

# Deconstructing Emotion Regulation in Schizophrenia: The Nature of Abnormalities at the Selection Stage

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# Introduction

Abnormalities in emotion regulation (ER) are present across psychiatric disorders, including psychotic disorders. (Khoury & Lecomte, 2012)

Existing research on ER in schizophrenia (SZ) suggests that SZ select “maladaptive” strategies more often than “adaptive” strategies (Chapman et al., 2020; Ludwig et al., 2019; O’Driscoll et al., 2014) and are less effective at applying strategies compared to controls (CN). (Bartolomeo et al., 2020; Strauss et al., 2013, 2015; Sullivan & Strauss, 2017; Visser et al., 2018; Zhang et al., 2020)

People with SZ also initiate regulation attempts at lower levels of negative affect compared to CN. (Raugh & Strauss, under review; Visser et al., 2018)

However, the literature regarding strategy selection in SZ relies on self-report of habitual ER which lacks potentially meaningful temporal resolution.

(Cohen et al., 2020, 2021; Ellison et al., 2020)

## Present Study

The present study aimed to use ecological momentary assessment (EMA) to investigate abnormalities in the selection stage of the Extended Process Model (Gross, 2015) of ER in SZ.

## Hypotheses

1. SZ would select maladaptive strategies (i.e., distraction, avoidance, suppression) at a greater rate than adaptive strategies (i.e., reappraisal, interpersonal) compared to CN.
2. SZ would exert greater effort in ER compared to CN.
3. Adaptive strategies would be more effective in regulating affect and symptoms compared to maladaptive strategies in SZ.

# Methods

- 50 SZ (schizophrenia, schizoaffective, or bipolar with psychotic features), 53 CN (non-psychiatric controls)
- Groups similar in age, sex, race, parental education; as expected, SZ had lower personal education
- SZ also had lower survey adherence
- Participants were trained to identify (but not how to implement) five ER strategies: Reappraisal, interpersonal, distraction, situation selection (avoidance), and expressive suppression
- 6 days of EMA assessing affect, ER, and symptoms 8 times per day
- Removed days with 2 or fewer observations

# Table 1. Demographic characteristics

Variable	CN ( <i>n</i> = 53; <i>k</i> = 1719)	SZ ( <i>n</i> = 50; <i>k</i> = 1366)	Test Statistic	<i>p</i>	Effect size
Age; M (SD)	39.3 (10.5)	38.42 (11.84)	$F = 0.16$	.69	$d = 0.08$
Female; <i>n</i> (%)	37 (69.8%)	32 (64%)	$\chi^2 = 0.39$	.53	OR = 1.3
Personal education; M (SD)	15.49 (2.83)	13.22 (2.31)	$F = 19.76$	< .001	$d = 0.88$
Parental education: M (SD)	13.54 (2.87)	13.89 (2.95)	$F = 0.35$	.56	$d = 0.12$
Race; <i>n</i> (%)			$\chi^2 = 7.58$	.18	
Black	15 (28.3%)	15 (30%)			
Asian-American	3 (5.7%)	0			
Biracial	3 (5.7%)	3 (6%)			
White	24 (45.3%)	30 (60%)			
LatinX	6 (11.3%)	2 (4%)			
Other	2 (3.8%)	0			
Survey adherence; M (SD)	69.26% (20.95%)	59.79% (25.1%)	$F = 4.34$	.04	$d = 0.41$

*Note.* Adherence is the percentage of surveys completed (out of eight per day) before removing days with inadequate adherence.

# ER items

Strategy	Process Domain	Probe
Reappraisal	Cognitive Change	Reappraising (Thinking about the situation differently)
Interpersonal		Sharing (Talking to others about how you feel)
Distraction	Attentional Deployment	Shifting attention (Turning attention away from situation)
Avoidance	Situation Modification	Avoiding (Removing yourself from the situation)
Suppression	Response Modulation	Hiding expressions (Hiding how you are feeling)

# Table 2. Omnibus results for ER selection rate and effort

	Selection rate	Selection rate + NA	Effort
Group	$\chi^2 = 5.7^*$	$\chi^2 = 1.77$	$F = 0.49$
Strategy	$\chi^2 = 27.68^{***}$	$\chi^2 = 32.76^{***}$	$F = 22.25^{***}$
Group X Strategy	$\chi^2 = 5.39$	$\chi^2 = \mathbf{11.51}^*$	$F = \mathbf{3.78}^{**}$
NA		$\chi^2 = 34.28^{***}$	
Group X NA		$\chi^2 = 8.96$	
Strategy X NA		$\chi^2 = 2.93$	
Group X Strategy X NA		$\chi^2 = 8.22^\dagger$	

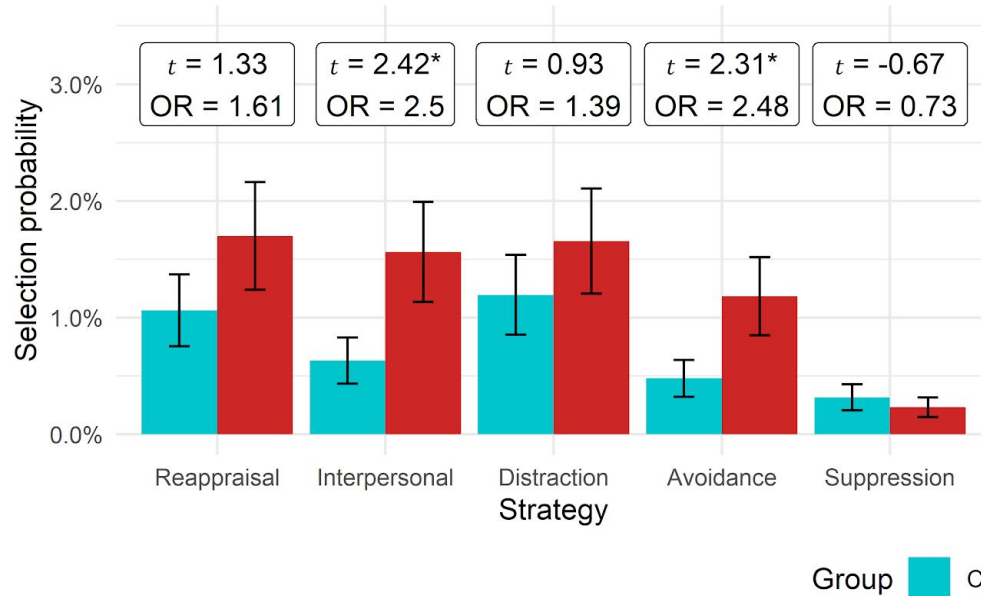
While the primary model of selection rate did not observe a significant Group X Strategy interaction, the inclusion of negative affect in the model improved model fit ( $\chi^2 = 199.91, p < .001$ ) and indicates a significant Group X Strategy interaction.

Note. NA = Negative Affect,  $^\dagger = p < .1$ ,  $* = p < .05$ ,  $** = p < .01$ ,  $*** = p < .001$

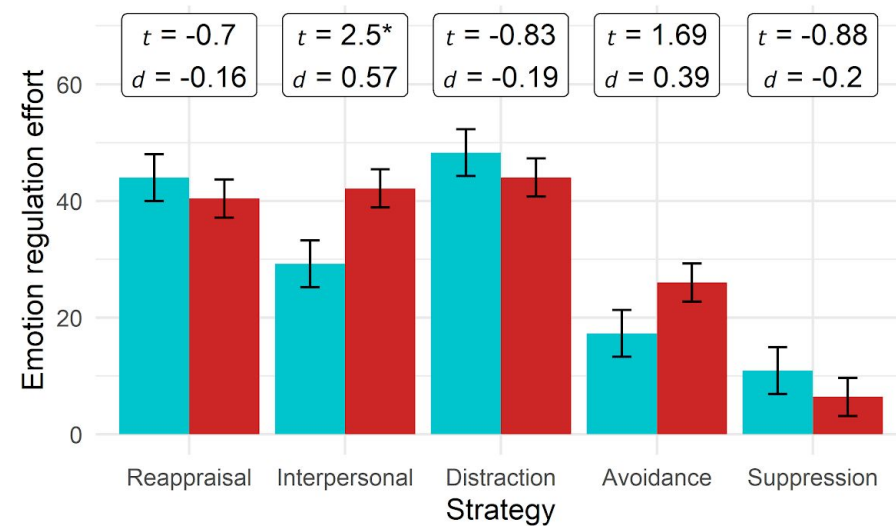


# Figure 1. Selection rate and effort by strategy and group

A. Selection rate by group, accounting for NA



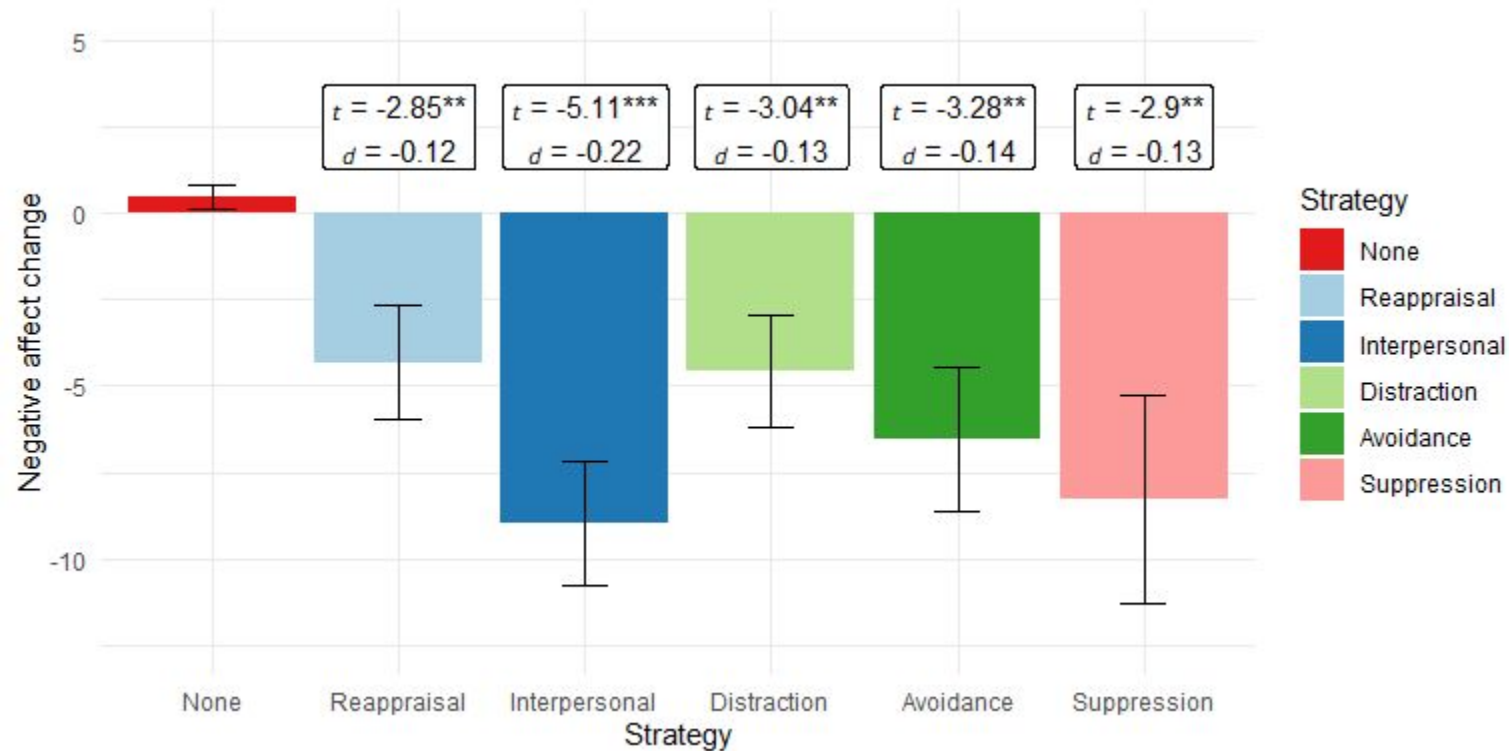
B. Emotion regulation effort by group



Note. Error bars reflect standard errors, all values presented are based on estimated marginal means.

\* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$

# ER effectiveness on negative affect



Group  $F = 0.08$ ,  $p = .77$

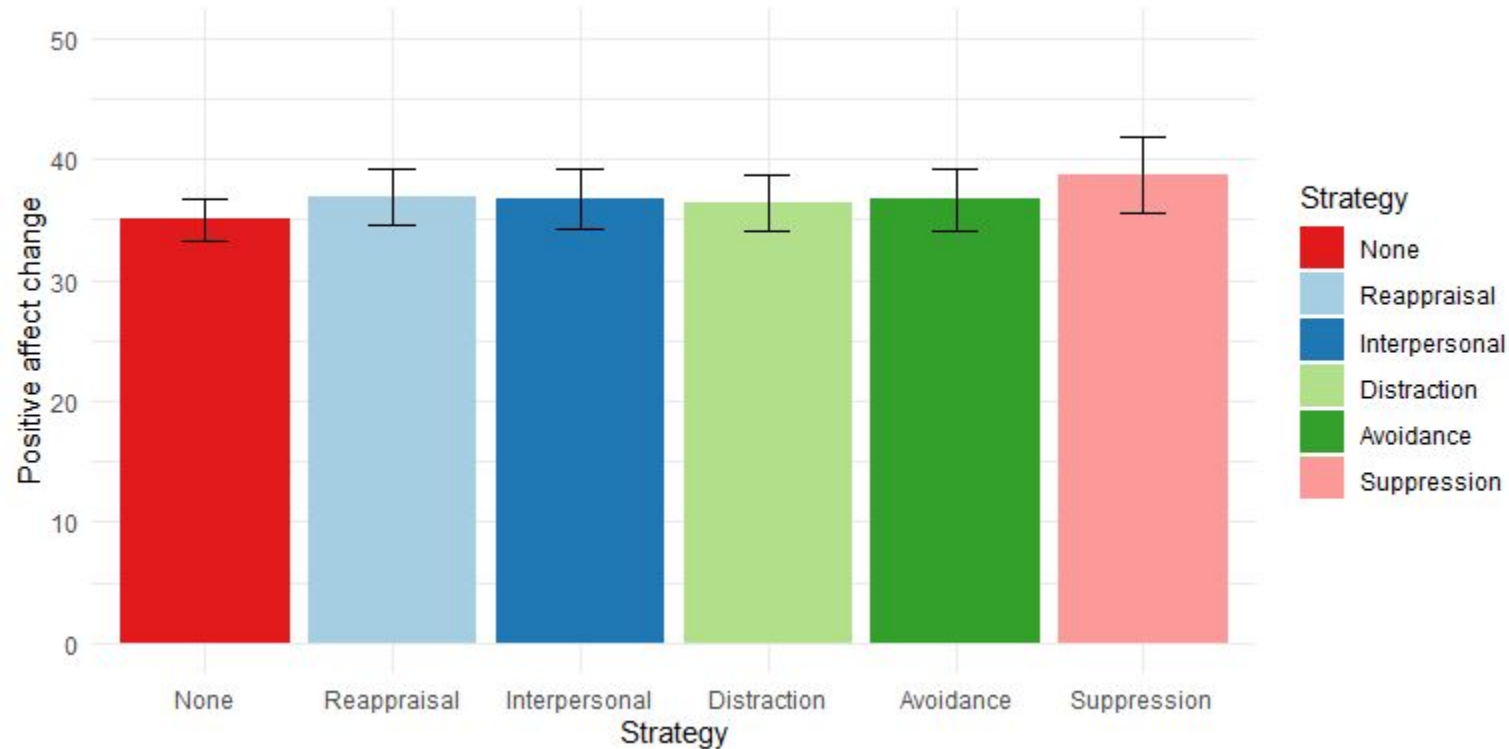
**Strategy  $F = 8.09$ ,  $p < .001$**

Group X Strategy  $F = 1.44$ ,  $p = .203$

All between-strategy contrasts were nonsignificant.

*Note.* All comparisons presented are relative to no regulation; values represent estimated marginal means with standard error bars. \* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$

# ER effectiveness on positive affect



Group  $F = 3.85$ ,  $p = .052$

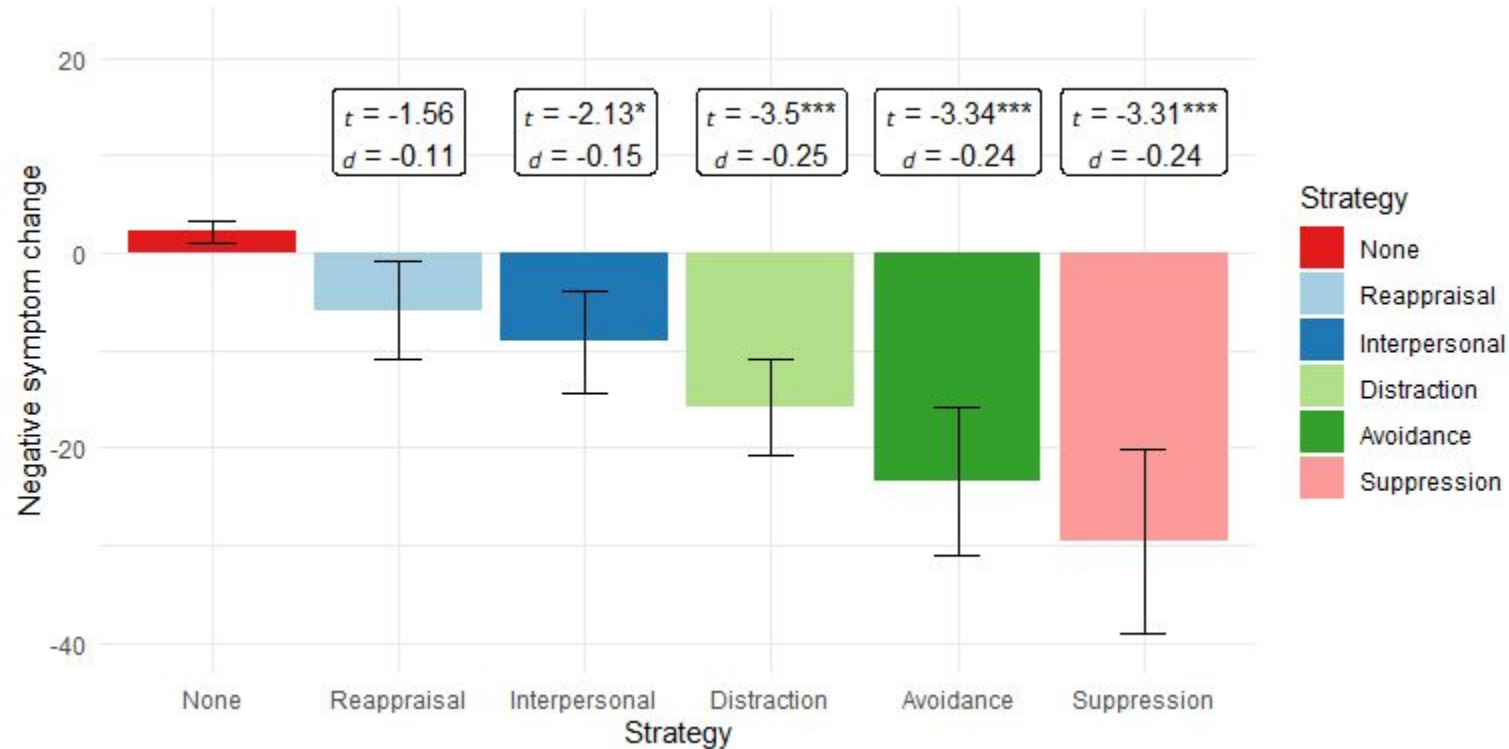
Strategy  $F = 0.22$ ,  $p = .954$

Group X Strategy  $F = 1.63$ ,  $p = .149$

Negative affect included as a covariate due to improvement in model fit ( $G^2 = 1196.38$ ,  $p < .001$ )

*Note.* All comparisons presented are relative to no regulation; values represent estimated marginal means with standard error bars. No contrasts are presented due to non-significant omnibus tests.

# ER adaptiveness for negative symptoms



Group  $F = 1.08$ ,  $p = .302$

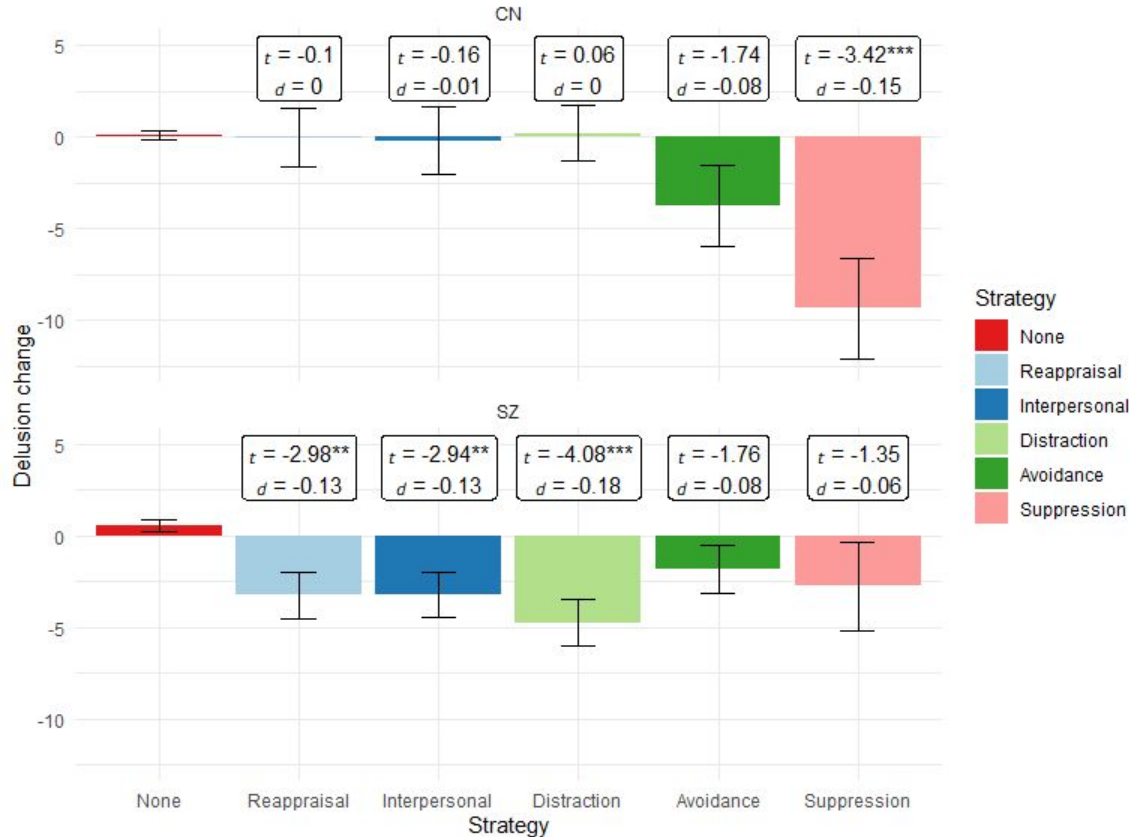
**Strategy  $F = 3.58$ ,  $p = .003$**

Group X Strategy  $F = 1.15$ ,  $p = .332$

Contrast of suppression relative to reappraisal was significant ( $t = 2.17$ ,  $p = .03$ ).

*Note.* All comparisons presented are relative to no regulation; values represent estimated marginal means with standard error bars. \* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$

# ER adaptiveness for delusions



Group  $F = 1.19, p = .277$

**Strategy  $F = 3.01, p = .01$**

**Group X Strategy  $F = 3.17, p = .007$**

Distraction is significantly more effective in SZ compared to CN ( $t = 2.5, p = .014$ ).

Within CN, suppression is significantly more effective than reappraisal, interpersonal, and distraction ( $ts > 2.5, ps < .01$ ).

Within SZ, no between-strategy contrasts were significant.

*Note.* All comparisons presented are relative to no regulation within that group; values represent estimated marginal means with standard error bars. \* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$

## Hypotheses

1. SZ would select maladaptive strategies (i.e., distraction, avoidance, suppression) at a greater rate than adaptive strategies (i.e., reappraisal, interpersonal) compared to CN.
2. SZ would exert greater effort in ER compared to CN.
3. Adaptive strategies would be more effective in regulating affect and symptoms compared to maladaptive strategies in SZ.

## Results

1. SZ would select interpersonal and avoidance more often than CN rather than selecting more maladaptive and less adaptive strategies generally.
2. SZ exert greater effort towards interpersonal regulation. This may reflect social skills deficits, asociality, or discomfort with discussing distress with others.
3. Strategy effectiveness and adaptiveness are generally similar between SZ and CN.

# Conclusions

- Results indicate greater likelihood of regulating across strategies, as reported elsewhere (Rough & Strauss, under review). However, SZ were more likely to engage in interpersonal ER or avoidance than CN. This is particularly notable as interpersonal ER was more effortful in SZ.
- Although it was effective in the short-term, more frequent engagement of situation selection (i.e., avoidance) as an ER strategy may contribute to negative symptoms (i.e., anhedonia, asociality, avolition) in the long-term as SZ may avoid situations involving goal-directed or social activities due to experienced or anticipated negative affect.
- The observed effectiveness of reappraisal for reducing delusion intensity is supportive of cognitive-behavioral therapy for psychosis.
- ER strategies generally seem to be helpful for negative affect, negative symptoms, and delusions, although specific strategies may be more helpful than others.

# Conclusions

People with schizophrenia show some differences in how they select strategies compared to controls and these differences may have consequences for emotional experience and symptoms.

Interventions that help people with schizophrenia select contextually appropriate strategies may enhance the success and adaptiveness of emotion regulation in this population.



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Want the slides? Find a link to  
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