reported norm groups – U22, 21-30, and 30-40.

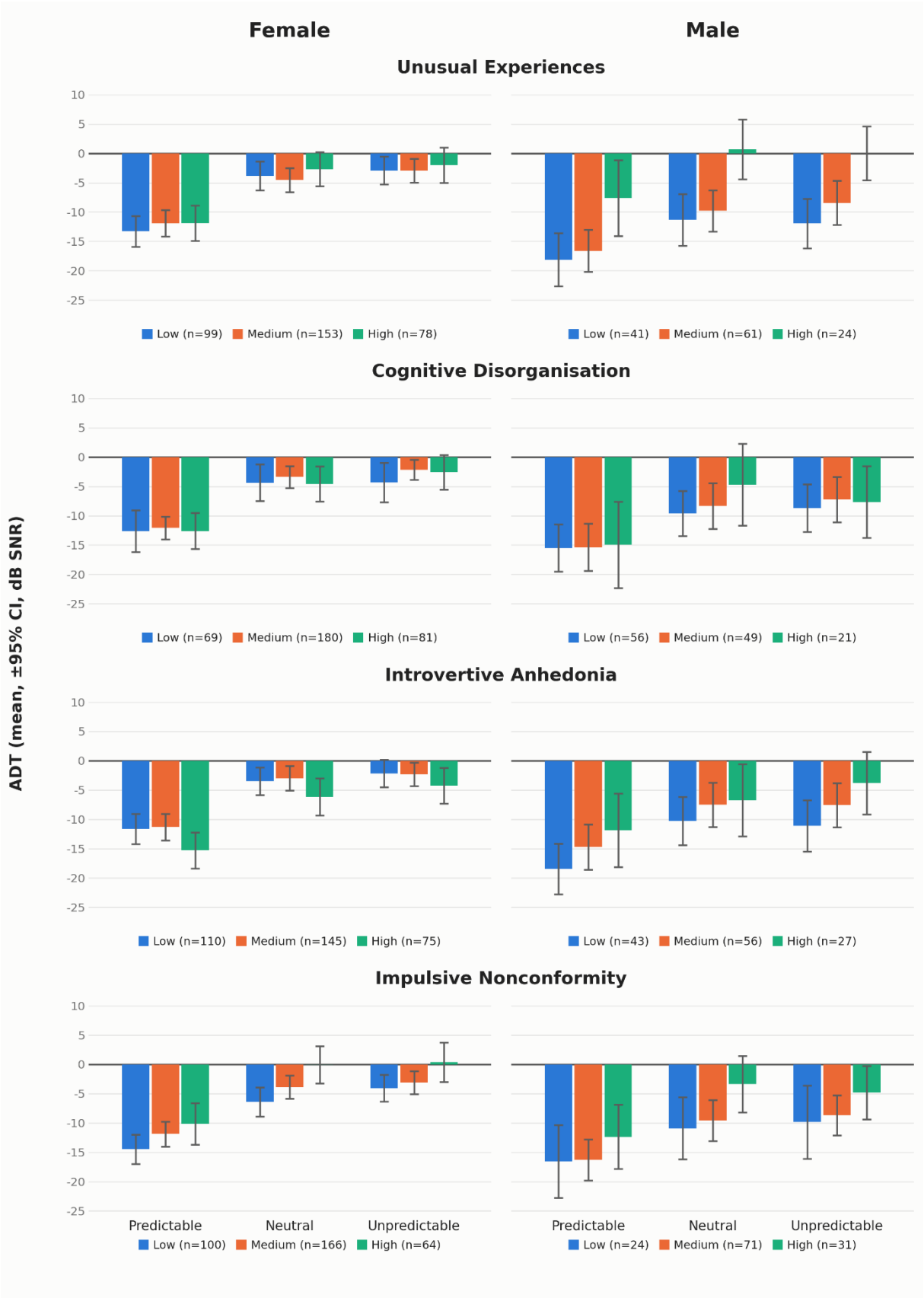
ADT Scores by prediction condition and schizotypy subscale by sex

To test our hypothesis of an association between ADT scores by prediction condition and schizotypy category across O-LIFE subscales sex was included as a factor to avoid potential confounding effects. Although our analysis above showed no significant interaction between prediction condition and sex, it was notably close to significance ($p = .061$). Furthermore, analysis (see above) of the distribution of sex across schizotypy categories revealed significant skew in the ImpNon and CogDis subscales.

Figure 5 illustrates again a clear effect of the predictable condition across all categories with a similar trajectory across the O-LIFE subscales and separated sex groups. Visual inspection of the data hints at an association between prediction condition and high schizotypy scores (especially in the ImpNon category). These observations were subject to statistical analysis in the following three-way mixed-design ANOVAs. Succinctly, our analysis provides no support for the hypothesis that a predictability benefit in the ADT task varies with level of schizotypy.

Figure 5

Mean Auditory Detection Threshold by Prediction Condition and Schizotypy Category Across All Four O-LIFE Subscales for Female and Male Groups



Note: Error bars represent 95% confidence intervals. ADT = auditory detection threshold (dB SNR); lower (more negative) values indicate better performance.

Shapiro-Wilk Tests were significant for 28/72 combinations (4x3x3x2 [subscales/schizotypy/categories/prediction conditions/sex]) (see Appendix F) showing that normal distribution was consistently violated (see above for justification [W statistics .888-.991]). The assumptions of sphericity (Mauchly's Test: $\chi^2(2) = 3.470\text{-}3.730$ p =.155 - .176) and homogeneity of variance were met across all four ANOVAs except for CogDis in the unpredictable condition (Levene: p = .017). The homogeneity of covariance was significant (assumption violated) in Box's M Test throughout (UnEx/CogDis/ImpNon p < .001 IntAn p = .004) (see above for justification). Independence of data was ensured, and outliers were not expected as described for the first ANOVA.

Consistent with the previous analyses the three-way ANOVA showed predictably two significant main effects: 1) A large[10] main effect of prediction condition across all models (4 schizotypy subscales) (F(2,900) = 172.63-188.97, MSE = 39.83-39.91, p <.001, partial η^2 = .277-.296); and 2) a small main effect of Sex on overall ADT (F(1, 450) = 4.89–9.29, MSE = 447.85–461.44, p = .002 –.028, partial η^2 = .011–.020). Across all models the predictable condition was associated with lower ADT scores (better performance), with men outperforming women almost entirely across the board.

For the UnEx and ImpNon dimensions, schizotypy group had a main effect on the overall ADT scores with the high schizotypy group scoring higher (worse) on the task (UnEx: F(2, 450) = 6.49, MSE = 447.85, p = .002, partial η^2 = .028; ImpNon: F(2, 450) = 4.25, MSE = 452.05, p = .015, partial η^2 = .019). In Bonferroni pairwise comparisons it was specifically the Low-High difference that was significant for ImpNon: M_diff [low-high] = −4.66, SE = 1.674, p = .017, 95% CI [−8.69, −0.64].

There was a significant group interaction effect between the UnEx group and sex (F(2,450) = 4.34, MSE = 447.85, p = .014, partial η^2 = .019). Although the typical male advantage persists in the low and medium groups (p = .002/.006), it is absent in the high schizotypy (UnEx) group (F(1,450) = 1.28, p = .259, M_diff (F-M) (high) = -3.22, SE = 2.852). Simple-effects tests showed that the effect for schizotypy group was limited to males (F(2,450) = 7.14, p <.001, partial η^2 = .031)[11] where the high-UnEx cell had considerably higher (worse) ADT (Low vs High: M-diff = -11.49, SE = 3.140. p<.001; Medium vs High: M_diff = -9.30, SE = 2.944, p = .005).

None of the three-way interactions - Prediction Condition x Schizotypy Category x Sex - is significant at α = .05 (Table 5) and would also not have been significant at a more conservative Bonferroni-adjusted α = .0125 (adapting for running 4 ANOVAs).

[10] By convention (partial η^2 > .25) see https://imaging.mrc-cbu.cam.ac.uk/statswiki/FAQ/effectSize
[11] UnEx women effect for schizotypy group: F(2,450) = 0.22, p = .805

Table 5

Three-way Interaction of Prediction Condition, Schizotypy Category, and Sex on ADT Performance

Schizotypy subscale	*F*(4,900)	*MSE*	*p*	partial η^2
UnEx	0.669	39.90	.614	.003
IntAn	0.722	39.91	.577	.003
ImpNon	0.442	39.83	.778	.002
CogDis	1.353	39.85	.248	.006

Note: MSE = mean square error. Each row reports, for that subscale, the prediction condition by schizotypy category by sex interaction from a three-way mixed ANOVA (df = 4,900).

None of the two-way interactions for prediction condition by schizotypy category is significant for any of the schizotypy subscales (Table 6).

Table 6

Two-way Interaction of Prediction Condition and Schizotypy Category on ADT Performance

Schizotypy subscale	*F*(4,900)	*MSE*	*p*	partial η^2
UnEx	0.752	39.90	.557	.003
IntAn	0.922	39.91	.450	.004
ImpNon	1.250	39.83	.288	.006
CogDis	0.966	39.85	.425	.004

Note: MSE = mean square error. Each row reports, for that subscale, the prediction condition by schizotypy category interaction from a separate mixed ANOVA (df = 4,900).

Correlation Analysis – Schizotypy by Predictability Benefit

Testing directly whether raw schizotypy scores associated with benefit from predictability Spearman correlation analyses compared schizotypy subscales and a predictability benefit score – the difference between an averaged score across the unpredictable and neutral conditions and ADT in the predictable condition. Consistent with the results revealed in the categorical three-way ANOVA above, there was no association between schizotypy scores as a continuous measure and predictability benefit. None of the four Spearman correlations were close to being significant (UnEx: $\rho = -.008$, $p = .857$; IntAn: $\rho = .037$, $p = .432$; ImpNon: $\rho = -.053$, $p = .254$; CogDis: $\rho = .055$, $p = .240$).

Discussion

Our results showed that ADT performance was better in the predictable condition and, as predicted, that men outperformed women overall. Self-reported musical experience did not associate with ADT performance. O-LIFE schizotypy scores were unexpectedly higher than in previous age-matched cohorts. UnEx, and to a lesser extent ImpNon, was associated with poorer ADT performance, with the UnEx effect driven by the disappearance of the usual male advantage in the high UnEx group. Some caution is, however, advised in interpreting this sex difference due to limited power. Despite associations between schizotypy and auditory detection, there was no evidence for our main hypothesis of an impaired use of temporal predictability in high schizotypy.

Predictability, sex effects, and musical experience

Our study replicated an overall effect of temporal predictability – regular vs jittered precursor pip tone timings (~20 Hz rate) – on tone detection thresholds (Sollini et al., 2022), with better ADT performance in the predictable condition. We did not, however, replicate a significant interference effect of the jittered/unpredictable precursor. A limitation in our study compared to Sollini et al. (2022) is that we cannot rule out differences in the calibration of participants' sound equipment. However, neither this nor the stimulus adaptations for online study, nor the increase to 8 reversals per adaptive threshold offers a rationale for why the interference failed to replicate while the benefit from predictability did. This asymmetry would therefore need to be addressed in future study.

As predicted, based on broader evidence of auditory sex differences – with men typically scoring better in masking and signal-detection tasks (McFadden, 1998; McFadden et al., 2024) – our male participants exhibited an overall lower (better) ADT performance. Our exploratory analysis of self-reported musical experience showed no effect on ADT performance nor did it interact with prediction condition, suggesting provisionally a separation in processing at the click-fusion boundary range (where discrete events begin to fuse into a continuous percept) from architecturally significant time frames in musical rhythm and pulse (see Bispham, 2021).

O-LIFE scores were higher than in previous cohorts

O-LIFE scores for our sample were notably and unexpectedly higher than age-matched groups in Mason & Claridge (2006). Specifically, our groups scored higher for CogDis, IntAn, higher for UnEx in women only, and slightly lower overall for ImpNon. The reason for these differences is unclear and would require specific study. One could perhaps speculate towards the rise of social media in the past 20 years or effects of the COVID pandemic as possible driving influences. For example, worldwide increases in adolescent loneliness in conjunction with the rise of smartphone use (Twenge et al., 2021) may track with higher IntAn scores in young adults now, while longitudinal evidence indicates an age-specific effect of the global pandemic on personality, with younger adults specifically showing a significant increase in neuroticism (Sutin et al., 2022).

UnEx and ImpNon were associated with attenuated ADT

Analysis also highlighted an overall association between high schizotypy scores – exclusively for UnEx and ImpNon subscales – and attenuated performance on the ADT task. UnEx was the more robust result ($p = .002$; partial $\eta^2 = .028$) and is notably the subscale most directly linked with perception – describing sensitivities and occasional auditory hallucinations. Issues with perception may well have contributed to the association with ADT performance. The effect in the high UnEx groups was further shown to have been driven specifically by the male group. ImpNon's main effect was smaller ($p = .015$; partial $\eta^2 = .019$) and would have narrowly missed a Bonferroni-corrected significance threshold across the four interaction terms ($p = .0125$). Furthermore, ImpNon was strongly correlated with UnEx ($\rho = .560$, $p < .001$), so the finding may potentially reflect a shared underlying factor – a potential confound that would need to be addressed in follow-up studies[12].

Our three-way ANOVAs revealed a significant interaction for UnEx by Sex. This should perhaps be interpreted with caution. It was not listed as an a-priori hypothesis and was underpowered due to the male group being substantially smaller than our target sample and the high-UnEx cell being especially small (N=24). This highlights a broader limitation with the current dataset having a smaller than desired male sample (N=126) and will be addressed as the project continues to accumulate participants next year. Furthermore, the significant interaction result emerged from one of 14 interaction tests run raising the chance of one or more false positives[13]. Even if illuminating a real statistical effect, it could parsimoniously be reflecting an artifact of the overall disruptive main effects of UnEx scaling differently from lower/better baseline scores on the ADT task (with males generally scoring lower). That said, it may indeed point to certain perceptual correlates of UnEx being expressed differently in men and women, and could inspire further hypotheses to be explored in future studies.

Predictability benefit did not vary with schizotypy

Our main hypothesis for an interaction between preceding temporal predictability, tone detection thresholds, and schizotypy scores was not supported. Rejection of our hypothesis was reinforced by the lack of a direct correlation between raw schizotypy scores and predictability benefit. There was not even numerical evidence in the direction of a schizotypy category by prediction condition interaction, so increasing the male sample group is unlikely to affect our main conclusion. High schizotypy is not, it seems, associated with impaired use of temporal predictability in the build-up of auditory grouping – at least not in this experimental paradigm.

We have shown, essentially, a disconnect for the high UnEx and ImpNon populations between a general auditory detection disadvantage and the maintained implicit use of temporal regularity in

[12] It is worth noting that UnEx correlated with CogDis (showing no effect on ADT performance) to the same degree, suggesting therefore that, if this supposition holds, it will need to be based upon a specific association with ImpNon rather than a simple shared variance.

[13] This point reflects a further broad limitation with the approach taken here, being that we ran multiple comparisons. Despite correcting the significance levels for the primary condition-by-schizotypy associations, there remained a risk of false positive results in the schizotypy-by-sex interactions.

auditory scene analysis. The supposition that predictability benefit would be reduced in high schizotypy was based primarily on evidence for attenuated MMN amplitude response to auditory frequency deviants in participants scoring high in schizotypy (e.g. Bissonnette et al., 2024). To a lesser extent we also considered established findings showing reduced MMN/EEG responses to violations of expectancy in schizophrenia (Fong et al., 2020), which could have been conceived to be partially inherent in a personality dimension that predisposes towards the clinical disorder.

However, despite both paradigms being concerned broadly with auditory prediction, there was no specific a priori reasoning to assume a shared mechanistic/computational foundation for our task and the MMN/EEG paradigms that were the basis for earlier research. The approach taken here was notably distinct in many key features. First, our task, rather than reflecting passive pre-attentive neuronal responses, involved active perceptual judgments and added a component of auditory grouping. Unlike, for example, the classic oddball paradigm (see Fritzsch, 2020), predictability itself was not violated in our stimuli. Rather, predictability in the background sounds putatively aided in the efficiency of stream segregation and, thus, supported perception of the added tone (Sollini et al., 2022). Secondly, the timescales involved were very different from the supraliminal inter-stimulus-intervals (ISI) featured typically in MMN studies. Bissonnette et al. (2024), for example, studied 75ms tones with a 500ms ISI (≈ 1.7Hz). The stimuli in the current study (≈ 20Hz) were instead situated right at the click-fusion boundary where discrete units cease to be heard as separate events, and where participants are not cognisant of pulsed regularities (Ungan & Yagcioglu, 2014).

Support for the null hypothesis in this experiment is consistent with the view that predictive processing as a construct is unlikely to reduce to a single unified computation, instead operating at different levels of auditory hierarchy with dissociable mechanisms (Furutachi & Hofer, 2026). Sollini and colleagues (2022) implicitly support this position, describing the build-up phase as a "high-level evidence accumulation process" (p. 14494; citing Nguyen et al., 2020) that is mechanistically separable from coherence and presumably therefore also from other computational aspects of predictability and auditory grouping.

Future Directions

The adapted experimental paradigm used has not yet been subject to extensive study, so there is considerable scope for expansion. For example, a recent study on stream-segregation in speech manipulating temporal coherence (Lee & Oxenham, 2025) found non-significant differences in performance between conditions. This connects specifically to the coherence manipulation in Sollini et al. (2022) rather than the predictability variable studied here but raises the question of the extent to which results in Sollini et al. (2022) generalise to naturalistic contexts and which specific features were doing causal work. To our knowledge an equivalent study on predictability has not yet been run and remains an avenue for future research. In terms of the main effects of predictability, it would be interesting to align directly our active perceptual paradigm with an EEG/MMN study[14].

[14] Given the distinction described above between MMN studies (frequently associated with NMDA-receptor function [Fong et al., 2020]) and the paradigm run here and given that NMDA hypofunction has been posited in schizophrenia but not high schizotypy (see footnote 1 above), it would be of further interest to investigate whether this task is dependent partially upon normal NMDA-receptor function.

This approach could illuminate neurological/neurophysiological correlates of the predictability condition and investigate whether pre-attentive neurological computations occur and associate with schizotypy subscales even in the absence of the active perceptual discrimination reported here, and whether any such neural-behavioural dissociations hold in a within-subjects analysis.

We acknowledge our WEIRD sample (Henrich et al., 2010), comprising a disproportionate number of young university students, so our results may not generalise to a wider population. It would be of interest to compare our findings with future studies recruiting across different age-groups and/or cultures. Extending this paradigm to participants diagnosed with schizophrenia would be of particular theoretical relevance. In the case of auditory steady-state responses in schizophrenia, a recent meta-analysis shows that deficits are consistently small or absent before the emergence of full psychosis, only becoming robust in diagnosed/first-episode cases (Zouaoui et al., 2023). This suggests that oscillatory entrainment deficits (unlike some MMN effects) do not clearly extend down into non-clinical risk populations. By extension this pattern may apply to our research paradigm, with participants with schizophrenia potentially showing impaired use of temporal predictability despite the null finding for high schizotypy in this study.

Our study concludes that, despite some evidence for attenuated ADT performance in certain subscales, there is a preserved use of temporal predictability in the build-up of auditory grouping in high schizotypy. The dissociation between this finding and reported disruptions in other forms of predictive processing in high schizotypy provides evidence of mechanistic and/or computational delineations – a pattern that could be explored further alongside neurophysiological measures, and across broader populations, and clinical samples.

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Appendix A
Participant Demographics

Table A1

Demographic characteristics of the final sample (N = 479), following exclusion of participants with invalid or missing age data, age exceeding 40 years, failure on 2 or more attention check questions, and/or incomplete data.

Characteristic	Category	n	%
Sex	Female	330	71.9
	Male	126	27.5
	Other	2	0.4
	Prefer not to say	1	0.2
Age	Mean (SD)	21.8 (SD4.6)	-
	Range	18–40	-
Handedness	Right	410	89.3
	Left	46	10.0
	Neither	3	0.7
Hearing	Normal	459	100
	Difficulties	0	0.0
Vision	Normal	269	58.6
	Corrected-to-normal	190	41.4
Musical experience	Little/no experience	310	67.5
	Plays an instrument	136	29.6
	Accomplished musician	13	2.8
Ethnicity	White/Caucasian	310	67.5
	Asian/Asian British	80	17.4
	Black/African/Caribbean	34	7.4
	Mixed/multiple ethnic groups	21	4.6
	Other	11	2.4
	Latino/Hispanic	3	0.7
	Prefer not to say	0	0.0
Education	A-Levels	227	49.5
	Undergraduate degree	156	34.0
	Postgraduate degree	51	11.1
	Trade/vocational training	14	3.1
	Secondary school	6	1.3
	Professional training	3	0.7
	No schooling	1	0.2
	Prefer not to say	1	0.2

Appendix B
Recruitment Materials

Brief Study Description for Potential Participants

Participate in Research – The University of Nottingham

ONLINE STUDY DETAILS

Study Title: Schizotypy and auditory rhythm processing
What study entails: This online study investigates the relationship between schizotypal personality traits and auditory rhythm processing. This will help to further our understanding of some of the cognitive impairments experienced by people with schizophrenia. Participants will complete a short-term rhythm memory task, and the O-LIFE questionnaire to measure schizotypal personality traits. Both the rhythm task and the questionnaire will be completed online.

Any special requirement: N/A

How long does it take: 45 minutes to 1 hour 30 minutes

Inconvenience allowance: No

Eligibility Requirements: You need to be between 18 and 40 years old with normal hearing. You also require a computer/laptop and headphones to complete the online study.

Names and e-mail addresses of Experimenters:

John Bispham, lpxjb15@nottingham.ac.uk

Yan Kiu Freya Fong, lpxyf1@nottingham.ac.uk

Jasmine Hughes, lpxjh18@nottingham.ac.uk

Lily Swallow, lpxls13@nottingham.ac.uk

Ross Watson, lpxrw6@nottingham.ac.uk

Supervisor: Tobias Bast (tobias.bast@nottingham.ac.uk) and Joe Sollini (joseph.sollini@nottingham.ac.uk)

Suitable for study swap: Yes

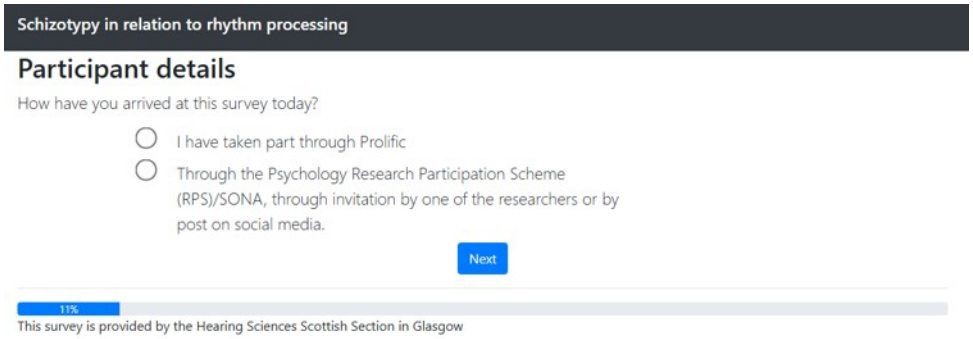
URL and/or information sheet link:

https://surveys.hearing.nottingham.ac.uk/rhythm_processing_v2.

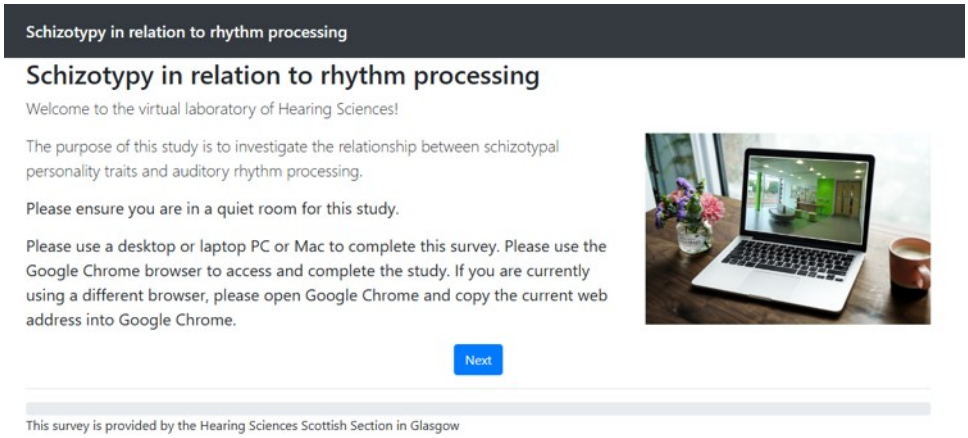
When asked ‘How have you arrived at this survey today?’, please select the second option (‘Through the Psychology Research Participation Scheme (RPS)/SONA, through invitation by one of the researchers or by post on social media.’).

Screenshots from the Online Study

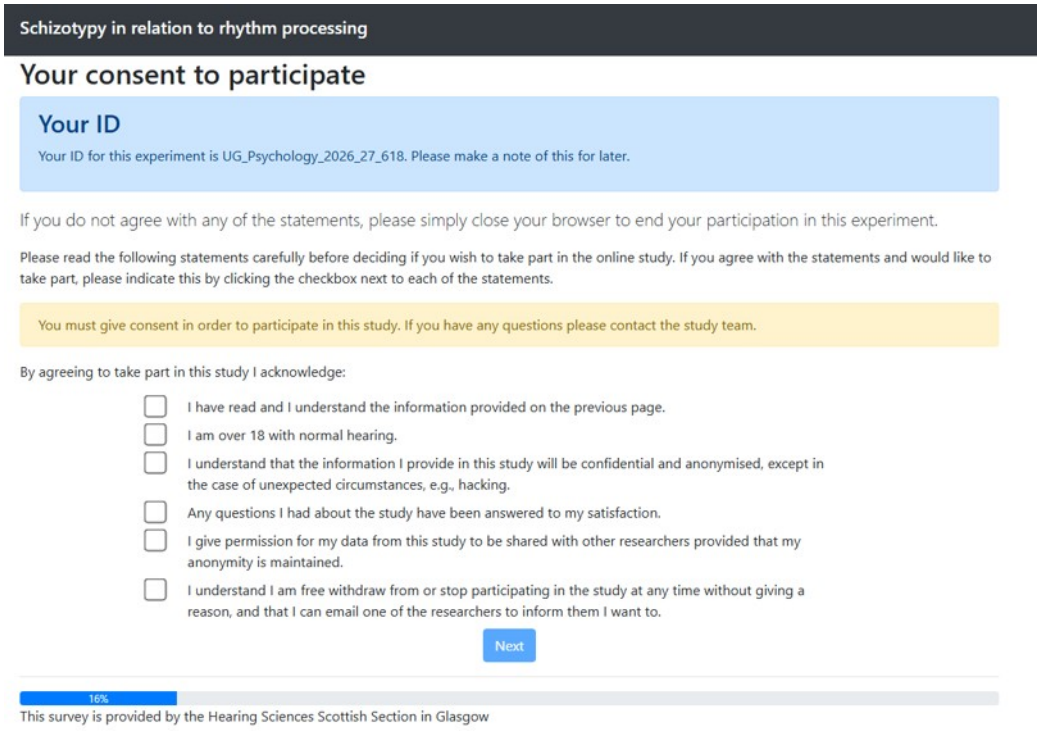
Screenshot 1



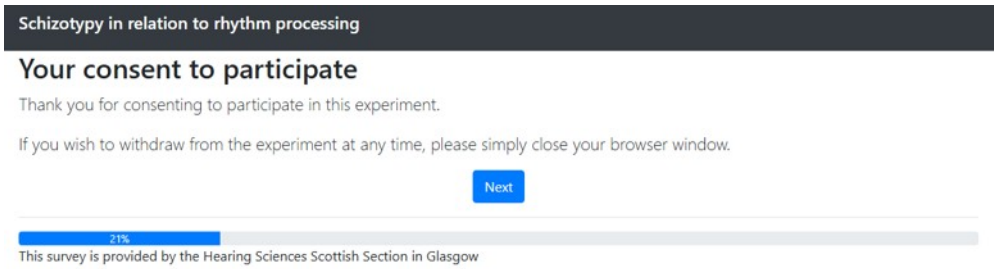
Screenshot 2



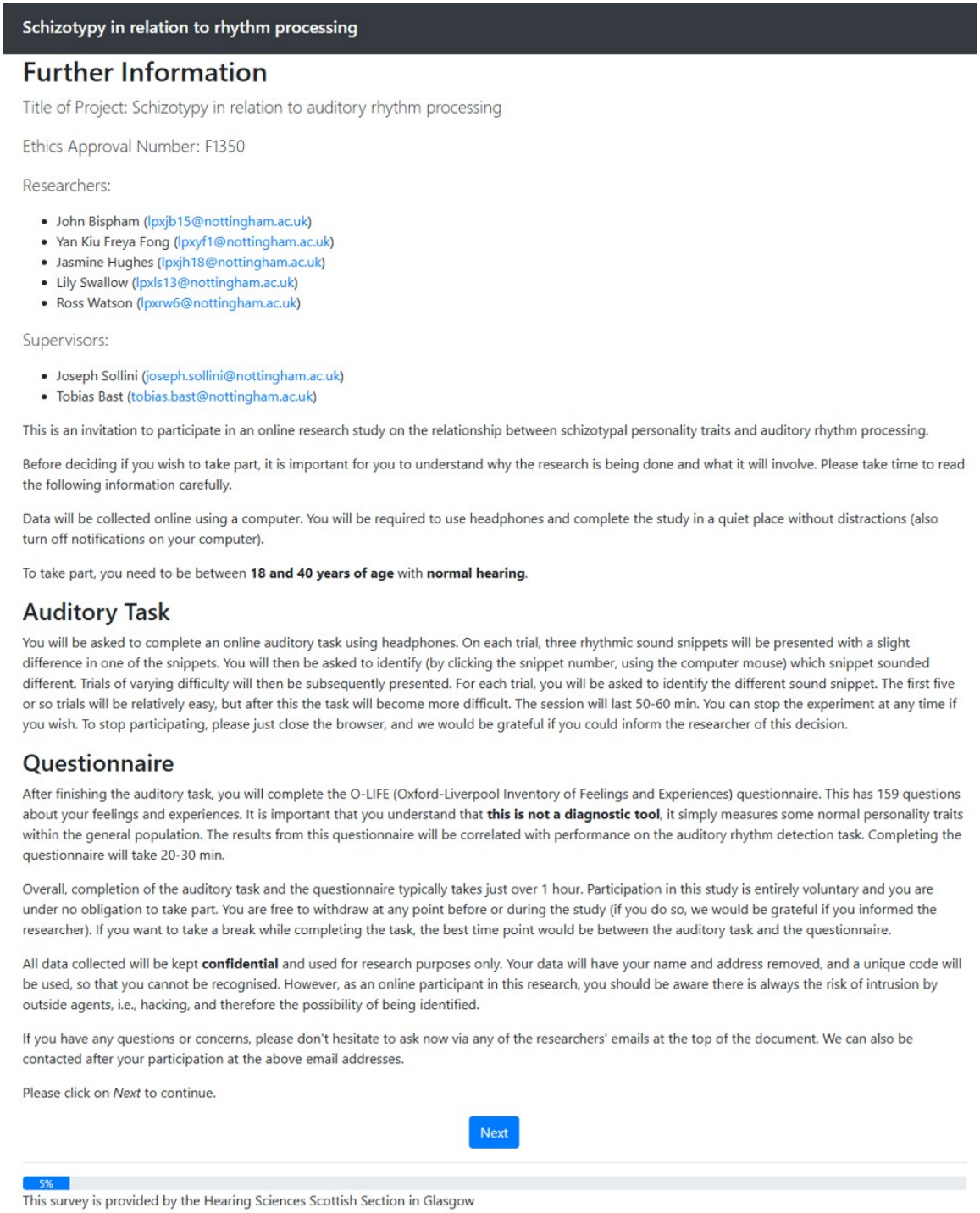
Screenshot 3



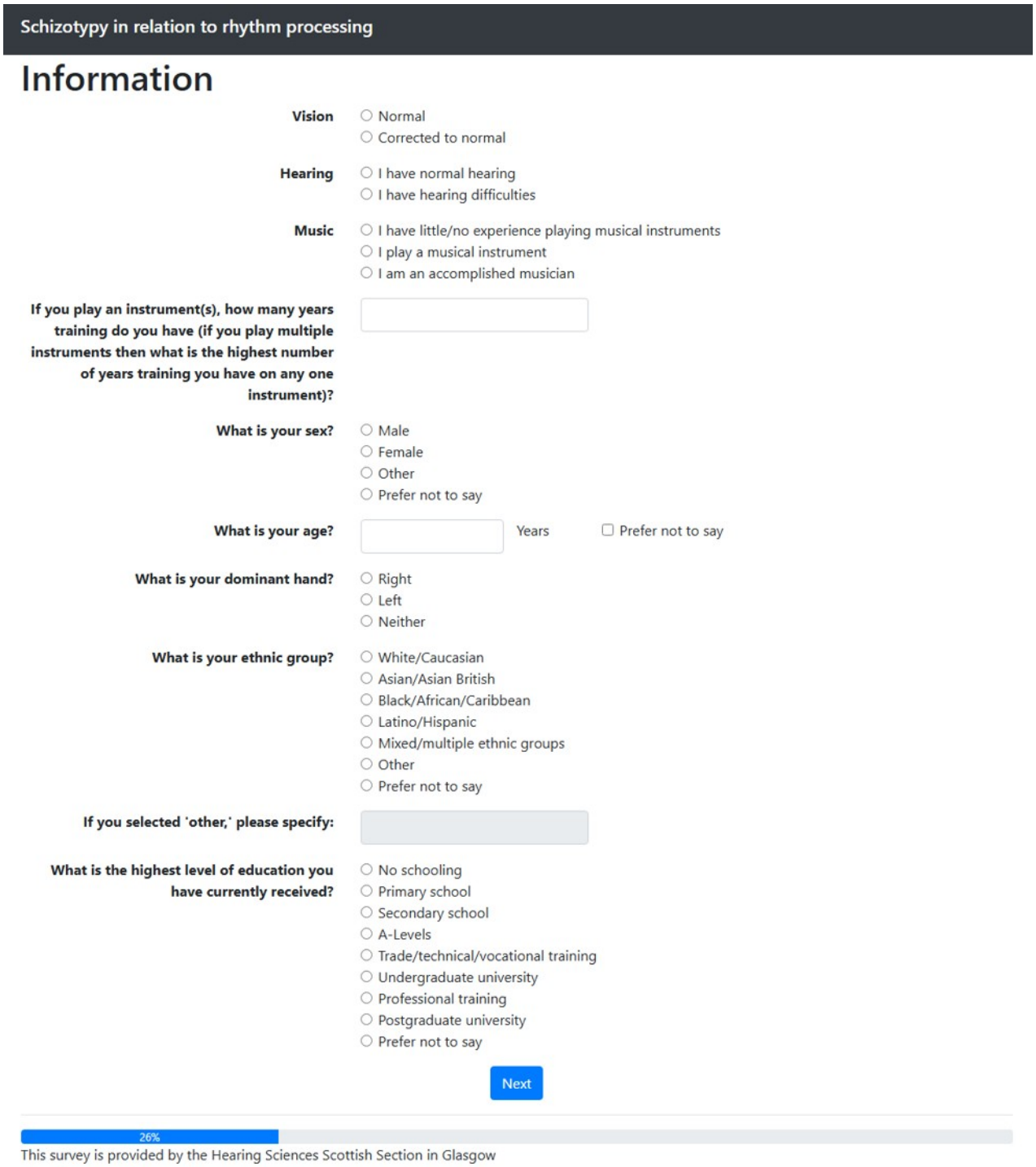
Screenshot 4



Screenshot 5



Screenshot 6



PLEASE DO NOT CITE

This project is ongoing and will be published in due course (Bast & Sollini, in preparation)

SOP for the study on auditory rhythm processing and schizotypy

Participants recruited by researchers directly contacting friends/family

1. Participants will be sent a link to the Psychology Online Study page:
   'Are you interested in helping us with a study on the relationship between a personality trait (schizotypy) and auditory processing capabilities (rhythm detection)?
   The study will be completed online.
   Please use Google Chrome as browser to access and complete the study.
   You can find more information on this study and a link to sign up here: https://www.nottingham.ac.uk/psychology/research/participate-in-research.aspx#Schizotypyandauditoryrhythmprocessing.

2. On the Psychology online study page, participants will find a study description with the direct link to the study on NOTE (Nottingham Online Testing Environment), which includes full information and a consent form. Following completion of the consent form, participants will be provided with a unique participant ID and can then continue to the auditory task and O-LIFE questionnaire. Following completion of the task, the participants will be given a debrief.

Participants through social media

(Note: This recruitment route was not used by experimenters in the MSc program)

1. On social media, participants will be directed to the Psychology Online Study page:
   'Are you interested in helping us with a study on the relationship between a personality trait (schizotypy) and auditory processing capabilities (rhythm detection)?
   The study will be completed online.
   Please use Google Chrome as browser to access and complete the study.
   You can find more information on this study and a link to sign up here: https://www.nottingham.ac.uk/psychology/research/participate-in-research.aspx#Schizotypyandauditoryrhythmprocessing.

2. On the Psychology online study page, participants will find a study description with the direct link to the study on NOTE (Nottingham Online Testing Environment), which includes full information and a consent form. Following completion of the consent form, participants will be provided with a unique participant ID and can then continue to the auditory task and O-LIFE questionnaire. Following completion of the task, the participants will be given a debrief.

Participants from RPS

1. On RPS, participants will be provided with a direct link to the study on NOTE.
2. They will find a study description with the direct link to the study on NOTE (Nottingham Online Testing Environment), which includes full information and a consent form. Following completion of the consent form, participants will be provided with a unique participant ID and can then continue to the auditory task and O-LIFE questionnaire. Following completion of the task, the participants will be given a debrief.

RPS information:

Details: (250 characters)

This online study investigates the relationship between schizotypal personality traits and auditory rhythm processing. This will help to further our understanding of some of the cognitive impairments experienced by people with schizophrenia. Participants will complete a short-term rhythm memory task, and the O-LIFE questionnaire to measure schizotypal personality traits. Both the rhythm task and the questionnaire will be completed online.

Appendix C

Ethics Documentation

Information Sheet

University of Nottingham, School of Psychology

Research Project on Schizotypy in relation to auditory rhythm processing

Ethics Approval Number: F1350

Researchers:

Name of Experimenter:	**Email of Experimenter:**
John Bispham	**lpxjb15@nottingham.ac.uk**
Yan Kiu Freya Fong	**lpxyf1@nottingham.ac.uk**
Jasmine Hughes	**lpxjh18@nottingham.ac.uk**
Lily Swallow	**lpxls13@nottingham.ac.uk**
Ross Watson	**lpxrw6@nottingham.ac.uk**

Supervisors:
Joseph Sollini, joseph.sollini@nottingham.ac.uk; Tobias Bast, tobias.bast@nottingham.ac.uk

This is an invitation to participate in an online research study on the relationship between schizotypal personality traits and auditory rhythm processing.

Before deciding if you wish to take part, it is important for you to understand why the research is being done and what it will involve. Please take the time to read the following information carefully.

Data will be collected online using a computer. You will be required to use headphones and complete the study in a quiet place without distractions (also, turn off notifications on your computer).
To take part, you need to be between **18 and 40 years of age** with **normal hearing**.

Auditory Task

You will be asked to complete an online auditory task using headphones. On each trial, three rhythmic sound snippets will be presented with a slight difference in one of the snippets. You will then be asked to identify (by clicking the snippet number, using the computer mouse) which snippet sounded different. Trials of varying difficulty will then be subsequently presented. For each trial, you will be asked to identify the different sound snippet. The first five or so trials will be relatively easy, but after this the task will become more difficult. The session will last 40-50 min. You can stop the experiment at any time if you wish. To stop

participating, please just close the browser, and we would be grateful if you could inform the researchers of this decision.

Questionnaire

After finishing the auditory task, you will complete the O-LIFE (Oxford-Liverpool Inventory of Feelings and Experiences) questionnaire. This has 159 questions about your feelings and experiences. It is important that you understand that **this is not a diagnostic tool**, it simply measures some normal personality traits within the general population. The results from this questionnaire will be correlated with performance on the auditory task. Completing the questionnaire will take 20-30 min.

Overall, completion of the auditory task and the questionnaire typically take just over 1 hour. Participation in this study is entirely voluntary, and you are under no obligation to take part. You are free to withdraw at any point before or during the study (if you do so, we would be grateful if you could please inform the researcher). If you want to take a break while completing the task, the best time point would be between the auditory task and the questionnaires.
All data collected will be kept **confidential** and used for research purposes only. Your data will have your name and address removed, and a unique code will be used, so that you cannot be recognised. However, as an online participant in this research, you should be aware there is always the risk of intrusion by outside agents, i.e., hacking, and therefore the possibility of being identified.

If you have any questions or concerns, please don't hesitate to ask now via any of the researchers' emails at the top of the document. We can also be contacted after your participation at the above email addresses.

PLEASE DO NOT CITE
This project is ongoing and will be published in due course (Bast & Sollini, in preparation)

Experimental Debriefing Information

School of Psychology
University of Nottingham

Name/Email of Experimenters:

John Bispham lpxjb15@nottingham.ac.uk
Yan Kiu Freya Fong lpxyf1@nottingham.ac.uk
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Name of Principal Supervisors/Supervisors:

Tobias Bast tobias.bast@nottingham.ac.uk
Joseph Sollini joseph.sollini@nottingham.ac.uk

Schizotypy in relation to auditory rhythm processing

The purpose of this study is to investigate the relationship between schizotypal personality traits and auditory rhythm processing. To do this, we are using a short-term rhythm memory task (Sollini et al., 2022) and the O-LIFE questionnaire (Mason & Claridge, 2006).

We predicted that, on average, the higher the score on the schizotypal personality questionnaire, the lower the performance on the auditory task would be. If supported this will show that participants reporting more schizotypy traits show, on average, reduced auditory processing compared to those with lower schizotypy scores. This hypothesis is based on previous findings suggesting that auditory processing is impaired in patients with schizophrenia (patients with schizophrenia score extremely highly on the schizotypy scale) (McLachlan et al., 2013). The auditory processing test used in the present study (Sollini et al., 2022) is based on an auditory processing test, in which performance has been shown to reduce with increasing schizotypy scores (Donaldson et al., 2022).

Our second main hypothesis was that participants with high schizotypy scores would derive no benefit from predictability in the auditory task. This stems from previous research reporting impaired auditory prediction in people with schizophrenia (Taylor et al., 2017).

The data we have collected from you will remain confidential. A participant number has been used rather than your name, so you will also remain anonymous.

Please remember that the O-LIFE questionnaire that you have completed is not a diagnostic tool and has no clinical relevance. If, however, you are concerned about issues raised by the questionnaire and would like to talk to someone about this, the following contact details may be useful:

___**University of Nottingham Student Counselling Service:**

Tel: 0115 951 3695

Email: counselling.service@nottingham.ac.uk

(Please note for University of Nottingham students only)

___**Rethink Mental Illness:**

Webpage: http://www.rethink.org/

___**Moodzone Support group:**

Moodzone – Stress, Anxiety and Depression (www.forumhealthcentre.nhs.uk)

___**Nottingham Nightline:**

Tel: 0115 9514985

Email: nightlineanon@nottingham.ac.uk

(Please note for University of Nottingham students during term time only)

___**The Samaritans:**

Tel: 116123

Webpage: https://www.samaritans.org/

___**BefriendersKL:**

Tel: 0376272929

Webpage: https://www.befrienders.org.my/

(Please note for participants living in Malaysia)

If you have any further concerns or complaints, please contact: Stephen Jackson (Ethics Committee Chair) stephen.jackson@nottingham.ac.uk

Thank you for participating in the experiment.

Useful Reading:

Donaldson, K.R., Larsen, E.M., Jonas, K., Tramazzo, S., Perlman, G., Foti, D., Mohanty, A., Kotov, R. (2021) Mismatch negativity amplitude in first-degree relatives of individuals with psychotic disorders: Links with cognition and schizgotypy. Schizophrenia Research 238, 161-169. https://doi.org/10.1016/j.schres.2021.10.006

Mason, O., & Claridge, G. (2006). The Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE): further description and extended norms. Schizophrenia Research, 82(2-3), 203–11. https://doi.org/10.1016/j.schres.2005.12.845

McLachlan, N, Phillips, D.S., Rossell, S.L., Wilson S.J., (2013): Auditory processing and hallucinations in schizophrenia. Schizophrenia Research 150(2–3), 380-385.

Sollini, J, Poole, K, Blauth-Muszkowski D, Bizley, J (2022): The role of temporal coherence and temporal stability in the build-up of auditory grouping. Scientific Reports 12, 14493 https://doi.org/10.1038/s41598-022-18583-0.

Taylor, J. A., Matthews, N., Michie, P. T., Rosa, M. J., & Garrido, M. I. (2017). Auditory prediction errors as individual biomarkers of schizophrenia. NeuroImage: Clinical, 15, 264-273. https://doi.org/10.1016/j.nicl.2017.04.027

PLEASE DO NOT CITE

This project is ongoing and will be published in due course (Bast & Sollini, in preparation)

Activity / Task Risk Assessment Form

Business Unit: School of Psychology	**Location(s) of Activity:** Online activity	**Risk Assessment Ref:** RA-OnlineStudies-UG-MSc
Activity Title: General online computer-based tasks within undergraduate project work		
Activity Outline: Completing online computer-based project work studies with participants for undergraduate students		
Those at risk / affected parties: Project students and participants		
Risk Assessor Name: Tobias Bast	Signature:	Date:
Responsible person / Line Manager Name: Tobias Bast	Signature:	Date:
Master Risk Assessment Reference where applicable: Master RA 1	**Related procedure references or links:**	
Review Period: 1 year		

PLEASE DO NOT CITE
This project is ongoing and will be published in due course (Bast & Sollini, in preparation)

What are the hazards?	**List the harm associated with the hazard**	**Risk Evaluation without controls in place** High/Med/Low	**What control measures are, or will be put, in place to control the risk?** List all elimination, substitution, engineering and/or administrative controls	**Risk Evaluation with controls in place** High/Med/Low
Participant exposure to inappropriate behaviour by the project student.	Emotional distress	Low	Project students are aware of the Nottingham Dignity policy: https://www.nottingham.ac.uk/hr/guidesandsupport/complaintsgrievanceanddignity/dignity/documents/dignity-at-nottingham-policy-february-2024.pdf	Low
Project student is exposed to inappropriate behaviour by the participant.	Emotional distress	Low	Project students are made aware of considering potential risks when recruiting participants to their study. Participants are recruited mainly from among the Nottingham University student population, all of whom will have been directed to the Nottingham Dignity Policy: https://www.nottingham.ac.uk/hr/guidesandsupport/complaintsgrievanceanddignity/dignity/documents/dignity-at-nottingham-policy-february-2024.pdf	Low
Participant drawing diagnostic conclusions from the O-LIFE questionnaire.	Emotional Distress	Med	In the information sheet and debrief provided to the participant, schizotypy is noted to be a normal personality trait, and that results from the O-LIFE questionnaire are not to be taken as diagnostic. If the participant has any concerns, we have provided resources for both mental health care and researcher contact in the debrief.	Low

Participants feeling that they perform 'abnormally' badly on the auditory task.	Emotional distress	Low	In the information sheet it is stated that the task will be difficult after the first few trials. So, the participant can expect that the task is difficult and is more likely to feel that any difficulties with the task are absolutely normal.	Low
Participants worried their data could face data breaching due to sensitive information	Emotional distress	Low	Data will be secured through anonymization of a participant ID. Data collected will thus not contain any personal information about the participant who completed the experiment. Participants will be made aware of this at the start of the experiment. The information sheet communicates the confidentiality of data with name and address removed and a unique code is used instead.	Low

Justification for selection of controls

Summarise justification for selecting control measures that are not to the highest, reasonably practicable standard or compliant with industry standard e.g. use of personal protective equipment rather than engineering means of control: State N/A if not applicable **N/A**

Additional Requirements (if not recorded elsewhere)

First Aid	**N/A**
Waste handling	**N/A**
Emergency	**N/A**
Training, supervision and competency	**N/A**
Other	

Competency Record

Name of worker	Measure of competency	Assessor comments	Competent to perform activity Y/N?	Signature (Worker)	Signature (Assessor)	Date

Guidance on completing the form

This form may be used to record the risk assessment for any University activity whether that be lab or workshop-based, an event, on or off-site working, etc. Separate templates exist for biological work, laser work and fieldwork.

Only complete a risk assessment if you have a good understanding of the activity being assessed and you have been instructed in the principles of carrying out a risk assessment (refer to your Business Unit arrangements on risk assessments).

Responsible Person

The manager who is responsible for the activity should approve the risk assessment, this indicates they agree the risk assessment is sufficiently detailed, they agree the control measures are appropriate and will be implemented and they authorise the work to commence. The Responsible Person may be a PI in the academic setting or a local line manager or head of section in non-academic sections of Schools/Faculties and Professional Services.

Those at risk / affected parties

Identify individuals or groups of people who might be affected by the Hazard. Besides staff and students consider visitors, members of the publics, volunteers and others who could be affected.

What are the hazards?

The definition of a Hazard is the potential for something to cause harm, e.g. chemicals, radiation, lasers, fire. In the Hazards column, list the hazards which could reasonably be expected to result in significant harm.

List the harm associated with the hazard

For each hazard, there may be one or more types of harm that could occur. For example, working with cryogenic substances - harm may be asphyxiation, cold burns or fire/explosion and each is likely to require different control measures to be implemented. It is recommended each is given a separate line on the form.

Risk Evaluation – High (H), Medium (M) or Low (L)

Decide whether the hazard presents a high, medium or low risk, based upon your knowledge of the severity of harm, frequency of activity and number and nature of the people involved. This is subjective which is why you must have good knowledge of the activity in order to undertake the risk assessment. Hazards that remain high risk once evaluated after control measures are put in place, must not proceed without further consideration.

What control measures are, or will be put, in place:

List what is, or will be put in place to reduce the likelihood of harm or make any harm less serious. These precautions should meet legal standards, represent good practice and reduce risk as far as reasonably practicable. They should also take into account the hierarchy of control and favour elimination, substitution, engineering methods over administrative controls. Fundamentally, ensure the risks are reduced so far as is reasonably practicable.

Review Period:

The University advises that all risk assessments are revised every two years to ensure validity. For activities undergoing change, consider a shorter timeframe for review. For lower risk activities, you may consider a longer timeframe. Comply with your Business Unit arrangements.

Justification for selection of controls

In brief, the hierarchy of control in terms of robustness is: (1) Elimination (2) Substitution (3) Engineering Control (4) Administrative Control. If not implementing a higher level of control, justify the reasons why a low level is appropriate in the situation.

Areas for additional consideration in your risk assessment or associated procedures

Consider training and supervision, manual handling, waste disposal, first aid, emergency situations such as spillage, access to medical assistance. It may be more appropriate for these to be covered as part of a safe working procedure or standard operating procedure

Ethics Approval Submission Form

Name of Applicant:- Joseph Sollini, Tobias Bast

Are you an undergraduate, postgraduate or staff? STAFF (Delete as appropriate)

E-mail address:- Joseph.Sollini@nottingham.ac.uk
Tobias.Bast@nottingham.ac.uk
Date of submission:-
Applicants home school / department: Medicine/Psychology

Title of project:- Is high schizotopy associated with impaired auditory rhythm processing?

Is this a re-submission? NO
If YES give the reference number of the original submission:-

Will this study involve brain stimulation (TMS or tDCS)? NO

Does the study include repetitive forms of TMS (rTMS)? NO

Will this study involve brain scanning (fMRI or MEG)? NO

This section to be completed by the supervisor or principal investigator

Name :- Tobias Bast
E-mail address :- Tobias.Bast@nottingham.ac.uk

Supervisors home school / department: Psychology

Please confirm that this application has your approval YES

Have you read the application to check that is accurate and complete?
YES

Has a similar study been approved by the Committee? YES

If YES give the reference number and submission date. This will speed the review process. Also state how this application differs.

Ref 322, 20 June 2013: Study investigating relation between schizotypy and attention by Kiri Granger and Mark Haselgrove
Ref 378, 26 November 2013, Schizotypy in relation to spatial memory, by Tobias Bast, Zara Janjua & Daisy Buckingham

The proposed new study differs from the previous studies above in that we will relate schizotypy scores to performance on an auditory rhythm detection task, instead of to attentional measures or performance on a computer-based place learning task.

Are all your ethical concerns identified in the application? YES

Declaration by Principal Investigator or Supervisor:

"*I have read the Ethical Risks Checklist and confirm that no items other than those listed in this submission are relevant to this research*." YES
Signature: Date: 25 April 2022

(submission from the supervisors University of Nottingham email address is to be used as well as a scanned electronic signature)

This section to be completed by the applicant

A. Rationale for the Research - Very briefly state the background and purpose of the proposed research (max = 300 words).

Auditory processing is abnormal in schizophrenia (Javitt and Sweet, 2015). Here, we will examine if healthy participants high in a personality trait called 'schizotypy', which has been linked neuropsychological characteristics of schizophrenia, show impairments on an auditory rhythm processing task.

Neural oscillatory activity in schizophrenia is abnormal, especially in the beta- and gamma-band frequencies (Uhlhaas and Singer, 2010). Moreover, the synchronisation of neural oscillations to rhythmic sound stimulation in these ranges is abnormal (Kwon et al. 1999). The auditory system may use this oscillatory activity when making predictions about the future of rhythmic sounds (Morillon and Schroeder, 2015). This suggests that disruption of neural oscillations should affect the ability to rapidly learn and make predictions about rhythmic sounds, and we developed a test for this (Sollini et al. 2021).

Neuropsychiatric disorders, including schizophrenia, have been suggested to reflect the extreme expression of personality traits that exist on a continuum within the general population. More specifically, there is a personality trait called schizotypy, which can be found in the general population. High schizotypy indicates a predisposition to subsequently developing schizophrenia, and schizophrenia patients show very high schizotypy. Moreover, healthy people high in schizotypy show neuropsychological characteristics related to schizophrenia, albeit in a weaker form (Nelson et al., 2013). This suggests that neuropsychological mechanisms relevant to schizophrenia can be studied in non-clinical populations by using measures of schizotypy.

Here, we will correlate questionnaire measures of schizotypy (Mason and Claridge, 2006) with performance on our test of auditory rhythm prediction (Sollini et al. 2022). Given the suggested link between schizotypy and schizophrenia (Nelson et al., 2013), we predict that relatively higher schizotypy predicts relatively poorer performance on the auditory rhythm prediction test. If we confirm this prediction, this will support the use of our auditory rhythm test to study schizophrenia-relevant neuropsychological mechanisms.

B. Procedure Give a complete description of the procedure (max = 1000 words). For web-based studies also provide the URL of the study and the URL of the software used (e.g., BOS, Qualtrics).

To ensure that participants have normal hearing health we will initially administer the SSQ12 (a 12 question hearing assessment tool, Noble et al., 2013).

Based on previous experience we would expect a standard deviation of ~10dB when measuring auditory behavioral thresholds using the proposed task (Sollini et al. 2021). We believe a 4dB difference would constitute a sufficient magnitude in threshold difference, between high, middle and low Schizotopy groups (categorized by Schizotopy scores, with high and low groups including those scoring within the top or bottom 25% of schizotypy based on Mason and Claridge, 2006, and the intermediate group scoring in between the top and bottom 25%), to warrant interest. This would correspond to an effect size of Cohen's d=0.4. This would require 78 participants within each group, and a total of 312 participants across the entire study, in order to achieve a power of 80% to detect this difference between two groups using one-tailed independent t-tests, with an alpha of 0.05. Participants will be asked to take part in listening in a rhythmic noise task (Sollini et al. 2021). Participants will be presented different types of sound signals (usually pure tone pips but sometimes rhythmic sounds) in the presence of a background sound (amplitude modulate pure tones). On each trial 3 sound backgrounds will be presented in serial order (with a 0.5 second silent gap between), in one of those backgrounds there will also be either a tone or the background will have changed slightly (e.g. slight frequency or sound level difference). The participant will be asked (via a graphical interface) to indicate in which of the backgrounds they heard either a) a change to the background or b) the addition of a tone pip. The size of the change in the background or the sound level of the tone will be varied across trials where an adaptive staircase procedure (3-down 1-up, i.e. 3 correct answers to lower sound level

or decrease the frequency difference between signal and background and 1 incorrect answer to reverse) will be used to decide the parameters of the signal/background on the next trial. We will need a least 6 reversals to be able to measure a behavioral threshold. Each trial will last between 6-8 seconds and the session will last no more than 40 minutess. During the task sounds will be presented at a comfortable sound level (i.e. less than <80dB SPL but generally at around 65dB SPL, which is roughly equivalent to the sound level of conversational speech).

After the hearing task, participants will be asked to complete the O-LIFE (Oxford-Liverpool Inventory of Experiences and Feelings) (Mason and Claridge, 2006) to establish each participant's level of schizotypy. The questionnaire includes 4 sections: cognitive disorganisation, introvertive anhedonia, unusual experiences and impulsive non-conformity. It will be emphasised to participants in the instruction and debrief sheets that results from this questionnaire are not a diagnostic, but that they are simply used to compare personality measures with the hearing task.

The task and the questionnaire together should take approximately one hour in total to complete. Participants will all be given information and debrief sheets to explain the nature of the study.

The auditory rhythm detection task and the O-LIFE questionnaire will be delivered online and, therefore, all data will be collected remotely.

Data will mainly be collected by MSc or UG students as part of their dissertation research projects. Participants may be recruited via the School of Psychology Research Participation Scheme, via students contacting acquaintances, via online platforms (such as Prolific) and by advertising the project and the School of Psychology webpage.

C. Items from the Ethical Risks Checklist. Explain how any of the following issues will be handled within your research to ensure ethically sound procedures (max = 300 words per item). Delete those items that do not apply.

1. Co-operation of a gatekeeper for initial access to the groups or individuals to be recruited (e.g. students at school, members of self-help group, residents of nursing home, prison inmates). See Guidance Notes on Educational Psychology applications.

N/A

2. Recruitment of patients or staff through the NHS.

N/A

3. Recruitment of people in a specially vulnerable state (e.g. depressed, anxious, bereaved etc).

N/A

4. Participants being investigated for a problem which has received medical, psychiatric, clinical psychological or other similar attention.

N/A

5. Participants who are vulnerable or may not be able to give free and informed consent (e.g. people under 16, those with learning disabilities or confusion, students dependent on you for their grades).

N/A

6. Any inducement for participants to take part other than reasonable expenses and compensation for time. See Guidance Notes.

N/A

7. Participants taking part in the study without their knowledge and consent at the time (e.g. covert observation of people in non-public places).

N/A

8.Children taking part in a study without their parents or carers having given explicit consent. The Committee will only approve "opt-out" consent in very exceptional circumstances.

N/A

9. Misleading participants about an experiment or withholding information.

N/A

10. Analysis of data about them which they did not know would be used for research purposes (especially confidential criminal, medical, or financial records).

N/A

11. Procedures which could affect participants' ability to give continuing consent, or to conduct themselves safely afterwards (e.g. alcohol use, hypnosis).
N/A

12. Procedures from which participants might not feel free to withdraw at any point or may regret taking part in.

Participants are free to withdraw from the study at any time without reason

13. Drugs, placebos or other substances (e.g. food substances, vitamins) or invasive, intrusive or potentially harmful procedures of any kind.

N/A

14. Blood or tissue samples.

N/A

15. Psychophysiological monitoring, TMS, tDCS, MEG or fMRI studies. See Guidance Notes.

N/A

16. Pain or more than mild discomfort.

N/A

17. Unpleasant, loud or prolonged stimuli.

Sounds will be presented at a comfortable sound level.

18. Deprivation or restriction (e.g. food or sleep).

N/A

19. Tasks which could threaten safety, if an accident occurred.

N/A

20. Prolonged testing or multiple sessions with the same participant.

Completion of the auditory rhythm detection task is expected to take a maximum of 40 min, and completion of the O-LIFE questionnaire a maximum of 20 min.

21. Procedures likely to change participants' mood, be aversive or stressful.

N/A

22. Procedures where participants might upset or harm one another or create conflict.

N/A

23. Lack of 'backup' / counselling / follow-up arrangements in cases where participants may be distressed or embarrassed.

Numbers for appropriate help lines will be provided, in case participants feel distressed about items in the questionnaire. However, we aim to minimize the risk of such distress by clearly pointing out, in Information and Debriefing sheets, that the questionnaire assesses normal personality traits and is not a diagnostic tool.

24. Recall of personal memories.

N/A

25. Information-gathering on sensitive issues, such as sexual, racial, religious or political attitudes.

It is emphasised in the information and debrief that the O-LIFE questionnaire is not a diagnostic tool and the results are confidential. In addition, the debrief will include contact details of mental health support groups, which the participants could contact if the questionnaire raised any issues about which they might be concerned.

26. Discussion or investigation of personal topics (e.g. relationships, feelings of success and failure) or any other procedure in which participants may have an emotional investment.

See 25.

27. Possible disclosure of confidential information (e.g. to other participants).

N/A

28. Possible identification of participants (e.g. when reporting results).

Participants are given a participant number rather than using their name, and their results remain anonymous throughout.

29. Online (web-based) study involving collection of personal data (i.e. data which relate to a living individual who can be identified). *Provide details about data security, server security, secure transmission of data, and data encryption. For surveys we recommend Bristol Online Surveys (https://www.onlinesurveys.ac.uk/) which is secure and free to use by University staff.*

Participant data, including information about age, education level, ethnicity and sex, and the O-Life questionnaire data will be collected, using the Psytester platform and or Prolific.

Any other reason(s) for possible ethical concern that you can think of.

Participants may potentially be upset if they score highly on the schizotypy questionnaire, misinterpreting this as a diagnostic tool. We will minimise the risk of this happening by highlighting, in our information and debriefing sheets, that the questionnaire assesses normal personality traits and is not used in a diagnostic or clinical manner.

D. Attachments Checklist.
Please confirm that the following are attached or indicate that they are not relevant to your research. Forms should be jargon-free and written in a style easily understandable by the participants of your study. The standard templates for Information Sheets and Consent Forms are downloadable from the Ethics workspace. Debrief statements or procedures are necessary for most research, not just that involving deception (see Guidance). Give your reasons for any departure from these standard procedures.*

1. Access and Recruitment letters (to participants, parents, schools etc)

Not Relevant
(delete as appropriate)

2. Template or example of recruitment posters (See Guidance Notes)
   Attached

3. Information Sheet for Participants.

Standard Form Attached.
Non-Standard Form Attached Not Relevant*

4. Consent Form (Please use the current template)

Standard Form Attached.

5. Debrief Statement/Procedure (see Guidance Notes)

Attached.

6. Examples of test materials, questionnaires etc. if these are not widely available and contain or deal with ethically sensitive material. Do not attach materials which the Committee are likely to have easy access to (e.g. widely published questionnaires) or neutral test materials.

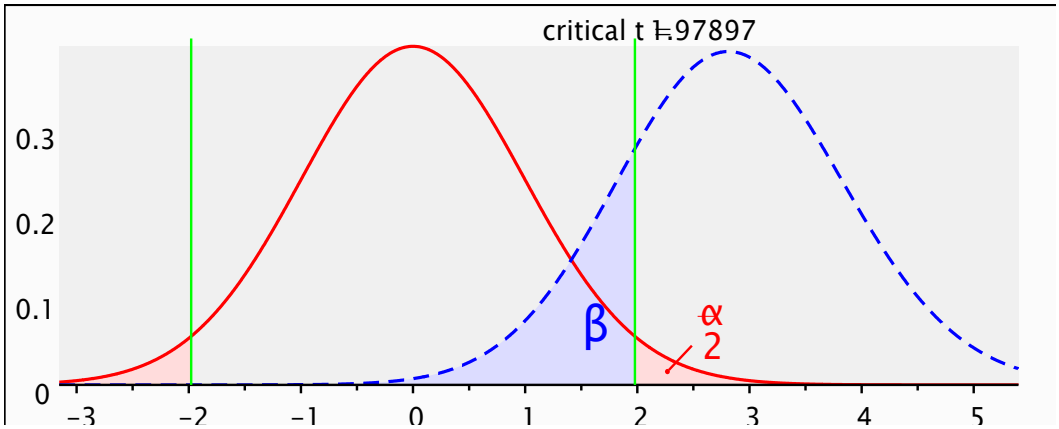
Attached

Appendix D
Sample Size Calculations (G*Power)

Table D1
*Input and Output Parameters from G*Power A Priori Power Analysis*

Input Parameters		Output Parameters	
Tails	2	Noncentrality parameter	2.828
Effect size d	0.5	Critical F	1.979
Alpha err prob	0.05	Df	126
Power (1-B err prob)	0.80	Sample size group 1	64
Allocation ratio N2/N1	1	Sample size group 2	64
		Total sample size	128
		Actual power	0.801

Figure D1
GPower Visualization of Critical t, α, and β for the A Priori Power Analysis



Appendix E
O-Life Questionnaire and SSQ12

Unusual Experiences

1. Do you believe in telepathy?
2. Do you ever feel sure that something is about to happen, even though there does not seem to be any reason for you thinking that?
3. Do you ever suddenly feel distracted by distant sounds that you are not normally aware of?
4. Do you often have days when indoor lights seem so bright that they bother your eyes?
5. Does your sense of smell sometimes become unusually strong?
6. Have you felt as though your head or limbs were somehow not your own?
7. Have you sometimes sensed an evil presence around you, even though you could not see it?
8. Have you wondered whether the spirits of the dead can influence the living?
9. On occasions, have you seen a person's face in front of you when no one was in fact there?
10. When in the dark do you often see shapes and forms even though there's nothing there?
11. When you look in the mirror does your face sometimes seem quite different from usual?
12. Are your thoughts sometimes so strong that you can almost hear them?
13. Can some people make you aware of them just by thinking about you?
14. Do ideas and insights sometimes come to you so fast that you cannot express them all?
15. Do the people in your daydreams seem so true to life that you sometimes think they are real?
16. Do you sometimes feel that your accidents are caused by mysterious forces?
17. Do you think you could learn to read other's minds if you wanted to?
18. Does it often happen that nearly every thought immediately and automatically suggests an enormous number of ideas?
19. Does a passing thought ever seem so real it frightens you?
20. Does your voice ever seem distant or faraway?
21. Have you ever felt that you have special, almost magical powers?
22. Is your hearing sometimes so sensitive that ordinary sounds become uncomfortable?
23. Do you ever have a sense of vague danger or sudden dread for reasons that you do not understand?
24. Do you feel so good at controlling others that it sometimes scares you?
25. Have you ever thought you heard people talking only to discover that it was in fact some nondescript noise?
26. Have you felt that you might cause something to happen just by thinking too much about it?
27. Have you occasionally felt as though your body did not exist?
28. Have you sometimes had the feeling of gaining or losing energy when certain people look at you or touch you?
29. Are the sounds you hear in your daydreams really clear and distinct?

30. Do your thoughts sometimes seem as real as actual events in your life?

Cognitive Disorganisation

1. Are you easily distracted when you read or talk to someone?
2. Do you ever feel that your speech is difficult to understand because the words are all mixed up and don't make sense?
3. Do you often experience an overwhelming sense of emptiness?
4. Do you often feel lonely?
5. Is it hard for you to make decisions?
6. Are you a person whose mood goes up and down easily?
7. Are you easily hurt when people find fault with you or the work you do?
8. Are you sometimes so nervous that you are 'blocked'?
9. Do you dread going into a room by yourself where other people have already gathered and are talking?
10. Do you easily lose your courage when criticised or failing in something?
11. Do you find it difficult to keep interested in the same thing for a long time?
12. Do you frequently have difficulty in starting to do things?
13. Do you often feel that there is no purpose to life?
14. Do you often have difficulties in controlling your thoughts?
15. Do you often worry about things you should not have done or said?
16. Do you worry about awful things that might happen?
17. No matter how hard you try to concentrate do unrelated thoughts creep into your mind?
18. When in a crowded room, do you often have difficulty in following a conversation?
19. Are you easily confused if too much happens at the same time?
20. Are you easily distracted from work by daydreams?
21. Do you often feel 'fed up'?
22. Do you worry too long after an embarrassing experience?
23. Would you call yourself a nervous person?
24. Do you often hesitate when you are going to say something in a group of people whom you more or less know?

Introvertive Anhedonia

1. Can you usually let yourself go and enjoy yourself at a lively party? *negative*
2. Do people who try to get to know you better usually give up after a while?
3. Do you feel that making new friends isn't worth the energy it takes?
4. Do you find the bright lights of a city exciting to look at? *negative*

5. Do you like going out a lot? *negative*
6. Do you prefer watching television to going out with other people?
7. Do you usually have very little desire to buy new kinds of food?
8. Is it fun to sing with other people? *negative*
9. Are people usually better off if they stay aloof from emotional involvements with people?
10. Are there very few things that you have ever really enjoyed doing?
11. Are you much too independent to really get involved with other people?
12. Are you rather lively? *negative*
13. Can just being with friends make you feel really good? *negative*
14. Do you have many friends? *negative*
15. Do you like mixing with people? *negative*
16. Do you think having close friends is not as important as some people say?
17. Does it often feel good to massage your muscles when they are tired or sore? *negative*
18. Has dancing or the idea of it always seemed dull to you?
19. Have you often felt uncomfortable when your friends touch you?
20. Is trying new foods something you have always enjoyed? *negative*
21. On seeing a soft, thick carpet have you sometimes had the impulse to take off your shoes and walk barefoot on it? *negative*
22. When things are bothering you do you like to talk to other people about it? *negative*
23. Do you feel very close to your friends? *negative*
24. Do you love having your back massaged? *negative*
25. Have you had very little fun from physical activities like walking, swimming, or sports?
26. Do you enjoy many different kinds of play and recreation? *negative*
27. Is it true that your relationships with other people never get very intense?

Impulsive Nonconformity

1. Do people who drive carefully annoy you?
2. Do you often feel like doing the opposite of what other people suggest, even though you know they are right?
3. Do you often feel the impulse to spend money which you know you can't afford?
4. Do you often have an urge to hit someone?
5. Do you sometimes talk about things you know nothing about?
6. Are you usually in an average sort of mood, not too high and not too low? *negative*
7. Do you at times have an urge to do something harmful or shocking?
8. Do you ever have the urge to break or smash things?

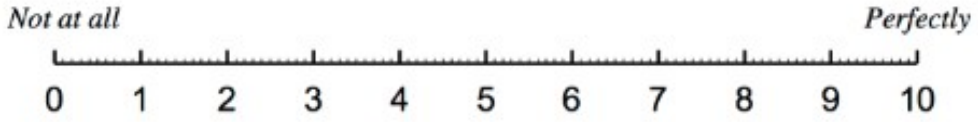
9. Do you often change between intense liking and disliking of the same person?
10. Do you stop to think things over before doing anything? *negative*
11. Do you think people spend too much time safeguarding their future with savings and insurance?
12. Have you ever blamed someone for doing something you know was really your fault?
13. Have you ever cheated at a game?
14. Have you ever felt the urge to injure yourself?
15. When in a group of people do you usually prefer to let someone else be the centre of attention? *negative*
16. When you catch a train do you often arrive at the last minute?
17. Would being in debt worry you? *negative*
18. Would you take drugs which may have strange or dangerous effects?
19. Do you consider yourself to be pretty much an average kind of person? *negative*
20. Have you ever taken advantage of someone?
21. Would you like other people to be afraid of you?
22. Do you often overindulge in alcohol or food?
23. Would it make you nervous to play the clown in front of other people? *negative*

All items scored + 1 for ‘yes’, 0 for ‘no’ except *negative* items for which + 1 for ‘no’, 0 for ‘yes’.

SSQ12: Speech, Spatial and Qualities of Hearing scale (short form)

All answered with reference to a 1-10 scale slider ranging from 'not at all' to 'perfectly' (see below)

1. You are talking with one other person and there is a TV on in the same room. Without turning the TV down, can you follow what the person you're talking to says?
2. You are listening to someone talking to you, while at the same time trying to follow the news on TV. Can you follow what both people are saying?
3. You are in conversation with one person in a room where there are many other people talking. Can you follow what the person you are talking to is saying?
4. You are in a group of about five people in a busy restaurant. You can see everyone else in the group. Can you follow the conversation?
5. You are with a group and the conversation switches from one person to another. Can you easily follow the conversation without missing the start of what each new speaker is saying?
6. You are outside. A dog barks loudly. Can you tell immediately where it is, without having to look?
7. Can you tell how far away a bus or a truck is, from the sound?
8. Can you tell from the sound whether a bus or truck is coming towards you or going away?
9. When you hear more than one sound at a time, do you have the impression that it seems like a single jumbled sound?
10. When you listen to music, can you make out which instruments are playing?
11. Do everyday sounds that you can hear easily seem clear to you (not blurred)?
12. Do you have to concentrate very much when listening to someone or something?



Appendix F
SPSS Output

1) Main effects of auditory prediction and sex, and their interaction, on task performance (ADT)

General Linear Model

Descriptive Statistics

	Sex	Mean	Std. Deviation	N
Unpredictable	Female	-2.71439	12.570797	330
	Male	-7.96329	14.121792	126
	Total	-4.16475	13.212593	456
Neutral	Female	-3.88523	12.854910	330
	Male	-8.29762	14.123375	126
	Total	-5.10444	13.348731	456
Predictable	Female	-12.32538	13.609731	330
	Male	-15.37897	14.733125	126
	Total	-13.16913	13.979759	456

Box's Test of Equality of Covariance Matrices[a]

Box's M	15.421
F	2.545
df1	6
df2	358250.821
Sig.	.018

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.[a]

a. Design: Intercept + Sex
Within Subjects Design: Prediction

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Sex	Statistic	df	Sig.	Statistic	df	Sig.
Unpredictable	Female	.101	330	<.001	.965	330	<.001
	Male	.105	126	.002	.966	126	.003
Predictable	Female	.056	330	.016	.988	330	.009
	Male	.095	126	.007	.977	126	.031
Neutral	Female	.091	330	<.001	.977	330	<.001
	Male	.082	126	.037	.978	126	.036

a. Lilliefors Significance Correction

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser	Epsilon Huynh-Feldt	Lower-bound
Prediction	.992	3.490	2	.175	.992	.999	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept + Sex
Within Subjects Design: Prediction
b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F
Prediction	Sphericity Assumed	16203.119	2	8101.559	203.381
	Greenhouse-Geisser	16203.119	1.985	8163.740	203.381
	Huynh-Feldt	16203.119	1.998	8110.324	203.381
	Lower-bound	16203.119	1.000	16203.119	203.381
Prediction * Sex	Sphericity Assumed	223.872	2	111.936	2.810
	Greenhouse-Geisser	223.872	1.985	112.795	2.810
	Huynh-Feldt	223.872	1.998	112.057	2.810
	Lower-bound	223.872	1.000	223.872	2.810
Error(Prediction)	Sphericity Assumed	36169.603	908	39.834	
	Greenhouse-Geisser	36169.603	901.084	40.140	
	Huynh-Feldt	36169.603	907.019	39.877	
	Lower-bound	36169.603	454.000	79.669	

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Sig.	Partial Eta Squared
Prediction	Sphericity Assumed	<.001	.309
	Greenhouse-Geisser	<.001	.309
	Huynh-Feldt	<.001	.309
	Lower-bound	<.001	.309
Prediction * Sex	Sphericity Assumed	.061	.006
	Greenhouse-Geisser	.061	.006
	Huynh-Feldt	.061	.006
	Lower-bound	.094	.006
Error(Prediction)	Sphericity Assumed		
	Greenhouse-Geisser		
	Huynh-Feldt		
	Lower-bound		

Levene's Test of Equality of Error Variances[a]

		Levene Statistic	df1	df2	Sig.
Unpredictable	Based on Mean	6.046	1	454	.014
	Based on Median	5.440	1	454	.020
	Based on Median and with adjusted df	5.440	1	453.997	.020
	Based on trimmed mean	6.256	1	454	.013
Neutral	Based on Mean	2.461	1	454	.117
	Based on Median	2.576	1	454	.109
	Based on Median and with adjusted df	2.576	1	453.999	.109
	Based on trimmed mean	2.483	1	454	.116
Predictable	Based on Mean	2.712	1	454	.100
	Based on Median	2.718	1	454	.100
	Based on Median and with adjusted df	2.718	1	453.995	.100
	Based on trimmed mean	2.714	1	454	.100

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.[a]

a. Design: Intercept + Sex
Within Subjects Design: Prediction

Tests of Between-Subjects Effects

Measure: MEASURE_1
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	77713.482	1	77713.482	169.526	<.001	.272
Sex	4913.862	1	4913.862	10.719	.001	.023
Error	208121.346	454	458.417			

Pairwise Comparisons

Measure: MEASURE_1

(I) Prediction	(J) Prediction	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b] Lower Bound	Upper Bound
1	2	-7.761*	.448	<.001	-8.837	-6.685
	3	-8.513*	.483	<.001	-9.674	-7.353
2	1	7.761*	.448	<.001	6.685	8.837
	3	-.753	.471	.331	-1.883	.378
3	1	8.513*	.483	<.001	7.353	9.674
	2	.753	.471	.331	-.378	1.883

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

1a) Boxplot Analysis for ADT outliers

Explore

Sex

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Sex	N	Percent	N	Percent	N	Percent
Unpredictable	Female	330	100.0%	0	0.0%	330	100.0%
	Male	126	100.0%	0	0.0%	126	100.0%
Predictable	Female	330	100.0%	0	0.0%	330	100.0%
	Male	126	100.0%	0	0.0%	126	100.0%
Neutral	Female	330	100.0%	0	0.0%	330	100.0%
	Male	126	100.0%	0	0.0%	126	100.0%

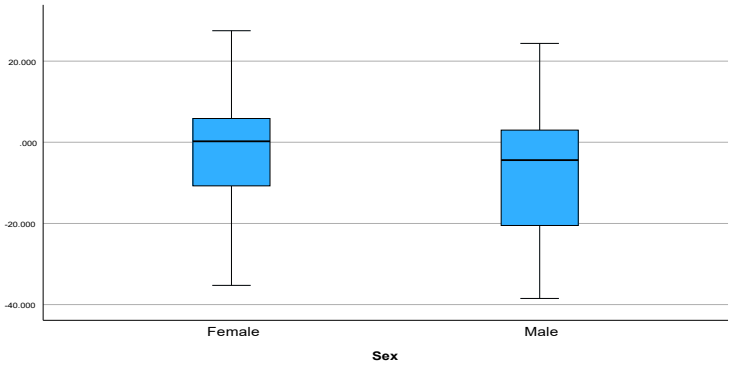
Extreme Values

	Sex			Case Number	Value
Unpredictable	Female	Highest	1	135	27.500
			2	15	26.875
			3	93	25.625
			4	431	23.500
			5	360	21.875
		Lowest	1	10	-35.250
			2	307	-34.750
			3	113	-33.750
			4	9	-33.000
			5	97	-32.250
	Male	Highest	1	68	24.375
			2	131	20.625
			3	287	13.750
			4	87	13.500
			5	63	13.125
		Lowest	1	16	-38.500
			2	440	-34.250
			3	414	-33.250
			4	308	-33.250
			5	104	-32.500
Predictable	Female	Highest	1	135	27.500
			2	15	26.250
			3	6	20.625
			4	383	19.125
			5	381	18.750[a]

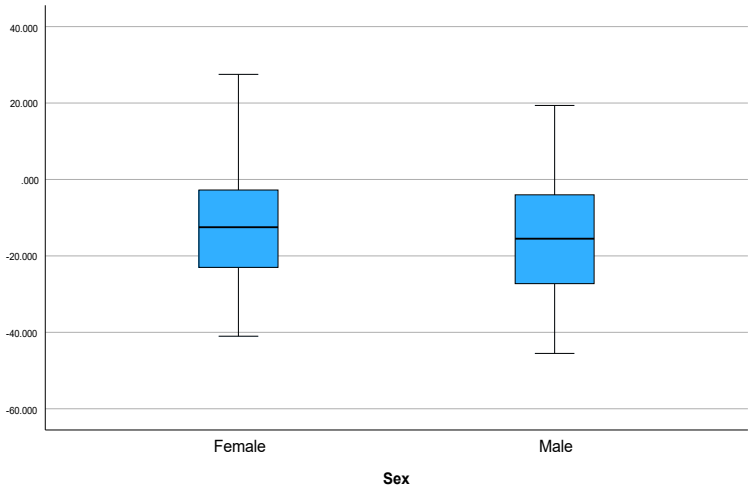
		Lowest	1	10	-41.000
			2	307	-40.250
			3	113	-39.500
			4	108	-38.000
			5	221	-37.500
	Male	Highest	1	131	19.375
			2	187	17.500
			3	355	15.375
			4	44	14.000
			5	63	10.625
		Lowest	1	414	-45.500
			2	317	-41.250
			3	439	-40.250
			4	308	-39.250
			5	16	-38.750
Neutral	Female	Highest	1	15	26.875
			2	57	22.500
			3	93	21.250
			4	135	21.000
			5	203	20.625[b]
		Lowest	1	10	-40.750
			2	416	-32.750
			3	113	-31.750
			4	409	-31.250
			5	97	-30.250
	Male	Highest	1	44	26.875
			2	155	26.250
			3	131	21.375
			4	438	16.625
			5	367	13.250
		Lowest	1	104	-40.250
			2	414	-37.500
			3	439	-36.500
			4	440	-30.500
			5	260	-30.250[c]

a. Only a partial list of cases with the value 18.750 are shown in the table of upper extremes.
b. Only a partial list of cases with the value 20.625 are shown in the table of upper extremes.
c. Only a partial list of cases with the value -30.250 are shown in the table of lower extremes.

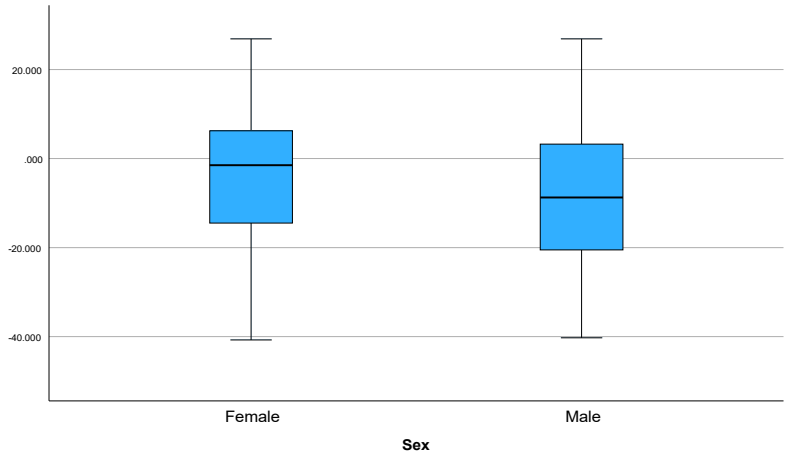
Unpredictable



Predictable



Neutral



2) Main effects of auditory prediction and musical experience, and their interaction, on task performance (ADT)

General Linear Model

Descriptive Statistics

	Musical_Experience	Mean	Std. Deviation	N
Unpredictable	Accomplished musician	-6.32692	17.547001	13
	Little/no experience	-3.87863	13.094153	310
	Plays an instrument	-4.44761	13.232164	136
	Total	-4.11656	13.250037	459
Neutral	Accomplished musician	-8.92308	14.902945	13
	Little/no experience	-4.74879	13.207764	310
	Plays an instrument	-5.41360	13.559407	136
	Total	-5.06400	13.350374	459
Predictable	Accomplished musician	-14.80769	16.006885	13
	Little/no experience	-13.00726	13.574608	310
	Plays an instrument	-13.18199	14.769995	136
	Total	-13.11002	13.979565	459

Box's Test of Equality of Covariance Matrices[a]

Box's M	17.894
F	1.413
df1	12
df2	4159.526
Sig.	.152

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.[a]

a. Design: Intercept + Musical_Experience
Within Subjects Design: Predict

Tests of Normality

Kolmogorov-Smirnov[a]			Shapiro-Wilk		
Statistic	df	Sig.	Statistic	df	Sig.
.136	13	.787	.962	13	.787
.060	310	.010	.988	310	.010
.087	136	.061	.981	136	.061
.120	13	.962	.977	13	.962
.076	310	<.001	.981	310	<.001
.112	136	.002	.967	136	.002
.101	13	.836	.966	13	.836
.111	310	<.001	.961	310	<.001
.094	136	.001	.963	136	.001

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser	Epsilon Huynh-Feldt	Epsilon Lower-bound
Predict	.991	3.962	2	.138	.991	1.000	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.[a]

a. Design: Intercept + Musical_Experience
Within Subjects Design: Predict

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square
Predict	Sphericity Assumed	4547.532	2	2273.766
	Greenhouse-Geisser	4547.532	1.983	2293.477
	Huynh-Feldt	4547.532	2.000	2273.766
	Lower-bound	4547.532	1.000	4547.532
Predict * Musical_Experience	Sphericity Assumed	46.884	4	11.721
	Greenhouse-Geisser	46.884	3.966	11.823
	Huynh-Feldt	46.884	4.000	11.721
	Lower-bound	46.884	2.000	23.442
Error(Predict)	Sphericity Assumed	36420.686	912	39.935
	Greenhouse-Geisser	36420.686	904.162	40.281
	Huynh-Feldt	36420.686	912.000	39.935
	Lower-bound	36420.686	456.000	79.870

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		F	Sig.	Partial Eta Squared
Predict	Sphericity Assumed	56.937	<.001	.111
	Greenhouse-Geisser	56.937	<.001	.111
	Huynh-Feldt	56.937	<.001	.111
	Lower-bound	56.937	<.001	.111
Predict * Musical_Experience	Sphericity Assumed	.294	.882	.001
	Greenhouse-Geisser	.294	.881	.001
	Huynh-Feldt	.294	.882	.001
	Lower-bound	.294	.746	.001
Error(Predict)	Sphericity Assumed			
	Greenhouse-Geisser			
	Huynh-Feldt			
	Lower-bound			

Levene's Test of Equality of Error Variances[a]

		Levene Statistic	df1	df2	Sig.
Unpredictable	Based on Mean	.843	2	456	.431
	Based on Median	.796	2	456	.452
	Based on Median and with adjusted df	.796	2	452.405	.452
	Based on trimmed mean	.851	2	456	.428
Neutral	Based on Mean	.401	2	456	.670
	Based on Median	.338	2	456	.713
	Based on Median and with adjusted df	.338	2	455.510	.713
	Based on trimmed mean	.410	2	456	.664
Predictable	Based on Mean	1.157	2	456	.315
	Based on Median	1.156	2	456	.316
	Based on Median and with adjusted df	1.156	2	448.183	.316
	Based on trimmed mean	1.168	2	456	.312

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.[a]
a. Design: Intercept + Musical_Experience
Within Subjects Design: Predict

Tests of Between-Subjects Effects
Measure: MEASURE_1
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	21277.290	1	21277.290	45.181	<.001
Musical_Experience	331.555	2	165.777	.352	.703
Error	214745.563	456	470.933		

Tests of Between-Subjects Effects
Measure: MEASURE_1
Transformed Variable: Average

Source	Partial Eta Squared
Intercept	.090
Musical_Experience	.002
Error	

Pairwise Comparisons

(I) Musical_Experience	(J) Musical_Experience	Mean Difference (I-J)	Std. Error	Sig.[a]	95%CI[a] Lower Bound	95%CI[a] Upper Bound
Accomplished musician	Little/no experience	-2.808	3.547	1.000	-11.331	5.715
	Plays an instrument	-2.338	3.637	1.000	-11.078	6.402
Little/no experience	Accomplished musician	2.808	3.547	1.000	-5.715	11.331
	Plays an instrument	.470	1.289	1.000	-2.627	3.566
Plays an instrument	Accomplished musician	2.338	3.637	1.000	-6.402	11.078
	Little/no experience	-.470	1.289	1.000	-3.566	2.627

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

Pairwise Comparisons

Measure: MEASURE_1

(I) prediction	(J) prediction	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b] Lower Bound	Upper Bound
1	2	-7.304*	.843	<.001	-9.329	-5.278
	3	-8.781*	.914	<.001	-10.977	-6.586
2	1	7.304*	.843	<.001	5.278	9.329
	3	-1.477	.885	.288	-3.605	.650
3	1	8.781*	.914	<.001	6.586	10.977
	2	1.477	.885	.288	-.650	3.605

3) Schizotypy Subscales – Correlations

Descriptives

			Statistic	Std. Error
UnEx_Raw	Mean		10.30	.318
	95% Confidence Interval for Mean	Lower Bound	9.68	
		Upper Bound	10.93	
	5% Trimmed Mean		10.00	
	Median		9.00	
	Variance		46.503	
	Std. Deviation		6.819	
	Minimum		0	
	Maximum		30	
	Range		30	
	Interquartile Range		10	
	Skewness		.545	.114
	Kurtosis		-.378	.227
CogDis_Raw	Mean		14.31	.274
	95% Confidence Interval for Mean	Lower Bound	13.77	
		Upper Bound	14.85	
	5% Trimmed Mean		14.47	
	Median		15.00	
	Variance		34.511	
	Std. Deviation		5.875	
	Minimum		0	
	Maximum		24	
	Range		24	
	Interquartile Range		9	
	Skewness		-.338	.114
	Kurtosis		-.715	.227
IntAn_Raw	Mean		7.65	.236
	95% Confidence Interval for Mean	Lower Bound	7.19	
		Upper Bound	8.12	
	5% Trimmed Mean		7.38	
	Median		7.00	
	Variance		25.637	
	Std. Deviation		5.063	
	Minimum		0	
	Maximum		23	
	Range		23	
	Interquartile Range		7	
	Skewness		.720	.114
	Kurtosis		-.117	.227
Impnon_Raw	Mean		7.21	.183
	95% Confidence Interval for Mean	Lower Bound	6.85	
		Upper Bound	7.57	
	5% Trimmed Mean		7.08	
	Median		7.00	
	Variance		15.419	
	Std. Deviation		3.927	
	Minimum		0	
	Maximum		21	
	Range		21	
	Interquartile Range		6	
	Skewness		.491	.114
	Kurtosis		-.269	.227

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
UnEx_Raw	.096	459	<.001	.960	459	<.001
CogDis_Raw	.092	459	<.001	.969	459	<.001
IntAn_Raw	.118	459	<.001	.944	459	<.001
Impnon_Raw	.097	459	<.001	.970	459	<.001

a. Lilliefors Significance Correction

Correlations

		UnEx_Raw	CogDis_Raw	IntAn_Raw	Impnon_Raw
UnEx_Raw	Pearson Correlation	1	.558**	.294**	.576**
	Sig. (2-tailed)		<.001	<.001	<.001
	N	459	459	459	459
CogDis_Raw	Pearson Correlation	.558**	1	.385**	.415**
	Sig. (2-tailed)	<.001		<.001	<.001
	N	459	459	459	459
IntAn_Raw	Pearson Correlation	.294**	.385**	1	.102*
	Sig. (2-tailed)	<.001	<.001		.028
	N	459	459	459	459
Impnon_Raw	Pearson Correlation	.576**	.415**	.102*	1
	Sig. (2-tailed)	<.001	<.001	.028	
	N	459	459	459	459

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Nonparametric Correlations

Correlations

			UnEx_Raw	CogDis_Raw	IntAn_Raw	Impnon_Raw
Spearman's rho	UnEx_Raw	Correlation Coefficient	1.000	.565**	.262**	.560**
		Sig. (2-tailed)	.	<.001	<.001	<.001
		N	459	459	459	459
	CogDis_Raw	Correlation Coefficient	.565**	1.000	.384**	.420**
		Sig. (2-tailed)	<.001	.	<.001	<.001
		N	459	459	459	459
	IntAn_Raw	Correlation Coefficient	.262**	.384**	1.000	.085
		Sig. (2-tailed)	<.001	<.001	.	.069
		N	459	459	459	459
	Impnon_Raw	Correlation Coefficient	.560**	.420**	.085	1.000
		Sig. (2-tailed)	<.001	<.001	.069	.
		N	459	459	459	459

**. Correlation is significant at the 0.01 level (2-tailed).

3b) Pearson Chi-Square Tests of Independence

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Sex_Num * Impnon_Category	456	99.3%	3	0.7%	459	100.0%
Sex_Num * IntAn_Category	456	99.3%	3	0.7%	459	100.0%
Sex_Num * UnEx_Category	456	99.3%	3	0.7%	459	100.0%
Sex_Num * CogDis_Category	456	99.3%	3	0.7%	459	100.0%

Sex_Num * Impnon_Category

Crosstab

Count

		Impnon_Category			
		High	Low	Medium	Total
Sex_Num	1	64	100	166	330
	2	31	24	71	126
Total		95	124	237	456

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	6.077[a]	2	.048
Likelihood Ratio	6.348	2	.042
N of Valid Cases	456		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 26.25.

Sex_Num * IntAn_Category

Crosstab

Count

		IntAn_Category			
		High	Low	Medium	Total
Sex_Num	1	75	110	145	330
	2	27	43	56	126
Total		102	153	201	456

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	.091[a]	2	.955
Likelihood Ratio	.092	2	.955
N of Valid Cases	456		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 28.18.

Sex_Num * UnEx_Category

Crosstab

Count

		UnEx_Category			
		High	Low	Medium	Total
Sex_Num	1	78	99	153	330
	2	24	41	61	126
Total		102	140	214	456

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.132[a]	2	.568
Likelihood Ratio	1.158	2	.561
N of Valid Cases	456		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 28.18.

Sex_Num * CogDis_Category

Crosstab

Count

		CogDis_Category			
		High	Low	Medium	Total
Sex_Num	1	81	69	180	330
	2	21	56	49	126
Total		102	125	229	456

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	25.407[a]	2	<.001
Likelihood Ratio	24.131	2	<.001
N of Valid Cases	456		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 28.18.

3c) Independent-Samples Mann-Whitney U Tests

Nonparametric Tests

Mann-Whitney U (2 samples)

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.[a,b]
1	The distribution of UnEx_Raw is the same across categories of Sex_Num.	Independent-Samples Mann-Whitney U Test	.201
2	The distribution of CogDis_Raw is the same across categories of Sex_Num.	Independent-Samples Mann-Whitney U Test	<.001
3	The distribution of IntAn_Raw is the same across categories of Sex_Num.	Independent-Samples Mann-Whitney U Test	.941
4	The distribution of Impnon_Raw is the same across categories of Sex_Num.	Independent-Samples Mann-Whitney U Test	.007

Hypothesis Test Summary

	Decision
1	Retain the null hypothesis.
2	Reject the null hypothesis.
3	Retain the null hypothesis.
4	Reject the null hypothesis.

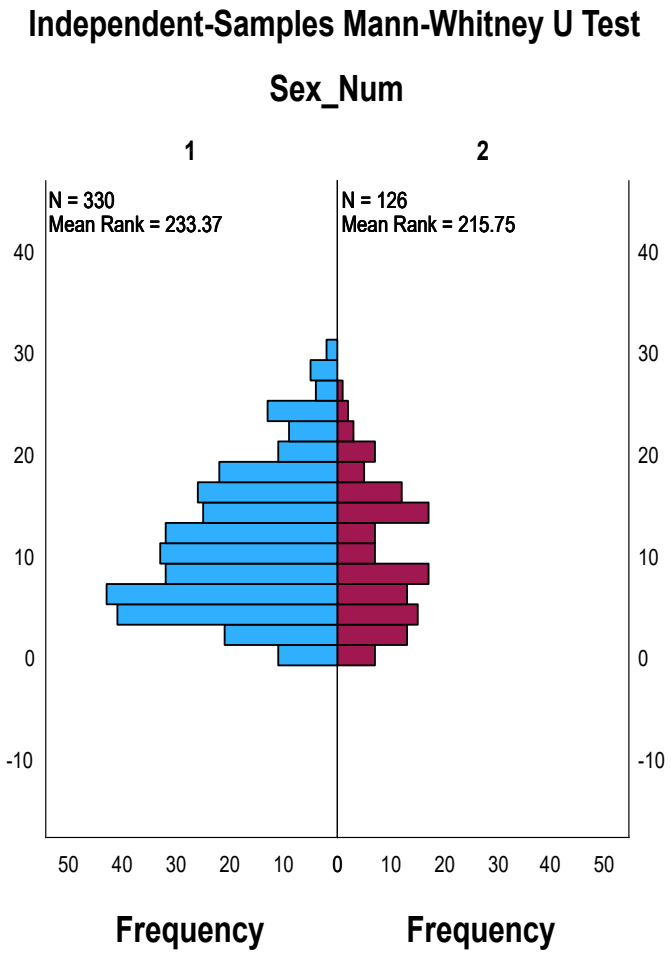
a. The significance level is .050.

b. Asymptotic significance is displayed.

UnEx_Raw across Sex_Num

Independent-Samples Mann-Whitney U Test Summary

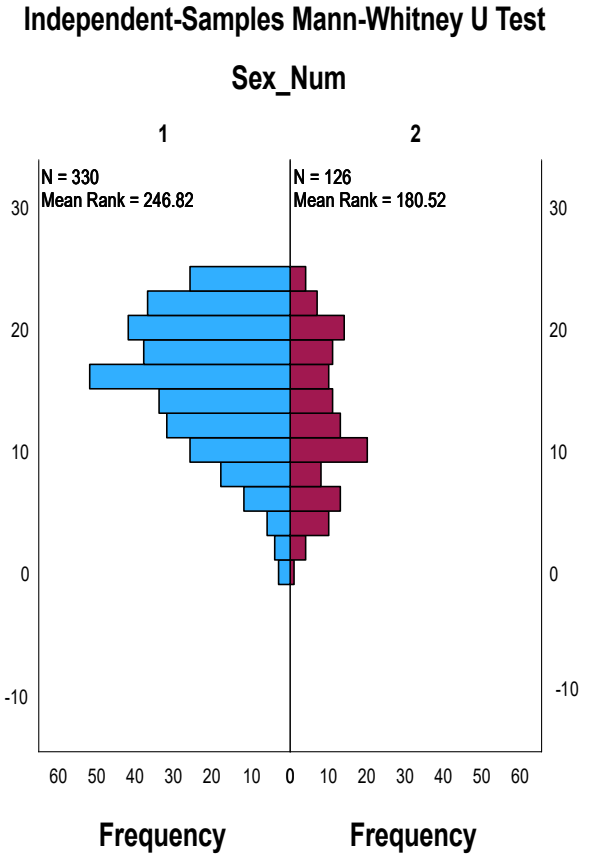
Total N	456
Mann-Whitney U	19183.000
Wilcoxon W	27184.000
Test Statistic	19183.000
Standard Error	1256.968
Standardized Test Statistic	-1.278
Asymptotic Sig.(2-sided test)	.201



CogDis_Raw across Sex_Num

Independent-Samples Mann-Whitney U Test Summary

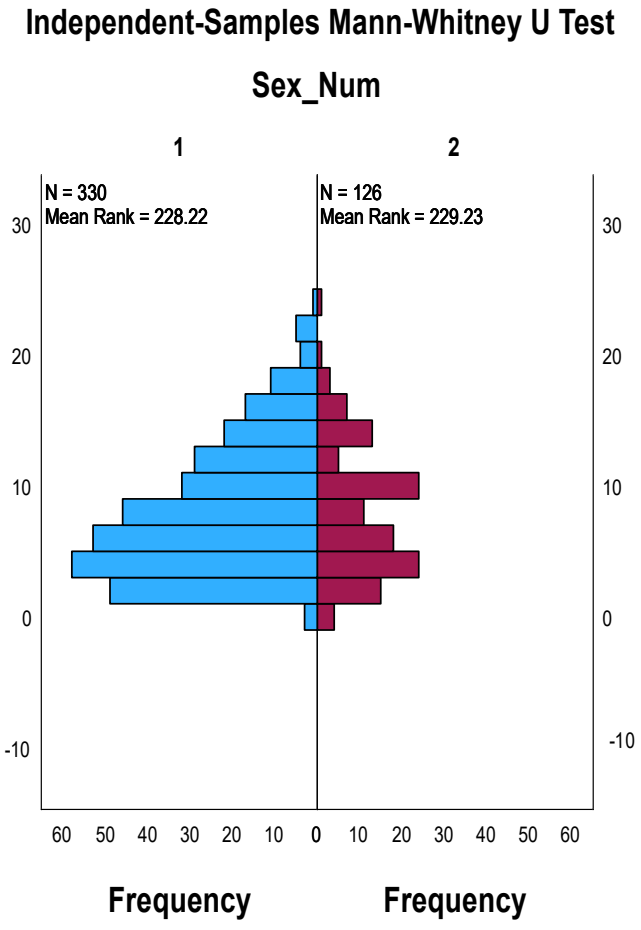
Total N	456
Mann-Whitney U	14744.000
Wilcoxon W	22745.000
Test Statistic	14744.000
Standard Error	1256.645
Standardized Test Statistic	-4.811
Asymptotic Sig.(2-sided test)	<.001



IntAn_Raw across Sex_Num

Independent-Samples Mann-Whitney U Test Summary

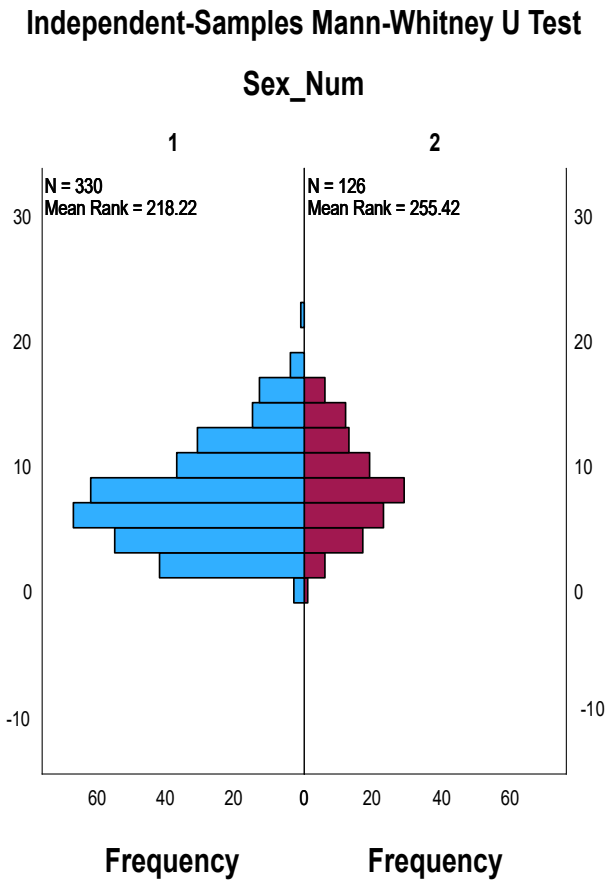
Total N	456
Mann-Whitney U	20882.500
Wilcoxon W	28883.500
Test Statistic	20882.500
Standard Error	1255.563
Standardized Test Statistic	.074
Asymptotic Sig.(2-sided test)	.941



Impnon_Raw across Sex_Num

Independent-Samples Mann-Whitney U Test Summary

Total N	456
Mann-Whitney U	24181.500
Wilcoxon W	32182.500
Test Statistic	24181.500
Standard Error	1254.427
Standardized Test Statistic	2.704
Asymptotic Sig.(2-sided test)	.007



4) Correlation Analysis for Composite SSQ12 scores against ATD (3 Prediction Conditions)

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
SSQ12_Total	459	100.0%	0	0.0%	459	100.0%
ADT_Unpredictable	459	100.0%	0	0.0%	459	100.0%
ADT_Predictable	459	100.0%	0	0.0%	459	100.0%
ADT_Neutral	459	100.0%	0	0.0%	459	100.0%

Descriptives

			Statistic	Std. Error
SSQ12_Total	Mean		7.023529411764707	.059334442784917
	95% Confidence Interval for Mean	Lower Bound	6.906927910353582	
		Upper Bound	7.140130913175831	
	5% Trimmed Mean		7.059020213023481	
	Median		7.033333333333334	
	Variance		1.616	
	Std. Deviation		1.271198029487859	
	Minimum		1.891666666666667	
	Maximum		10.000000000000000	
	Range		8.108333333333334	
	Interquartile Range		1.650000000000000	
	Skewness		-.438	.114
	Kurtosis		.583	.227
ADT_Unpredictable	Mean		-4.11656	.618459
	95% Confidence Interval for Mean	Lower Bound	-5.33193	
		Upper Bound	-2.90119	
	5% Trimmed Mean		-3.84238	
	Median		-1.00000	
	Variance		175.563	
	Std. Deviation		13.250037	
	Minimum		-38.500	
	Maximum		27.500	
	Range		66.000	
	Interquartile Range		18.000	
	Skewness		-.450	.114
	Kurtosis		-.424	.227
ADT_Predictable	Mean		-13.11002	.652510

	95% Confidence Interval for Mean	Lower Bound	-14.39231	
		Upper Bound	-11.82774	
	5% Trimmed Mean		-13.34119	
	Median		-13.00000	
	Variance		195.428	
	Std. Deviation		13.979565	
	Minimum		-45.500	
	Maximum		27.500	
	Range		73.000	
	Interquartile Range		21.750	
	Skewness		.169	.114
	Kurtosis		-.569	.227
ADT_Neutral	Mean		-5.06400	.623142
	95% Confidence Interval for Mean	Lower Bound	-6.28857	
		Upper Bound	-3.83943	
	5% Trimmed Mean		-4.98463	
	Median		-3.00000	
	Variance		178.232	
	Std. Deviation		13.350374	
	Minimum		-40.750	
	Maximum		26.875	
	Range		67.625	
	Interquartile Range		22.250	
	Skewness		-.175	.114
	Kurtosis		-.748	.227

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
SSQ12_Total	.034	459	.200*	.988	459	<.001
ADT_Unpredictable	.098	459	<.001	.966	459	<.001
ADT_Predictable	.052	459	.005	.988	459	<.001
ADT_Neutral	.084	459	<.001	.979	459	<.001

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

Nonparametric Correlations

Correlations

			SSQ12 Total	ADT Unpredictable	ADT Predictable	ADT Neutral
Spearman's rho	SSQ12 Total	Correlation Coefficient	1.000	-.121**	-.101*	-.127**
		Sig. (2-tailed)	.	.010	.031	.007
		N	459	459	459	459
	ADT Unpredictable	Correlation Coefficient	-.121**	1.000	.754**	.756**
		Sig. (2-tailed)	.010	.	<.001	<.001
		N	459	459	459	459
	ADT Predictable	Correlation Coefficient	-.101*	.754**	1.000	.809**
		Sig. (2-tailed)	.031	<.001	.	<.001
		N	459	459	459	459
	ADT Neutral	Correlation Coefficient	-.127**	.756**	.809**	1.000
		Sig. (2-tailed)	.007	<.001	<.001	
		N	459	459	459	

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Spearman's rho Correlations **Highly Positive:** *(None)* **Positive:** *(ADT_Unpredictable <---> ADT_Predictable), (ADT_Unpredictable <---> ADT_Neutral), (ADT_Predictable <---> ADT_Neutral)* **No Linear Correlation:** ***(None)*** **Negative:** *(SSQ12_Total <---> ADT_Unpredictable), (SSQ12_Total <---> ADT_Predictable), (SSQ12_Total <---> ADT_Neutral)* **Highly Negative:** *(None)Note: Curated Help is calculated based on actual cell values, not the formatted values.*

Correlations

			ADT Unpredictable	ADT Predictable	ADT Neutral
Spearman's rho	SSQ Speech	Correlation Coefficient	-.019	-.007	-.036
		Sig. (2-tailed)	.685	.888	.446
		N	459	459	459
	SSQ Spatial	Correlation Coefficient	-.116*	-.116*	-.120*
		Sig. (2-tailed)	.013	.013	.010
		N	459	459	459
	SSQ Qualities	Correlation Coefficient	-.138**	-.115*	-.133**
		Sig. (2-tailed)	.003	.014	.004
		N	459	459	459

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Spearman's rho Correlations **Highly Positive:** *(None)* **Positive:** *(None)* **No Linear Correlation:** *(None)* **Negative:** *(SSQ_Speech <---> ADT_Unpredictable), (SSQ_Speech <---> ADT_Predictable), (SSQ_Speech <---> ADT_Neutral), (SSQ_Spatial <---> ADT_Unpredictable), (SSQ_Spatial <---> ADT_Predictable), (SSQ_Spatial <---> ADT_Neutral), (SSQ_Qualities <---> ADT_Unpredictable), (SSQ_Qualities <---> ADT_Predictable), (SSQ_Qualities <---> ADT_Neutral)* **Highly Negative:** *(None)Note: Curated Help is calculated based on actual cell values, not the formatted values.*

5) ADT Scores by prediction condition and schizotypy subscale x sex

A) Unusual Experiences

General Linear Model

Within-Subjects Factors

Measure: MEASURE_1

Prediction	Dependent Variable
1	Unpredictable
2	Predictable
3	Neutral

Between-Subjects Factors

		Value Label	N
Unusual Experiences schizotypy category	1	Low	140
	2	Medium	214
	3	High	102
Sex (numeric)	1	Female	330
	2	Male	126

Descriptive Statistics

	Unusual Experiences schizotypy category	Sex (numeric)	Mean	Std. Deviation	N
Unpredictable	Low	Female	-2.91035	11.925765	99
		Male	-11.93902	13.343278	41
		Total	-5.55446	12.981190	140
	Medium	Female	-2.95098	12.619928	153
		Male	-8.42418	14.667660	61
		Total	-4.51110	13.430882	214
	High	Female	-2.00160	13.383630	78
		Male	.00000	10.864844	24
		Total	-1.53064	12.812788	102
	Total	Female	-2.71439	12.570797	330
		Male	-7.96329	14.121792	126
		Total	-4.16475	13.212593	456
Predictable	Low	Female	-13.29545	13.062942	99
		Male	-18.11890	14.384669	41
		Total	-14.70804	13.590636	140
	Medium	Female	-11.91422	14.081058	153
		Male	-16.59631	13.911839	61
		Total	-13.24883	14.159787	214
	High	Female	-11.90064	13.457535	78
		Male	-7.60417	15.315640	24
		Total	-10.88971	13.958559	102

	Total	Female	-12.32538	13.609731	330
		Male	-15.37897	14.733125	126
		Total	-13.16913	13.979759	456
Neutral	Low	Female	-3.81187	12.504927	99
		Male	-11.32622	13.940551	41
		Total	-6.01250	13.339838	140
	Medium	Female	-4.54739	13.027946	153
		Male	-9.79918	13.745781	61
		Total	-6.04439	13.416099	214
	High	Female	-2.67949	13.024789	78
		Male	.69271	12.104503	24
		Total	-1.88603	12.836102	102
	Total	Female	-3.88523	12.854910	330
		Male	-8.29762	14.123375	126
		Total	-5.10444	13.348731	456

Box's Test of Equality of Covariance Matrices[a]

Box's M	63.840
F	2.075
df1	30
df2	72963.175
Sig.	<.001

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.[a]

a. Design: Intercept + UnEx_Group + Sex_Num + UnEx_Group * Sex_Num
Within Subjects Design: Prediction

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Prediction	Pillai's Trace	.454	186.349[b]	2.000	449.000	<.001	.454
	Wilks' Lambda	.546	186.349[b]	2.000	449.000	<.001	.454
	Hotelling's Trace	.830	186.349[b]	2.000	449.000	<.001	.454
	Roy's Largest Root	.830	186.349[b]	2.000	449.000	<.001	.454
Prediction * UnEx_Group	Pillai's Trace	.007	.802	4.000	900.000	.524	.004
	Wilks' Lambda	.993	.801[b]	4.000	898.000	.525	.004
	Hotelling's Trace	.007	.800	4.000	896.000	.525	.004
	Roy's Largest Root	.007	1.545[c]	2.000	450.000	.214	.007
Prediction * Sex_Num	Pillai's Trace	.012	2.840[b]	2.000	449.000	.059	.012
	Wilks' Lambda	.988	2.840[b]	2.000	449.000	.059	.012
	Hotelling's Trace	.013	2.840[b]	2.000	449.000	.059	.012
	Roy's Largest Root	.013	2.840[b]	2.000	449.000	.059	.012
Prediction *	Pillai's Trace	.006	.640	4.000	900.000	.634	.003

UnEx_Group * Sex_Num							
	Wilks' Lambda	.994	.640[b]	4.000	898.000	.634	.003
	Hotelling's Trace	.006	.639	4.000	896.000	.635	.003
	Roy's Largest Root	.006	1.242[c]	2.000	450.000	.290	.005

a. Design: Intercept + UnEx_Group + Sex_Num + UnEx_Group * Sex_Num
Within Subjects Design: Prediction
b. Exact statistic
c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser	Epsilon Huynh-Feldt	Lower-bound
Prediction	.992	3.730	2	.155	.992	1.000	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.[a]
b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Prediction	Sphericity Assumed	14691.645	2	7345.823	184.118	<.001	.290
	Greenhouse-Geisser	14691.645	1.984	7406.590	184.118	<.001	.290
	Huynh-Feldt	14691.645	2.000	7345.823	184.118	<.001	.290
	Lower-bound	14691.645	1.000	14691.645	184.118	<.001	.290
Prediction * UnEx_Group	Sphericity Assumed	119.988	4	29.997	.752	.557	.003
	Greenhouse-Geisser	119.988	3.967	30.245	.752	.556	.003
	Huynh-Feldt	119.988	4.000	29.997	.752	.557	.003
	Lower-bound	119.988	2.000	59.994	.752	.472	.003
Prediction * Sex_Num	Sphericity Assumed	239.256	2	119.628	2.998	.050	.007
	Greenhouse-Geisser	239.256	1.984	120.618	2.998	.051	.007
	Huynh-Feldt	239.256	2.000	119.628	2.998	.050	.007
	Lower-bound	239.256	1.000	239.256	2.998	.084	.007
Prediction * UnEx_Group * Sex_Num	Sphericity Assumed	106.726	4	26.682	.669	.614	.003
	Greenhouse-Geisser	106.726	3.967	26.902	.669	.613	.003
	Huynh-Feldt	106.726	4.000	26.682	.669	.614	.003
	Lower-bound	106.726	2.000	53.363	.669	.513	.003
Error(Prediction)	Sphericity Assumed	35907.671	900	39.897			
	Greenhouse-Geisser	35907.671	892.616	40.227			

	Huynh-Feldt	35907.671	900.000	39.897			
	Lower-bound	35907.671	450.000	79.795			

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Prediction	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Prediction	Linear	47.056	1	47.056	1.161	.282	.003
	Quadratic	14644.589	1	14644.589	373.101	<.001	.453
Prediction * UnEx_Group	Linear	89.529	2	44.764	1.104	.332	.005
	Quadratic	30.459	2	15.229	.388	.679	.002
Prediction * Sex_Num	Linear	43.112	1	43.112	1.063	.303	.002
	Quadratic	196.144	1	196.144	4.997	.026	.011
Prediction * UnEx_Group * Sex_Num	Linear	17.490	2	8.745	.216	.806	.001
	Quadratic	89.236	2	44.618	1.137	.322	.005
Error(Prediction)	Linear	18244.704	450	40.544			
	Quadratic	17662.967	450	39.251			

Levene's Test of Equality of Error Variances[a]

		Levene Statistic	df1	df2	Sig.
Unpredictable	Based on Mean	1.757	5	450	.120
	Based on Median	1.570	5	450	.167
	Based on Median and with adjusted df	1.570	5	445.213	.167
	Based on trimmed mean	1.787	5	450	.114
Predictable	Based on Mean	.350	5	450	.882
	Based on Median	.321	5	450	.900
	Based on Median and with adjusted df	.321	5	436.302	.900
	Based on trimmed mean	.345	5	450	.886
Neutral	Based on Mean	.525	5	450	.758
	Based on Median	.514	5	450	.766
	Based on Median and with adjusted df	.514	5	440.619	.766
	Based on trimmed mean	.507	5	450	.771

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.[a]

a. Design: Intercept + UnEx_Group + Sex_Num + UnEx_Group * Sex_Num
Within Subjects Design: Prediction

Tests of Between-Subjects Effects

Measure: MEASURE_1
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	57655.773	1	57655.773	128.739	<.001	.222
UnEx_Group	5812.079	2	2906.040	6.489	.002	.028
Sex_Num	2188.075	1	2188.075	4.886	.028	.011
UnEx_Group * Sex_Num	3887.615	2	1943.808	4.340	.014	.019
Error	201531.847	450	447.849			

Estimated Marginal Means

1. Unusual Experiences schizotypy category * Sex (numeric)

Estimates

Measure: MEASURE_1

Unusual Experiences schizotypy category	Sex (numeric)	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Low	Female	-6.673	1.228	-9.086	-4.259
	Male	-13.795	1.908	-17.545	-10.045
Medium	Female	-6.471	.988	-8.412	-4.530
	Male	-11.607	1.564	-14.681	-8.532
High	Female	-5.527	1.383	-8.246	-2.808
	Male	-2.304	2.494	-7.205	2.598

Pairwise Comparisons

Measure: MEASURE_1

Sex (numeric)	(I) Unusual Experiences schizotypy category	(J) Unusual Experiences schizotypy category	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
						Lower Bound	Upper Bound
Female	Low	Medium	-.202	1.576	1.000	-3.989	3.585
		High	-1.145	1.850	1.000	-5.590	3.300
	Medium	Low	.202	1.576	1.000	-3.585	3.989
		High	-.944	1.700	1.000	-5.028	3.141
	High	Low	1.145	1.850	1.000	-3.300	5.590
		Medium	.944	1.700	1.000	-3.141	5.028

Male	Low	Medium	-2.188	2.467	1.000	-8.117	3.741
		High	-11.491*	3.140	<.001	-19.037	-3.945
	Medium	Low	2.188	2.467	1.000	-3.741	8.117
		High	-9.303*	2.944	.005	-16.377	-2.228
	High	Low	11.491*	3.140	<.001	3.945	19.037
		Medium	9.303*	2.944	.005	2.228	16.377

Based on estimated marginal means
*. The mean difference is significant at the .05 level.
b. Adjustment for multiple comparisons: Bonferroni.

Univariate Tests

Measure: MEASURE_1

Sex (numeric)		Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Female	Contrast	64.763	2	32.381	.217	.805	.001
	Error	67177.282	450	149.283			
Male	Contrast	2131.737	2	1065.868	7.140	<.001	.031
	Error	67177.282	450	149.283			

Each F tests the simple effects of Unusual Experiences schizotypy category within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

2. Unusual Experiences schizotypy category * Sex (numeric)

Estimates

Measure: MEASURE_1

Unusual Experiences schizotypy category	Sex (numeric)	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound	Mean Difference (I-J)	Std. Error	Sig.[b]	95% CI Interval Lower Bound	95% CI Interval Upper Bound
Low	Female	-6.673	1.228	-9.086	-4.259	7.122*	2.269	.002	2.663	2.663
	Male	-13.795	1.908	-17.545	-10.045	-7.122*	2.269	.002	-11.582	-11.582
Medium	Female	-6.471	.988	-8.412	-4.530	5.136*	1.850	.006	1.500	1.500
	Male	-11.607	1.564	-14.681	-8.532	-5.136*	1.850	.006	-8.772	-8.772
High	Female	-5.527	1.383	-8.246	-2.808	-3.223	2.852	.259	-8.828	-8.828
	Male	-2.304	2.494	-7.205	2.598	3.223	2.852	.259	-2.382	-2.382

Based on estimated marginal means
*. The mean difference is significant at the .05 level.
b. Adjustment for multiple comparisons: Bonferroni.

Univariate Tests

Measure: MEASURE_1

Unusual Experiences schizotypy category		Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Low	Contrast	1470.666	1	1470.666	9.852	.002	.021
	Error	67177.282	450	149.283			
Medium	Contrast	1150.287	1	1150.287	7.705	.006	.017
	Error	67177.282	450	149.283			
High	Contrast	190.696	1	190.696	1.277	.259	.003
	Error	67177.282	450	149.283			

Each F tests the simple effects of Sex (numeric) within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

Post Hoc Tests

A) Unusual Experiences schizotypy category

Multiple Comparisons

Measure: MEASURE_1

Bonferroni

(I) Unusual Experiences schizotypy category	(J) Unusual Experiences schizotypy category	Mean Difference (I-J)	Std. Error	Sig.	95% CI Lower Bound	95% CI Upper Bound
Low	Medium	-.82356	1.328115	1.000	-4.01497	2.36785
	High	-3.98954*	1.590554	.037	-7.81159	-.16750
Medium	Low	.82356	1.328115	1.000	-2.36785	4.01497
	High	-3.16598	1.470082	.095	-6.69854	.36657
High	Low	3.98954*	1.590554	.037	.16750	7.81159
	Medium	3.16598	1.470082	.095	-.36657	6.69854

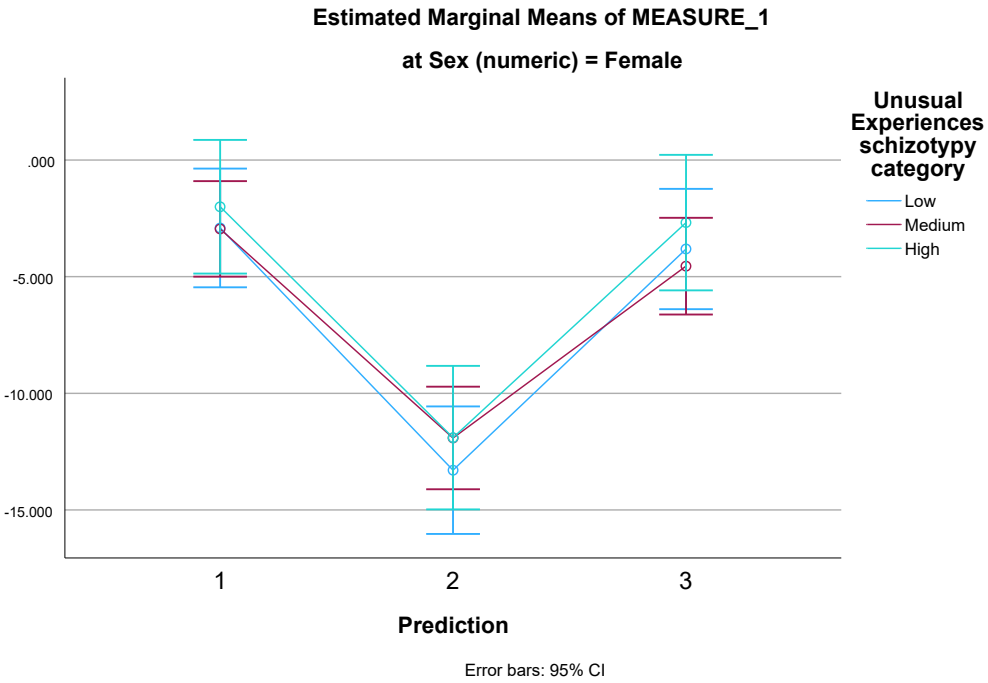
Based on observed means.

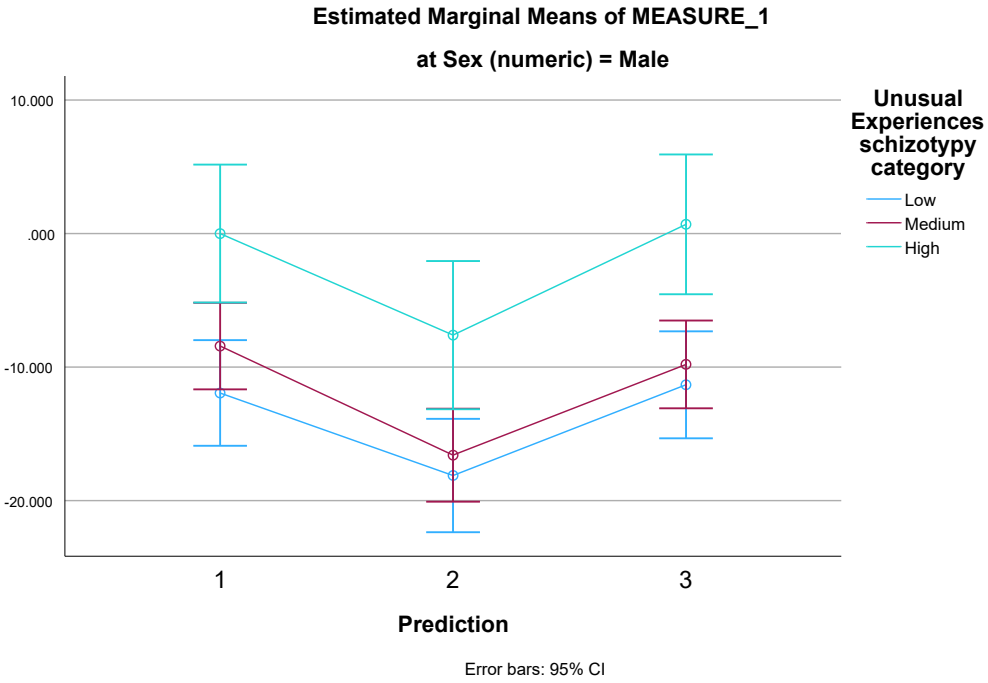
The error term is Mean Square(Error) = 149.283.

*. The mean difference is significant at the .05 level.

Profile Plots

Prediction * Unusual Experiences schizotypy category * Sex (numeric)





B) Introvertive Anhedonia

General Linear Model

Within-Subjects Factors

Measure: MEASURE_1

Prediction	Dependent Variable
1	Unpredictable
2	Predictable
3	Neutral

Between-Subjects Factors

		Value Label	N
Introvertive Anhedonia schizotypy category	1	Low	153
	2	Medium	201
	3	High	102
Sex (numeric)	1	Female	330
	2	Male	126

Descriptive Statistics

	Introvertive Anhedonia schizotypy category	Sex (numeric)	Mean	Std. Deviation	N
Unpredictable	Low	Female	-2.17273	12.518049	110
		Male	-11.09012	14.164303	43
		Total	-4.67892	13.563976	153
	Medium	Female	-2.31379	12.289664	145
		Male	-7.56027	14.098819	56
		Total	-3.77550	12.998818	201
	High	Female	-4.28333	13.213638	75
		Male	-3.81944	13.410554	27
		Total	-4.16054	13.200887	102
	Total	Female	-2.71439	12.570797	330
		Male	-7.96329	14.121792	126
		Total	-4.16475	13.212593	456
Predictable	Low	Female	-11.62955	13.605190	110
		Male	-18.45930	14.079618	43
		Total	-13.54902	14.035663	153
	Medium	Female	-11.31466	13.616596	145
		Male	-14.71652	14.452204	56
		Total	-12.26244	13.902237	201
	High	Female	-15.30000	13.355141	75
		Male	-11.84722	15.872362	27
		Total	-14.38603	14.066861	102

	Total	Female	-12.32538	13.609731	330
		Male	-15.37897	14.733125	126
		Total	-13.16913	13.979759	456
Neutral	Low	Female	-3.49659	12.400411	110
		Male	-10.28488	13.364380	43
		Total	-5.40441	12.999753	153
	Medium	Female	-3.00086	12.685511	145
		Male	-7.51786	14.071195	56
		Total	-4.25933	13.207378	201
	High	Female	-6.16500	13.711928	75
		Male	-6.75000	15.533811	27
		Total	-6.31985	14.139976	102
	Total	Female	-3.88523	12.854910	330
		Male	-8.29762	14.123375	126
		Total	-5.10444	13.348731	456

Box's Test of Equality of Covariance Matrices[a]

Box's M	56.243
F	1.830
df1	30
df2	91575.175
Sig.	.004

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.[a]

a. Design: Intercept + IntAn_Group + Sex_Num + IntAn_Group * Sex_Num
Within Subjects Design: Prediction

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Prediction	Pillai's Trace	.457	188.791[b]	2.000	449.000	<.001	.457
	Wilks' Lambda	.543	188.791[b]	2.000	449.000	<.001	.457
	Hotelling's Trace	.841	188.791[b]	2.000	449.000	<.001	.457
	Roy's Largest Root	.841	188.791[b]	2.000	449.000	<.001	.457
Prediction * IntAn_Group	Pillai's Trace	.008	.898	4.000	900.000	.465	.004
	Wilks' Lambda	.992	.897[b]	4.000	898.000	.465	.004
	Hotelling's Trace	.008	.897	4.000	896.000	.465	.004

	Roy's Largest Root	.008	1.718[c]	2.000	450.000	.181	.008
Prediction * Sex_Num	Pillai's Trace	.013	2.924[b]	2.000	449.000	.055	.013
	Wilks' Lambda	.987	2.924[b]	2.000	449.000	.055	.013
	Hotelling's Trace	.013	2.924[b]	2.000	449.000	.055	.013
	Roy's Largest Root	.013	2.924[b]	2.000	449.000	.055	.013
Prediction * IntAn_-Group * Sex_Num	Pillai's Trace	.007	.784	4.000	900.000	.535	.003
	Wilks' Lambda	.993	.784[b]	4.000	898.000	.536	.003
	Hotelling's Trace	.007	.783	4.000	896.000	.536	.003
	Roy's Largest Root	.007	1.535[c]	2.000	450.000	.217	.007

a. Design: Intercept + IntAn_Group + Sex_Num + IntAn_Group * Sex_Num
Within Subjects Design: Prediction

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Prediction	.992	3.470	2	.176	.992	1.000	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.[a]
a. Design: Intercept + IntAn_Group + Sex_Num + IntAn_Group * Sex_Num
Within Subjects Design: Prediction

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Prediction	Sphericity Assumed	15084.301	2	7542.150	188.969	<.001	.296
	Greenhouse-Geisser	15084.301	1.985	7600.212	188.969	<.001	.296
	Huynh-Feldt	15084.301	2.000	7542.150	188.969	<.001	.296
	Lower-bound	15084.301	1.000	15084.301	188.969	<.001	.296
Prediction * IntAn_Group	Sphericity Assumed	147.264	4	36.816	.922	.450	.004
	Greenhouse-Geisser	147.264	3.969	37.100	.922	.450	.004
	Huynh-Feldt	147.264	4.000	36.816	.922	.450	.004
	Lower-bound	147.264	2.000	73.632	.922	.398	.004
Prediction * Sex_Num	Sphericity Assumed	239.767	2	119.884	3.004	.050	.007
	Greenhouse-Geisser	239.767	1.985	120.807	3.004	.051	.007
	Huynh-Feldt	239.767	2.000	119.884	3.004	.050	.007
	Lower-bound	239.767	1.000	239.767	3.004	.084	.007
Prediction * IntAn_Group * Sex_Num	Sphericity Assumed	115.315	4	28.829	.722	.577	.003
	Greenhouse-Geisser	115.315	3.969	29.051	.722	.576	.003
	Huynh-Feldt	115.315	4.000	28.829	.722	.577	.003
	Lower-bound	115.315	2.000	57.658	.722	.486	.003
Error(Prediction)	Sphericity Assumed	35920.838	900	39.912			
	Greenhouse-Geisser	35920.838	893.124	40.219			
	Huynh-Feldt	35920.838	900.000	39.912			
	Lower-bound	35920.838	450.000	79.824			

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Prediction	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Prediction	Linear	166.123	1	166.123	4.113	.043	.009
	Quadratic	14918.178	1	14918.178	378.309	<.001	.457
Prediction * IntAn_Group	Linear	138.562	2	69.281	1.715	.181	.008
	Quadratic	8.702	2	4.351	.110	.896	.000
Prediction * Sex_Num	Linear	15.237	1	15.237	.377	.539	.001
	Quadratic	224.531	1	224.531	5.694	.017	.012
Prediction * IntAn_Group * Sex_Num	Linear	61.326	2	30.663	.759	.469	.003
	Quadratic	53.990	2	26.995	.685	.505	.003
Error(Prediction)	Linear	18175.613	450	40.390			
	Quadratic	17745.225	450	39.434			

Levene's Test of Equality of Error Variances[a]

		Levene Statistic	df1	df2	Sig.
Unpredictable	Based on Mean	.923	5	450	.466
	Based on Median	.865	5	450	.504
	Based on Median and with adjusted df	.865	5	445.879	.504
	Based on trimmed mean	.935	5	450	.458
Predictable	Based on Mean	.603	5	450	.697
	Based on Median	.551	5	450	.737
	Based on Median and with adjusted df	.551	5	448.892	.737
	Based on trimmed mean	.597	5	450	.703
Neutral	Based on Mean	1.091	5	450	.364
	Based on Median	.988	5	450	.425
	Based on Median and with adjusted df	.988	5	446.153	.425
	Based on trimmed mean	1.083	5	450	.369

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.[a]

a. Design: Intercept + IntAn_Group + Sex_Num + IntAn_Group * Sex_Num
Within Subjects Design: Prediction

Tests of Between-Subjects Effects

Measure: MEASURE_1
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	71398.011	1	71398.011	156.870	<.001	.258
IntAn_Group	713.087	2	356.543	.783	.457	.003
Sex_Num	3249.748	1	3249.748	7.140	.008	.016
IntAn_Group * Sex_Num	2700.533	2	1350.267	2.967	.052	.013
Error	204814.085	450	455.142			

Estimated Marginal Means

1. Introvertive Anhedonia schizotypy category * Sex (numeric)

Estimates

Measure: MEASURE_1

Introvertive Anhedonia schizotypy category	Sex (numeric)	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Low	Female	-5.766	1.174	-8.074	-3.458
	Male	-13.278	1.878	-16.970	-9.587
Medium	Female	-5.543	1.023	-7.553	-3.533
	Male	-9.932	1.646	-13.166	-6.697
High	Female	-8.583	1.422	-11.378	-5.788
	Male	-7.472	2.370	-12.131	-2.814

Pairwise Comparisons

Measure: MEASURE_1

Sex (numeric)	(I) Introvertive Anhedonia schizotypy category	(J) Introvertive Anhedonia schizotypy category	Mean Difference (I-J)	Std. Error	Sig.[a]	95% CI for Difference[a] Lower Bound	95% C I for Difference Upper Bound
Female	Low	Medium	-.223	1.557	1.000	-3.966	3.519
		High	2.816	1.844	.382	-1.616	7.249
	Medium	Low	.223	1.557	1.000	-3.519	3.966
		High	3.040	1.752	.250	-1.170	7.249
	High	Low	-2.816	1.844	.382	-7.249	1.616
		Medium	-3.040	1.752	.250	-7.249	1.170
Male	Low	Medium	-3.347	2.497	.543	-9.348	2.655
		High	-5.806	3.024	.167	-13.074	1.462

	Medium	Low	3.347	2.497	.543	-2.655	9.348
		High	-2.459	2.886	1.000	-9.394	4.475
	High	Low	5.806	3.024	.167	-1.462	13.074
		Medium	2.459	2.886	1.000	-4.475	9.394

Based on estimated marginal means
a. Adjustment for multiple comparisons: Bonferroni.

Univariate Tests

Measure: MEASURE_1

Sex (numeric)		Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Female	Contrast	505.210	2	252.605	1.665	.190	.007
	Error	68271.362	450	151.714			
Male	Contrast	597.210	2	298.605	1.968	.141	.009
	Error	68271.362	450	151.714			

Each F tests the simple effects of Introvertive Anhedonia schizotypy category within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

2. Introvertive Anhedonia schizotypy category * Sex (numeric)

Estimates

Measure: MEASURE_1

Introvertive Anhedonia schizotypy category	Sex (numeric)	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Low	Female	-5.766	1.174	-8.074	-3.458
	Male	-13.278	1.878	-16.970	-9.587
Medium	Female	-5.543	1.023	-7.553	-3.533
	Male	-9.932	1.646	-13.166	-6.697
High	Female	-8.583	1.422	-11.378	-5.788
	Male	-7.472	2.370	-12.131	-2.814

Pairwise Comparisons

Measure: MEASURE_1

Introvertive Anhedonia schizotypy category	(I) Sex (numeric)	(J) Sex (numeric)	Mean Difference (I-J)	Std. Error	Sig.[b]	95% CI for Difference[b] Lower Bound	95% C I for Difference Upper Bound
Low	Female	Male	7.512*	2.215	<.001	3.158	11.865
	Male	Female	-7.512*	2.215	<.001	-11.865	-3.158
Medium	Female	Male	4.388*	1.938	.024	.580	8.197
	Male	Female	-4.388*	1.938	.024	-8.197	-.580
High	Female	Male	-1.111	2.764	.688	-6.543	4.322
	Male	Female	1.111	2.764	.688	-4.322	6.543

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Univariate Tests

Measure: MEASURE_1

Introvertive Anhedonia schizotypy category		Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Low	Contrast	1744.453	1	1744.453	11.498	<.001	.025
	Error	68271.362	450	151.714			
Medium	Contrast	778.003	1	778.003	5.128	.024	.011
	Error	68271.362	450	151.714			
High	Contrast	24.485	1	24.485	.161	.688	.000
	Error	68271.362	450	151.714			

Each F tests the simple effects of Sex (numeric) within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

Post Hoc Tests

Introvertive Anhedonia schizotypy category

Multiple Comparisons

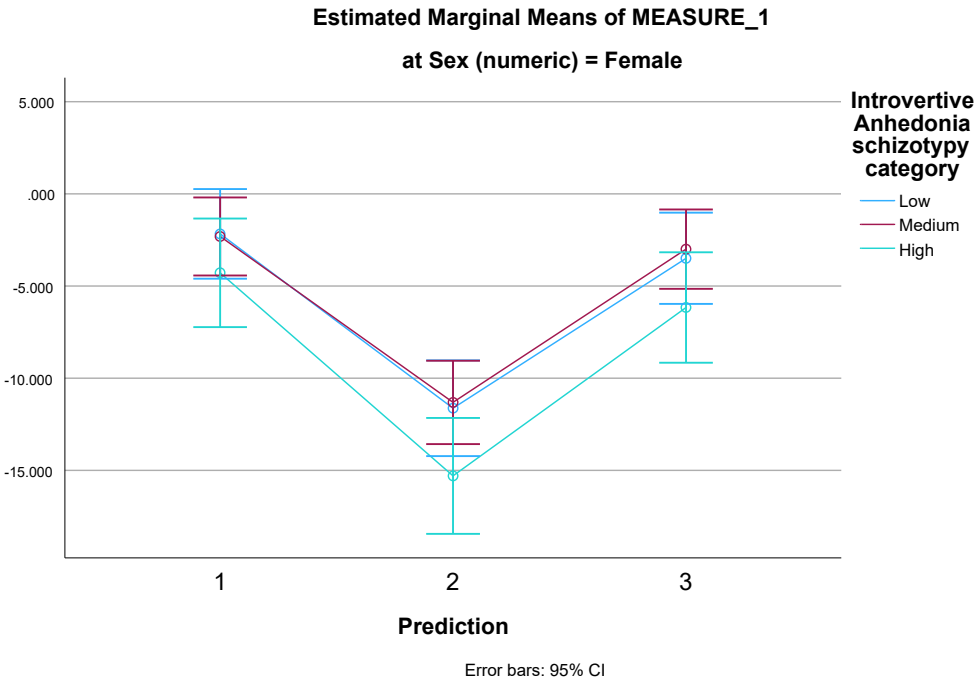
Measure: MEASURE_1
Bonferroni

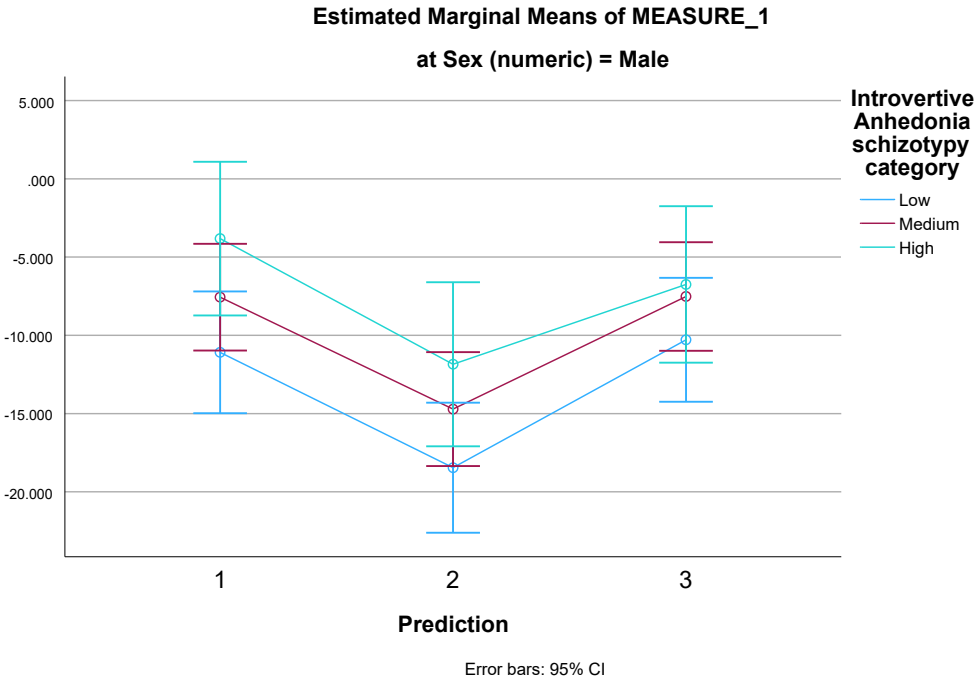
(I) Introvertive Anhedonia schizotypy category	(J) Introvertive Anhedonia schizotypy category	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Low	Medium	-1.11170	1.321511	1.000	-4.28724	2.06385
	High	.41136	1.574481	1.000	-3.37206	4.19478
Medium	Low	1.11170	1.321511	1.000	-2.06385	4.28724
	High	1.52305	1.497394	.929	-2.07513	5.12124
High	Low	-.41136	1.574481	1.000	-4.19478	3.37206
	Medium	-1.52305	1.497394	.929	-5.12124	2.07513

Based on observed means.
The error term is Mean Square(Error) = 151.714.

Profile Plots

Prediction * Introvertive Anhedonia schizotypy category * Sex (numeric)





C) Impulsive NonConformity

General Linear Model

Within-Subjects Factors

Measure: MEASURE_1

Prediction	Dependent Variable
1	Unpredictable
2	Predictable
3	Neutral

Between-Subjects Factors

		Value Label	N
Impulsive Nonconformity schizotypy category	1	Low	124
	2	Medium	237
	3	High	95
Sex (numeric)	1	Female	330
	2	Male	126

Descriptive Statistics

	Impulsive Nonconformity schizotypy category	Sex (numeric)	Mean	Std. Deviation	N
Unpredictable	Low	Female	-4.05750	11.599556	100
		Male	-9.84896	14.832533	24
		Total	-5.17843	12.438366	124
	Medium	Female	-3.10166	12.687806	166
		Male	-8.68662	14.543820	71
		Total	-4.77479	13.485637	237
	High	Female	.38867	13.384706	64
		Male	-4.84677	12.433645	31
		Total	-1.31974	13.247550	95
	Total	Female	-2.71439	12.570797	330
		Male	-7.96329	14.121792	126
		Total	-4.16475	13.212593	456
Predictable	Low	Female	-14.47500	12.533251	100
		Male	-16.55729	14.742628	24
		Total	-14.87802	12.952074	124
	Medium	Female	-11.86822	13.884632	166
		Male	-16.30986	14.693093	71
		Total	-13.19884	14.246969	237
	High	Female	-10.15234	14.242574	64
		Male	-12.33468	14.877219	31

		Total	-10.86447	14.410037	95
	Total	Female	-12.32538	13.609731	330
		Male	-15.37897	14.733125	126
		Total	-13.16913	13.979759	456
Neutral	Low	Female	-6.38625	12.402462	100
		Male	-10.88542	12.520305	24
		Total	-7.25706	12.502198	124
	Medium	Female	-3.85166	12.895762	166
		Male	-9.58451	14.685981	71
		Total	-5.56909	13.680909	237
	High	Female	-.06445	12.686036	64
		Male	-3.34677	13.156340	31
		Total	-1.13553	12.864521	95
	Total	Female	-3.88523	12.854910	330
		Male	-8.29762	14.123375	126
		Total	-5.10444	13.348731	456

Box's Test of Equality of Covariance Matrices[a]

Box's M	63.205
F	2.051
df1	30
df2	62644.270
Sig.	<.001

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.[a]

a. Design: Intercept + Impnon_Group + Sex_Num + Impnon_Group * Sex_Num
Within Subjects Design: Prediction

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Prediction	Pillai's Trace	.436	173.886[b]	2.000	449.000	<.001	.436
	Wilks' Lambda	.564	173.886[b]	2.000	449.000	<.001	.436
	Hotelling's Trace	.775	173.886[b]	2.000	449.000	<.001	.436
	Roy's Largest Root	.775	173.886[b]	2.000	449.000	<.001	.436
Prediction * Impnon_Group	Pillai's Trace	.012	1.355	4.000	900.000	.248	.006
	Wilks' Lambda	.988	1.356[b]	4.000	898.000	.247	.006
	Hotelling's	.012	1.356	4.000	896.000	.247	.006

	Trace						
	Roy's Largest Root	.012	2.621[c]	2.000	450.000	.074	.012
Prediction * Sex_Num	Pillai's Trace	.014	3.167[b]	2.000	449.000	.043	.014
	Wilks' Lambda	.986	3.167[b]	2.000	449.000	.043	.014
	Hotelling's Trace	.014	3.167[b]	2.000	449.000	.043	.014
	Roy's Largest Root	.014	3.167[b]	2.000	449.000	.043	.014
Prediction * Impnon_Group * Sex_Num	Pillai's Trace	.004	.415	4.000	900.000	.798	.002
	Wilks' Lambda	.996	.414[b]	4.000	898.000	.799	.002
	Hotelling's Trace	.004	.413	4.000	896.000	.799	.002
	Roy's Largest Root	.003	.715[c]	2.000	450.000	.490	.003

a. Design: Intercept + Impnon_Group + Sex_Num + Impnon_Group * Sex_Num
Within Subjects Design: Prediction

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b]	Epsilon	
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Prediction	.992	3.688	2	.158	.992	1.000	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.[a]
a. Design: Intercept + Impnon_Group + Sex_Num + Impnon_Group * Sex_Num
Within Subjects Design: Prediction

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Prediction	Sphericity Assumed	13751.015	2	6875.507	172.632	<.001	.277
	Greenhouse-Geisser	13751.015	1.984	6931.752	172.632	<.001	.277
	Huynh-Feldt	13751.015	2.000	6875.507	172.632	<.001	.277
	Lower-bound	13751.015	1.000	13751.015	172.632	<.001	.277
Prediction * Impnon_Group	Sphericity Assumed	199.119	4	49.780	1.250	.288	.006
	Greenhouse-Geisser	199.119	3.968	50.187	1.250	.288	.006
	Huynh-Feldt	199.119	4.000	49.780	1.250	.288	.006
	Lower-bound	199.119	2.000	99.559	1.250	.288	.006
Prediction * Sex_Num	Sphericity Assumed	265.230	2	132.615	3.330	.036	.007
	Greenhouse-Geisser	265.230	1.984	133.700	3.330	.037	.007
	Huynh-Feldt	265.230	2.000	132.615	3.330	.036	.007
	Lower-bound	265.230	1.000	265.230	3.330	.069	.007
Prediction * Impnon_Group * Sex_Num	Sphericity Assumed	70.449	4	17.612	.442	.778	.002
	Greenhouse-Geisser	70.449	3.968	17.756	.442	.777	.002
	Huynh-Feldt	70.449	4.000	17.612	.442	.778	.002
	Lower-bound	70.449	2.000	35.224	.442	.643	.002
Error(Prediction)	Sphericity Assumed	35844.808	900	39.828			
	Greenhouse-Geisser	35844.808	892.697	40.153			
	Huynh-Feldt	35844.808	900.000	39.828			
	Lower-bound	35844.808	450.000	79.655			

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Prediction	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Prediction	Linear	65.733	1	65.733	1.628	.203	.004
	Quadratic	13685.282	1	13685.282	348.390	<.001	.436
Prediction * Impnon_Group	Linear	101.418	2	50.709	1.256	.286	.006
	Quadratic	97.700	2	48.850	1.244	.289	.005
Prediction * Sex_Num	Linear	40.092	1	40.092	.993	.320	.002
	Quadratic	225.138	1	225.138	5.731	.017	.013
Prediction * Impnon_Group * Sex_Num	Linear	37.554	2	18.777	.465	.628	.002
	Quadratic	32.895	2	16.447	.419	.658	.002
Error(Prediction)	Linear	18168.140	450	40.374			
	Quadratic	17676.668	450	39.281			

Levene's Test of Equality of Error Variances[a]

		Levene Statistic	df1	df2	Sig.
Unpredictable	Based on Mean	1.914	5	450	.091
	Based on Median	1.684	5	450	.137
	Based on Median and with adjusted df	1.684	5	440.267	.137
	Based on trimmed mean	1.932	5	450	.088
Predictable	Based on Mean	.686	5	450	.634
	Based on Median	.661	5	450	.653
	Based on Median and with adjusted df	.661	5	433.445	.653
	Based on trimmed mean	.683	5	450	.637
Neutral	Based on Mean	.873	5	450	.499
	Based on Median	.832	5	450	.528
	Based on Median and with adjusted df	.832	5	438.824	.528
	Based on trimmed mean	.891	5	450	.487

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.[a]

a. Design: Intercept + Impnon_Group + Sex_Num + Impnon_Group * Sex_Num
Within Subjects Design: Prediction

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	59355.201	1	59355.201	131.303	<.001	.226
Impnon_Group	3839.944	2	1919.972	4.247	.015	.019
Sex_Num	4200.740	1	4200.740	9.293	.002	.020
Impnon_Group * Sex_Num	143.583	2	71.792	.159	.853	.001
Error	203421.747	450	452.048			

Estimated Marginal Means

1. Impulsive Nonconformity schizotypy category * Sex (numeric)

Estimates

Measure: MEASURE_1

Impulsive Nonconformity schizotypy category	Sex (numeric)	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Low	Female	-8.306	1.228	-10.719	-5.894
	Male	-12.431	2.506	-17.355	-7.506
Medium	Female	-6.274	.953	-8.146	-4.401
	Male	-11.527	1.457	-14.390	-8.664
High	Female	-3.276	1.534	-6.292	-.261
	Male	-6.843	2.205	-11.176	-2.510

Pairwise Comparisons

Measure: MEASURE_1

Sex (numeric)	(I) Impulsive Nonconformity schizotypy category	(J) Impulsive Nonconformity schizotypy category	Mean Difference (I-J)	Std. Error	Sig.[b]	95% CI for Difference[b]	95% CI for Difference
						Lower Bound	Upper Bound
Female	Low	Medium	-2.032	1.554	.575	-5.766	1.702
		High	-5.030*	1.965	.032	-9.752	-.308
	Medium	Low	2.032	1.554	.575	-1.702	5.766
		High	-2.998	1.806	.293	-7.338	1.342
	High	Low	5.030*	1.965	.032	.308	9.752
		Medium	2.998	1.806	.293	-1.342	7.338
Male	Low	Medium	-.904	2.898	1.000	-7.868	6.061
		High	-5.588	3.338	.284	-13.608	2.432
	Medium	Low	.904	2.898	1.000	-6.061	7.868
		High	-4.684	2.643	.231	-11.034	1.666

	High	Low	5.588	3.338	.284	-2.432	13.608
		Medium	4.684	2.643	.231	-1.666	11.034

Based on estimated marginal means
*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Univariate Tests

Measure: MEASURE_1

Sex (numeric)		Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Female	Contrast	987.831	2	493.916	3.278	.039	.014
	Error	67807.249	450	150.683			
Male	Contrast	578.702	2	289.351	1.920	.148	.008
	Error	67807.249	450	150.683			

Each F tests the simple effects of Impulsive Nonconformity schizotypy category within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

2. Impulsive Nonconformity schizotypy category * Sex (numeric)

Estimates

Measure: MEASURE_1

Impulsive Nonconformity schizotypy category	Sex (numeric)	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Low	Female	-8.306	1.228	-10.719	-5.894
	Male	-12.431	2.506	-17.355	-7.506
Medium	Female	-6.274	.953	-8.146	-4.401
	Male	-11.527	1.457	-14.390	-8.664
High	Female	-3.276	1.534	-6.292	-.261
	Male	-6.843	2.205	-11.176	-2.510

Pairwise Comparisons

Measure: MEASURE_1

Impulsive Nonconformity schizotypy category	(I) Sex (numeric)	(J) Sex (numeric)	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b] Lower Bound	95% Confidence Interval for Difference Upper Bound
Low	Female	Male	4.124	2.790	.140	-1.359	9.608
	Male	Female	-4.124	2.790	.140	-9.608	1.359
Medium	Female	Male	5.253*	1.741	.003	1.832	8.674
	Male	Female	-5.253*	1.741	.003	-8.674	-1.832
High	Female	Male	3.567	2.686	.185	-1.712	8.846
	Male	Female	-3.567	2.686	.185	-8.846	1.712

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Univariate Tests

Measure: MEASURE_1

Impulsive Nonconformity schizotypy category		Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Low	Contrast	329.224	1	329.224	2.185	.140	.005
	Error	67807.249	450	150.683			
Medium	Contrast	1372.327	1	1372.327	9.107	.003	.020
	Error	67807.249	450	150.683			
High	Contrast	265.675	1	265.675	1.763	.185	.004
	Error	67807.249	450	150.683			

Each F tests the simple effects of Sex (numeric) within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

Post Hoc Tests

Impulsive Nonconformity schizotypy category

Multiple Comparisons

Measure: MEASURE_1
Bonferroni

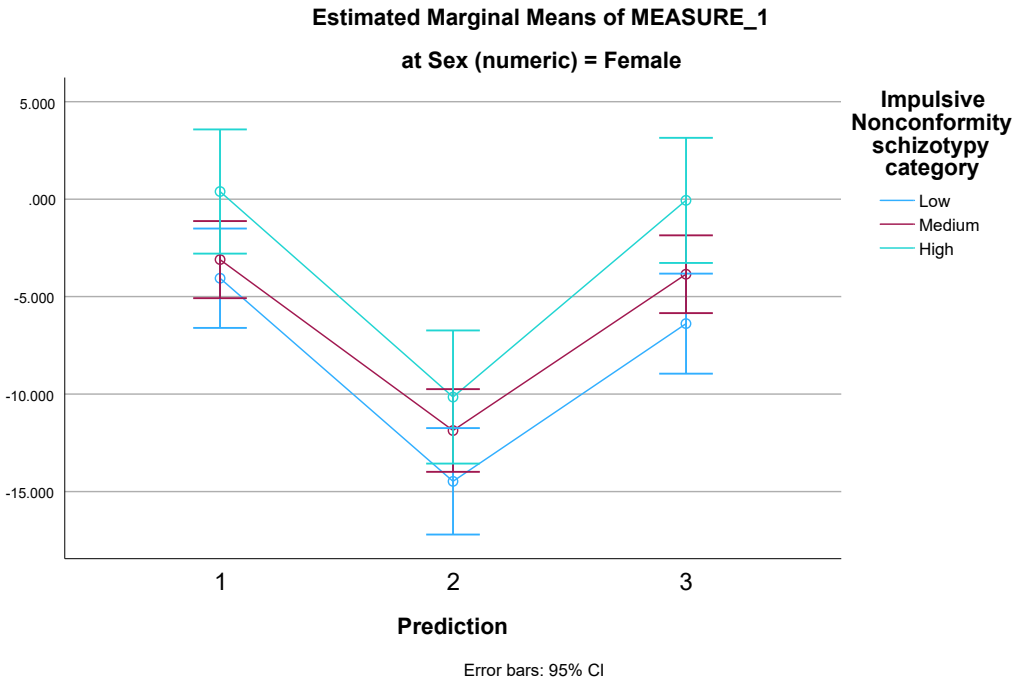
(I) Impulsive Nonconformity schizotypy category	(J) Impulsive Nonconformity schizotypy category	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Low	Medium	-1.25693	1.360506	1.000	-4.52618	2.01232
	High	-4.66459*	1.673714	.017	-8.68646	-.64272
Medium	Low	1.25693	1.360506	1.000	-2.01232	4.52618
	High	-3.40766	1.490613	.068	-6.98955	.17423
High	Low	4.66459*	1.673714	.017	.64272	8.68646
	Medium	3.40766	1.490613	.068	-.17423	6.98955

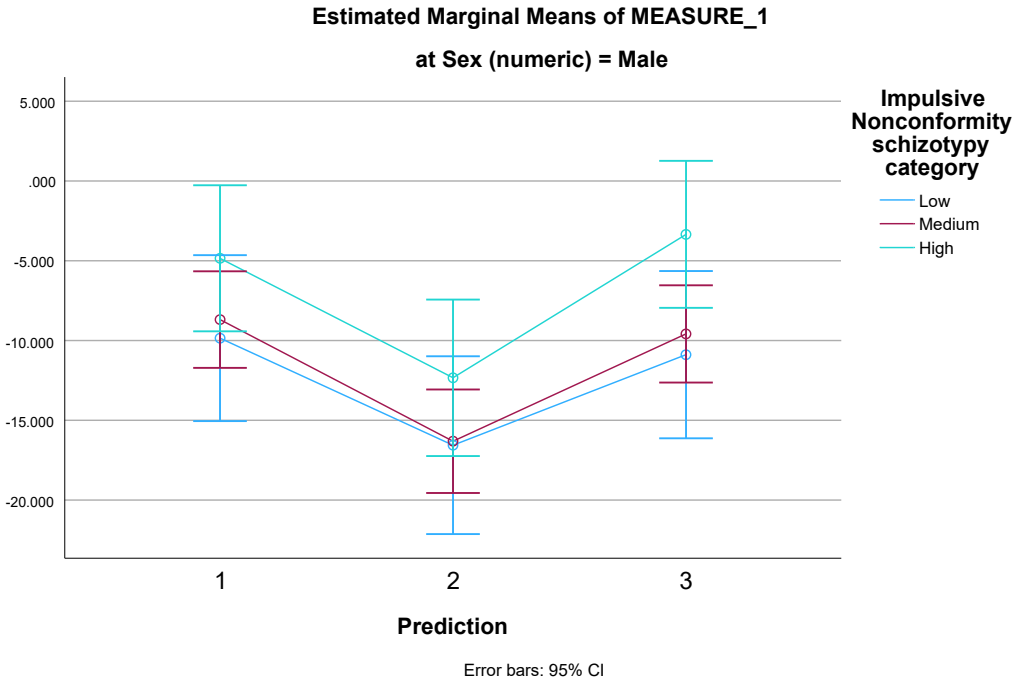
Based on observed means.
The error term is Mean Square(Error) = 150.683.

*. The mean difference is significant at the .05 level.

Profile Plots

Prediction * Impulsive Nonconformity schizotypy category * Sex (numeric)





D) Cognitive Disorganisation

General Linear Model

Within-Subjects Factors

Measure: MEASURE_1

Prediction	Dependent Variable
1	Unpredictable
2	Predictable
3	Neutral

Between-Subjects Factors

		Value Label	N
Cognitive Disorganisation schizotypy category	1	Low	125
	2	Medium	229
	3	High	102
Sex (numeric)	1	Female	330
	2	Male	126

Descriptive Statistics

	Cognitive Disorganisation schizotypy category	Sex (numeric)	Mean	Std. Deviation	N
Unpredictable	Low	Female	-4.30254	13.946299	69
		Male	-8.70982	15.102719	56
		Total	-6.27700	14.583313	125
	Medium	Female	-2.17569	11.652691	180
		Male	-7.23980	13.456475	49
		Total	-3.25928	12.208885	229
	High	Female	-2.55864	13.337200	81
		Male	-7.66071	13.477014	21
		Total	-3.60907	13.459575	102
	Total	Female	-2.71439	12.570797	330
		Male	-7.96329	14.121792	126
		Total	-4.16475	13.212593	456
Predictable	Low	Female	-12.64493	14.798301	69
		Male	-15.52009	14.986524	56
		Total	-13.93300	14.891980	125
	Medium	Female	-12.07361	13.080073	180
		Male	-15.38776	14.099055	49
		Total	-12.78275	13.342559	229
	High	Female	-12.61265	13.873404	81
		Male	-14.98214	16.177641	21

		Total	-13.10049	14.324962	102
	Total	Female	-12.32538	13.609731	330
		Male	-15.37897	14.733125	126
		Total	-13.16913	13.979759	456
Neutral	Low	Female	-4.36232	13.097189	69
		Male	-9.60714	14.232693	56
		Total	-6.71200	13.812142	125
	Medium	Female	-3.40069	12.529760	180
		Male	-8.33929	13.505521	49
		Total	-4.45742	12.875350	229
	High	Female	-4.55556	13.465654	81
		Male	-4.70833	15.281644	21
		Total	-4.58701	13.779332	102
	Total	Female	-3.88523	12.854910	330
		Male	-8.29762	14.123375	126
		Total	-5.10444	13.348731	456

Box's Test of Equality of Covariance Matrices[a]

Box's M	65.330
F	2.120
df1	30
df2	58203.683
Sig.	<.001

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.[a]

a. Design: Intercept + CogDis_Group + Sex_Num + CogDis_Group * Sex_Num
Within Subjects Design: Prediction

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Prediction	Pillai's Trace	.437	174.611[b]	2.000	449.000	<.001	.437
	Wilks' Lambda	.563	174.611[b]	2.000	449.000	<.001	.437
	Hotelling's Trace	.778	174.611[b]	2.000	449.000	<.001	.437
	Roy's Largest Root	.778	174.611[b]	2.000	449.000	<.001	.437
Prediction * CogDis-_Group	Pillai's Trace	.009	.988	4.000	900.000	.413	.004
	Wilks' Lambda	.991	.986[b]	4.000	898.000	.414	.004
	Hotelling's	.009	.984	4.000	896.000	.416	.004

	Trace						
	Roy's Largest Root	.006	1.270[c]	2.000	450.000	.282	.006
Prediction * Sex_Num	Pillai's Trace	.008	1.858[b]	2.000	449.000	.157	.008
	Wilks' Lambda	.992	1.858[b]	2.000	449.000	.157	.008
	Hotelling's Trace	.008	1.858[b]	2.000	449.000	.157	.008
	Roy's Largest Root	.008	1.858[b]	2.000	449.000	.157	.008
Prediction * CogDis-_Group * Sex_Num	Pillai's Trace	.013	1.417	4.000	900.000	.226	.006
	Wilks' Lambda	.987	1.419[b]	4.000	898.000	.226	.006
	Hotelling's Trace	.013	1.420	4.000	896.000	.225	.006
	Roy's Largest Root	.013	2.853[c]	2.000	450.000	.059	.013

a. Design: Intercept + CogDis_Group + Sex_Num + CogDis_Group * Sex_Num
Within Subjects Design: Prediction

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

					Epsilon[b]	Epsilon	
Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Prediction	.992	3.646	2	.162	.992	1.000	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.[a]
a. Design: Intercept + CogDis_Group + Sex_Num + CogDis_Group * Sex_Num
Within Subjects Design: Prediction

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Prediction	Sphericity Assumed	13783.850	2	6891.925	172.952	<.001	.278
	Greenhouse-Geisser	13783.850	1.984	6947.657	172.952	<.001	.278
	Huynh-Feldt	13783.850	2.000	6891.925	172.952	<.001	.278
	Lower-bound	13783.850	1.000	13783.850	172.952	<.001	.278
Prediction * Cog-Dis_Group	Sphericity Assumed	154.019	4	38.505	.966	.425	.004
	Greenhouse-Geisser	154.019	3.968	38.816	.966	.425	.004
	Huynh-Feldt	154.019	4.000	38.505	.966	.425	.004
	Lower-bound	154.019	2.000	77.009	.966	.381	.004
Prediction * Sex_Num	Sphericity Assumed	161.455	2	80.727	2.026	.132	.004
	Greenhouse-Geisser	161.455	1.984	81.380	2.026	.133	.004
	Huynh-Feldt	161.455	2.000	80.727	2.026	.132	.004
	Lower-bound	161.455	1.000	161.455	2.026	.155	.004
Prediction * Cog-Dis_Group * Sex_Num	Sphericity Assumed	215.685	4	53.921	1.353	.248	.006
	Greenhouse-Geisser	215.685	3.968	54.357	1.353	.249	.006
	Huynh-Feldt	215.685	4.000	53.921	1.353	.248	.006
	Lower-bound	215.685	2.000	107.842	1.353	.259	.006
Error(Prediction)	Sphericity Assumed	35863.971	900	39.849			
	Greenhouse-Geisser	35863.971	892.781	40.171			
	Huynh-Feldt	35863.971	900.000	39.849			
	Lower-bound	35863.971	450.000	79.698			

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Prediction	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Prediction	Linear	22.873	1	22.873	.568	.452	.001
	Quadratic	13760.977	1	13760.977	349.157	<.001	.437
Prediction * CogDis_Group	Linear	64.002	2	32.001	.794	.453	.004
	Quadratic	90.016	2	45.008	1.142	.320	.005
Prediction * Sex_Num	Linear	75.899	1	75.899	1.884	.171	.004
	Quadratic	85.556	1	85.556	2.171	.141	.005
Prediction * CogDis_Group * Sex_Num	Linear	193.445	2	96.723	2.401	.092	.011
	Quadratic	22.240	2	11.120	.282	.754	.001
Error(Prediction)	Linear	18128.571	450	40.286			
	Quadratic	17735.400	450	39.412			

Levene's Test of Equality of Error Variances[a]

		Levene Statistic	df1	df2	Sig.
Unpredictable	Based on Mean	2.790	5	450	.017
	Based on Median	2.539	5	450	.028
	Based on Median and with adjusted df	2.539	5	442.943	.028
	Based on trimmed mean	2.867	5	450	.015
Predictable	Based on Mean	1.320	5	450	.254
	Based on Median	1.272	5	450	.275
	Based on Median and with adjusted df	1.272	5	445.146	.275
	Based on trimmed mean	1.317	5	450	.256
Neutral	Based on Mean	.973	5	450	.434
	Based on Median	.891	5	450	.487
	Based on Median and with adjusted df	.891	5	437.482	.487
	Based on trimmed mean	.971	5	450	.435

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.[a]

a. Design: Intercept + CogDis_Group + Sex_Num + CogDis_Group * Sex_Num
Within Subjects Design: Prediction

Tests of Between-Subjects Effects

Measure: MEASURE_1
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	64123.385	1	64123.385	138.963	<.001	.236
CogDis_Group	332.353	2	166.177	.360	.698	.002
Sex_Num	3156.782	1	3156.782	6.841	.009	.015
CogDis_Group * Sex_Num	131.422	2	65.711	.142	.867	.001
Error	207649.380	450	461.443			

Estimated Marginal Means

1. Cognitive Disorganisation schizotypy category * Sex (numeric)

Estimates

Measure: MEASURE_1

Cognitive Disorganisation schizotypy category	Sex (numeric)	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Low	Female	-7.103	1.493	-10.037	-4.169
	Male	-11.279	1.657	-14.536	-8.022
Medium	Female	-5.883	.924	-7.700	-4.067
	Male	-10.322	1.772	-13.804	-6.840
High	Female	-6.576	1.378	-9.284	-3.867
	Male	-9.117	2.706	-14.436	-3.798

Pairwise Comparisons

Measure: MEASURE_1

Sex (numeric)	(I) Cognitive Disorganisation schizotypy category	(J) Cognitive Disorganisation schizotypy category	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	95% Confidence Interval for Difference
						Lower Bound	Upper Bound
Female	Low	Medium	-1.220	1.756	1.000	-5.440	3.000
		High	-.528	2.032	1.000	-5.410	4.355
	Medium	Low	1.220	1.756	1.000	-3.000	5.440
		High	.692	1.659	1.000	-3.295	4.680
	High	Low	.528	2.032	1.000	-4.355	5.410
		Medium	-.692	1.659	1.000	-4.680	3.295
Male	Low	Medium	-.957	2.426	1.000	-6.786	4.873
		High	-2.162	3.174	1.000	-9.788	5.464

	Medium	Low	.957	2.426	1.000	-4.873	6.786
		High	-1.205	3.235	1.000	-8.978	6.568
	High	Low	2.162	3.174	1.000	-5.464	9.788
		Medium	1.205	3.235	1.000	-6.568	8.978

Based on estimated marginal means
a. Adjustment for multiple comparisons: Bonferroni.

Univariate Tests

Measure: MEASURE_1

Sex (numeric)		Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Female	Contrast	81.901	2	40.950	.266	.766	.001
	Error	69216.460	450	153.814			
Male	Contrast	75.421	2	37.711	.245	.783	.001
	Error	69216.460	450	153.814			

Each F tests the simple effects of Cognitive Disorganisation schizotypy category within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

2. Cognitive Disorganisation schizotypy category * Sex (numeric)

Estimates

Measure: MEASURE_1

Cognitive Disorganisation schizotypy category	Sex (numeric)	Mean	Std. Error	95% Confidence Interval Lower Bound	Upper Bound
Low	Female	-7.103	1.493	-10.037	-4.169
	Male	-11.279	1.657	-14.536	-8.022
Medium	Female	-5.883	.924	-7.700	-4.067
	Male	-10.322	1.772	-13.804	-6.840
High	Female	-6.576	1.378	-9.284	-3.867
	Male	-9.117	2.706	-14.436	-3.798

Pairwise Comparisons

Measure: MEASURE_1

Cognitive Disorganisation schizotypy category	(I) Sex (numeric)	(J) Sex (numeric)	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b] Lower Bound	95% Confidence Interval for Difference Upper Bound
Low	Female	Male	4.176	2.231	.062	-.208	8.560
	Male	Female	-4.176	2.231	.062	-8.560	.208
Medium	Female	Male	4.439*	1.998	.027	.512	8.366
	Male	Female	-4.439*	1.998	.027	-8.366	-.512
High	Female	Male	2.541	3.037	.403	-3.427	8.510
	Male	Female	-2.541	3.037	.403	-8.510	3.427

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Univariate Tests

Measure: MEASURE_1

Cognitive Disorganisation schizotypy category		Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Low	Contrast	539.011	1	539.011	3.504	.062	.008
	Error	69216.460	450	153.814			
Medium	Contrast	758.914	1	758.914	4.934	.027	.011
	Error	69216.460	450	153.814			
High	Contrast	107.712	1	107.712	.700	.403	.002
	Error	69216.460	450	153.814			

Each F tests the simple effects of Sex (numeric) within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

Post Hoc Tests

Cognitive Disorganisation schizotypy category

Multiple Comparisons

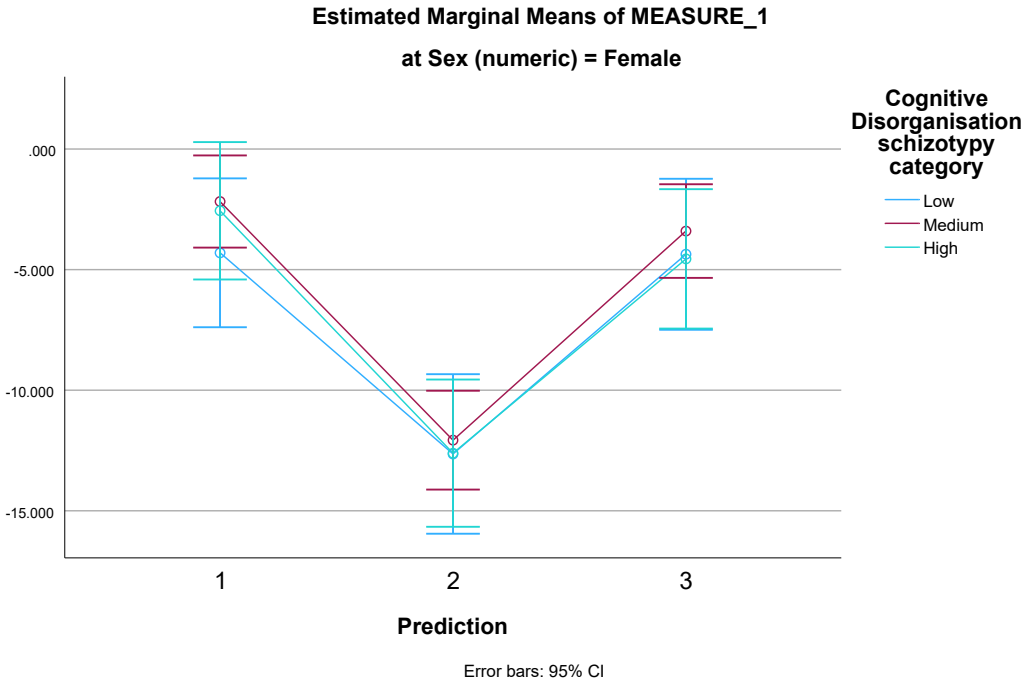
Measure: MEASURE_1
Bonferroni

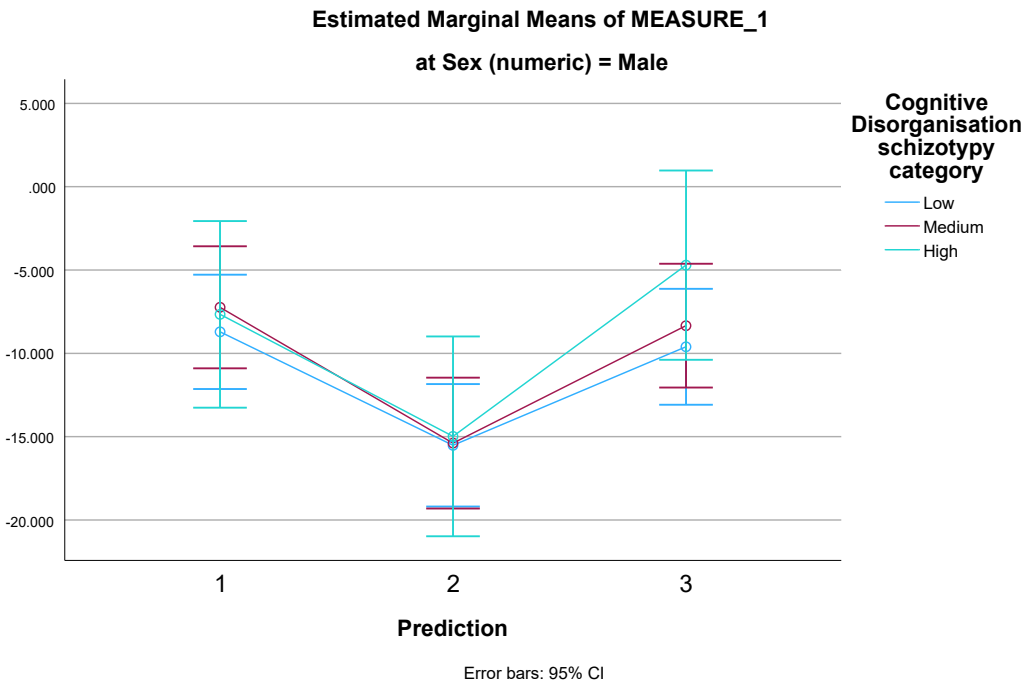
(I) Cognitive Disorganisation schizotypy category	(J) Cognitive Disorganisation schizotypy category	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Low	Medium	-2.14085	1.379200	.364	-5.45502	1.17332
	High	-1.87514	1.654841	.773	-5.85167	2.10138
Medium	Low	2.14085	1.379200	.364	-1.17332	5.45502
	High	.26570	1.476368	1.000	-3.28195	3.81336
High	Low	1.87514	1.654841	.773	-2.10138	5.85167
	Medium	-.26570	1.476368	1.000	-3.81336	3.28195

Based on observed means.
The error term is Mean Square(Error) = 153.814.

Profile Plots

Prediction * Cognitive Disorganisation schizotypy category * Sex (numeric)





5c) Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		Shapiro-Wilk[a]
	UnEx_Category	Statistic	df	Sig.	Statistic	df	Sig.
Unpredictable	High	.105	103	.007	.955	103	.002
	Low	.115	140	<.001	.960	140	<.001
	Medium	.105	216	<.001	.966	216	<.001
Predictable	High	.064	103	.200*	.983	103	.198
	Low	.084	140	.016	.975	140	.010
	Medium	.065	216	.027	.985	216	.023
Neutral	High	.132	103	<.001	.963	103	.005
	Low	.090	140	.007	.974	140	.008
	Medium	.064	216	.032	.983	216	.012
	CogDis_Category						
Unpredictable	High	.077	103	.146	.972	103	.030
	Low	.114	125	<.001	.957	125	<.001
	Medium	.121	231	<.001	.962	231	<.001
Predictable	High	.058	103	.200*	.982	103	.167
	Low	.078	125	.061	.980	125	.067
	Medium	.055	231	.087	.989	231	.081
Neutral	High	.082	103	.084	.982	103	.164
	Low	.097	125	.006	.973	125	.014
	Medium	.097	231	<.001	.970	231	<.001
	IntAn_Category						
Unpredictable	High	.107	104	.005	.958	104	.002
	Low	.121	153	<.001	.963	153	<.001
	Medium	.096	202	<.001	.967	202	<.001
Predictable	High	.063	104	.200*	.984	104	.246
	Low	.083	153	.013	.980	153	.023
	Medium	.058	202	.090	.987	202	.060
Neutral	High	.113	104	.002	.972	104	.028
	Low	.075	153	.036	.982	153	.041
	Medium	.083	202	.002	.974	202	<.001
	ImpNon_Category						
Unpredictable	High	.088	96	.065	.971	96	.030
	Low	.094	124	.009	.969	124	.005
	Medium	.116	239	<.001	.952	239	<.001
Predictable	High	.052	96	.200*	.985	96	.344
	Low	.105	124	.002	.965	124	.003
	Medium	.053	239	.096	.989	239	.069
Neutral	High	.101	96	.017	.972	96	.036
	Low	.086	124	.024	.970	124	.008
	Medium	.097	239	<.001	.976	239	<.001

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

5c) Correlational Analysis – Schizotypy Subscale by Predictability Benefit (ADT in the neutral/unpredictable [average] minus ADT in the predictable condition

Nonparametric Correlations

Correlations

			UnEx_Raw	CogDis_Raw	IntAn_Raw	Impnon_Raw	Predictability_Benefit_vs_Avg
Spearman's rho	UnEx_Raw	Correlation Coefficient	1.000	.565**	.262**	.560**	-.008
		Sig. (2-tailed)	.	<.001	<.001	<.001	.857
		N	459	459	459	459	459
	CogDis_Raw	Correlation Coefficient	.565**	1.000	.384**	.420**	.055
		Sig. (2-tailed)	<.001	.	<.001	<.001	.240
		N	459	459	459	459	459
	IntAn_Raw	Correlation Coefficient	.262**	.384**	1.000	.085	.037
		Sig. (2-tailed)	<.001	<.001	.	.069	.432
		N	459	459	459	459	459
	Impnon_Raw	Correlation Coefficient	.560**	.420**	.085	1.000	-.053
		Sig. (2-tailed)	<.001	<.001	.069	.	.254
		N	459	459	459	459	459
	Predictability_Benefit_vs_Avg	Correlation Coefficient	-.008	.055	.037	-.053	1.000
		Sig. (2-tailed)	.857	.240	.432	.254	.
		N	459	459	459	459	459

**. Correlation is significant at the 0.01 level (2-tailed).

Spearman's rho Correlations

Highly Positive: *(None)*

Positive: *(UnEx_Raw <---> CogDis_Raw), (UnEx_Raw <---> IntAn_Raw), (UnEx_Raw <---> Impnon_Raw), (CogDis_Raw <---> IntAn_Raw), (CogDis_Raw <---> Impnon_Raw), (CogDis_Raw <---> Predictability_Benefit_vs_Avg), (IntAn_Raw <---> Impnon_Raw), (IntAn_Raw <---> Predictability_Benefit_vs_Avg)*

No Linear Correlation: *(None)*

Negative: *(UnEx_Raw <---> Predictability_Benefit_vs_Avg), (Impnon_Raw <---> Predictability_Benefit_vs_Avg)*

Highly Negative: *(None)*

Note: Curated Help is calculated based on actual cell values, not the formatted values.