

# Anhedonia and Avolition in Schizophrenia: Relationships with Social Motivation Tendencies

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## Introduction

Social motivational deficits are common in **schizophrenia** and are represented by abnormal **approach-avoidance tendencies**. Previous studies suggested that negative symptoms of anhedonia and avolition were associated with social motivational deficits, but their relationships remain unclear. This study aimed to investigate the associations between approach-avoidance tendencies with schizophrenia symptom severity, and whether the changes in these tendencies will predict changes in **social anhedonia** and **avolition** at six-month follow-up.

## Hypotheses

### Baseline

**H1:** Approach tendencies toward the three emotions will be significantly different (i.e., happy = neutral > angry).

**H2:** Approach tendency towards happy faces will be negatively correlated with the severity of negative symptoms, while avoidance tendency from angry faces will be positively correlated with the severity of positive symptoms.

### 6-month follow-up

**H3:** An increase in the approach tendency toward happy faces (but not angry faces) will predict a decrease in social anhedonia and avolition levels at follow-up, controlling for change in the level of depression.

## Results

The sample consisted of 68 participants at baseline, and 53 participants at follow-up.

The AAT effect scores were computed using the formula  
**RT emotion-push (direct/averted) - RT emotion-pull (direct/averted)**

Mean (SD) baseline AAT effect score (n=68)			
	Happy	Angry	Neutral
Direct	-0.99 (74.22)	14.33 (68.54)	-13.21 (56.52)
Avverted	-17.69 (64.30)	42.67 (96.25)	5.11 (71.96)
All gazes	-9.57 (54.20)	32.33 (74.95)	-4.05 (49.29)

A **positive score** indicated an **approach bias**, while a **negative score** indicated an **avoidance bias**

### H1 not supported:

**Approach tendency: Angry > Happy = Neutral**

AAT effect scores were **greater** for **angry faces**, relative to happy faces ( $t(67) = 4.34, p > .001$ ) and neutral faces ( $t(67) = 3.90, p < .001$ )

### H2 not supported:

- AAT effect scores of **happy faces** on **all gazes** ( $r(66) = -0.28, p = .020$ ) and **direct gaze** ( $r(66) = -0.27, p = .024$ ) conditions were **negatively correlated** with **PANSS positive** subscore
- AAT effect score of **angry faces** with **all gazes** was **negatively correlated** with **PANSS general psychopathology** subscore ( $r(66) = -0.27, p = .028$ ) and **R-SAS** ( $r(66) = -0.25, p = .042$ )
- AAT effect score of **angry faces** with **all gazes** conditions and **PANSS positive** subscore showed a marginally significant **negative correlation** ( $r(66) = -0.27, p = .051$ )

### H3 not supported:

Multiple linear regression analysis revealed that change in AAT effect scores did not explain a significant amount of the variance in the change in R-SAS ( $R^2 = 0.21, F(7,44) = 1.64, p = .149$ )

- An **increase** in the AAT effect score of **happy faces with averted gaze** significantly predicted an **increase** in the **R-SAS** (standardized  $\beta = 0.35, p = .014$ ).

Change in AAT effect scores explained a significant amount of variance in the change in avolition composite score ( $R^2 = 0.27, F(7,44) = 2.30, p = .044$ )

- An **increase** in the AAT effect score of **angry faces with direct gaze** significantly predicted the **increase** in **avolition** composite score (standardized  $\beta = 0.34, p = .032$ )

## Schizophrenia

A psychotic disorder with heterogeneous symptom constellations, including delusions, hallucinations, disorganized speech, grossly disorganized and catatonic behaviors, and negative symptoms (APA, 2013).

## Social Anhedonia

The disinterest in social contact and lack of pleasure derived from social relationships and interactions (Chapman et al., 1976, 1995; Fulford et al., 2018). Individuals with schizophrenia showed diminished anticipatory pleasure from social interactions (Campellone & Kring, 2018).

## Avolition

Reduction in the drive to initiate and persist in goal-directed behaviors (APA, 2013), such as grooming, working, learning in school, and socializing.

## Methods

### Sample

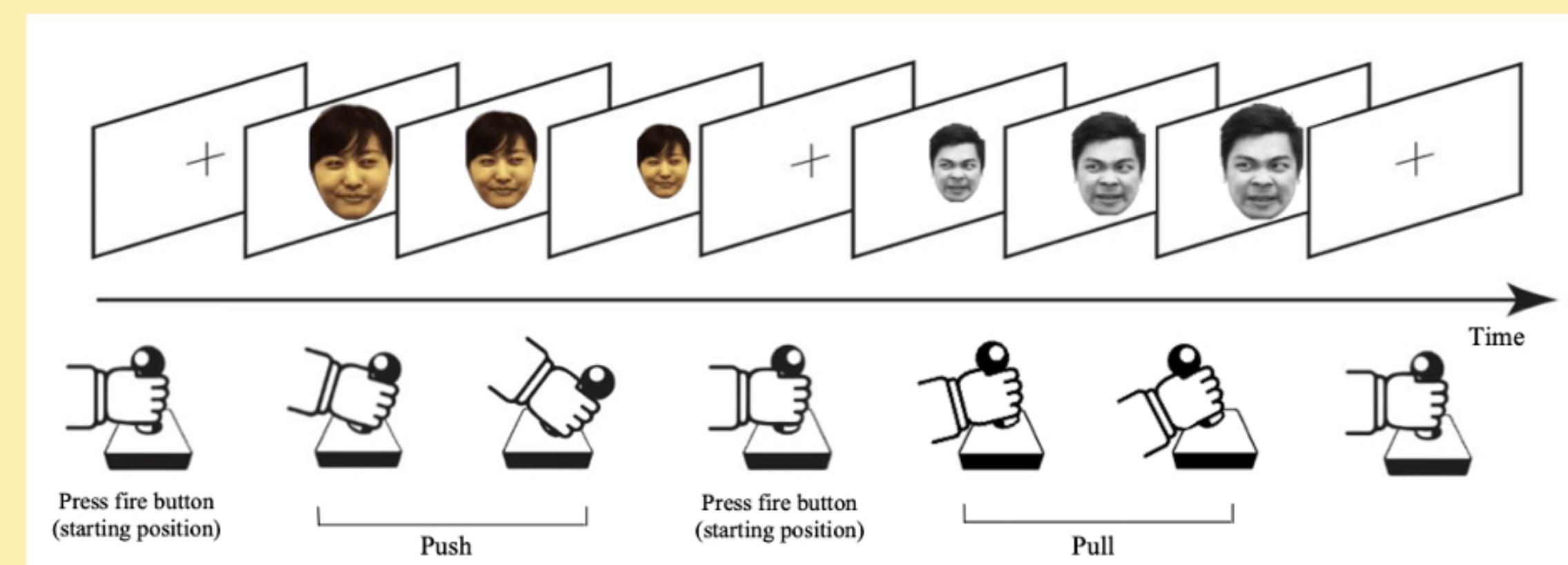
Participants were included if they were:

- 18-65 years old
- diagnosed with Schizophrenia Spectrum Disorder in the SCID-DSM-5
- in the early stage of schizophrenia (i.e., first-episode psychosis within four years)
- assessed with an estimated IQ of 70 or above assessed by WAIS-IV [HK]
- not diagnosed with substance-induced psychosis

### Measures

- Positive and Negative Syndrome Scale (PANSS)
- Revised Social Anhedonia Scale (R-SAS)
- Calgary Depression Scale for Schizophrenia (CDSS)

### Approach-Avoidance Task (AAT)



\*\*controlled photo stimuli of Asian faces created and validated by Lo et al. (2018)

Social motivation tendencies were measured using an implicit reaction-time-based measure. Participants were presented with facial expressions with different **emotions (happy, neutral, or angry)** and **gaze directions (direct or averted)**. They are instructed to push or pull the joystick as quickly and accurately as possible according to the **colors (grey or sepia)**. The pictures expand in size when the joystick is pushed and shrink when the joystick is pulled, which conveys the visual impressions of coming closer (i.e., approach) and moving away (i.e., avoid).

- The same clinical interview (except IQ test), self-report questionnaire, and AAT procedures were administered in both baseline and follow-up measurements.

## Discussion

### Individuals with schizophrenia tend to approach angry faces, but not happy faces

- Anger approaching tendency may be related to the autonomic drive to aggressively confront social threats (Wilkowski & Meier, 2010)
- Aggressive responses may be intensified by personalizing biases, hostility, and misinterpretation of facial expressions in schizophrenia (Ahmed et al., 2014)

### Individuals with schizophrenia tend to avoid happy faces with averted gaze and not when it was averted

- A happy face with an averted gaze is an ambiguous stimulus
- Individuals with schizophrenia may perceive it as a sign of social rejection, social exclusion, or mockery (De la Asuncion et al., 2015)
- Resulting in avoidance responses to minimize potential social threats

### A decrease in avoidance tendency from happy faces with averted gaze predicted an increase in social anhedonia, while an increase in approach tendency towards angry faces predicted an increase in avolition

- AAT biases may be related to deficits in reward learning, effort computation and expenditure, and abnormal neurobiological activities (Fulford et al., 2018)
- These deficits are also linked to reduced motivation to pursue social and non-social goals, which leads to more severe social anhedonia and avolition in schizophrenia
- Also, social anhedonia and avolition are influenced by more variable and unpredictable factors compared to implicit approach and avoidance tendencies

## Conclusion

The current study suggests a complex relationship between implicit approach and avoidance tendencies and changes in schizophrenia symptoms. Further investigations are necessary to investigate their causal relationships and possible AAT bias modification interventions.

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