Dissociation Between Habitual Use and Choice Preferences of Emotion Regulation Strategies: The Moderating Role of Trait Anxiety

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Abstract

The present study investigates the relationship between usage habits and selection preferences of emotion regulation strategies among college students and their underlying mechanisms. Study 1 employed questionnaire and behavioral experimental methods to examine the usage habits and selection preferences of five emotion regulation strategies and the relationship between these two dimensions; Study 2 explored the influence of trait anxiety on the correlations between usage habits and selection preferences of emotion regulation strategies. Results revealed that college students exhibited a significant negative correlation between usage habits and selection preferences only for expressive venting. Trait anxiety did not affect the correlations between usage habits and selection preferences for cognitive reappraisal, expressive suppression, acceptance, and attentional distraction strategies; however, it did influence the correlation for expressive venting.

Full Text

The Disjunction Effect of Emotion Regulation Strategy Usage and Choice Preference: The Moderating Role of Trait Anxiety

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Abstract

This study explores the relationship between college students'emotion regulation strategy usage habits and choice preferences and their underlying mechanisms. Study 1 employed questionnaire and behavioral experimental methods to examine the usage habits and choice preferences of five emotion regulation strategies and their interrelationships. Study 2 investigated how trait anxiety influences the correlation between emotion regulation strategy usage habits and choice preferences. Results revealed a significant negative correlation between usage habits and choice preferences only for venting. Trait anxiety did not moderate the relationship between usage habits and choice preferences for cognitive reappraisal, expressive suppression, acceptance, or distraction; however, it did affect the correlation for venting.

Keywords: trait anxiety, emotion regulation strategy usage, emotion regulation strategy choice preference, GNAT

1. Introduction

Emotion regulation unfolds during emotional generation and refers to the process by which individuals influence which emotions they have, when they have them, and how they experience and express these emotions (Gross, 1998). Based on the specific loci in the emotion generation process where emotions can be regulated, this process-oriented conceptual framework divides emotion regulation into five processes: situation selection, situation modification, attentional deployment, cognitive change, and response modulation (Gross, 1998), correspondingly yielding five families of emotion regulation strategies (Gross, 2015a). Among common emotion regulation strategies, distraction belongs to attentional deployment—redirecting or shifting attention entirely away from the emotional stimulus; cognitive reappraisal and acceptance belong to cognitive change, with reappraisal involving altering the meaning or self-relevance of an emotionally evocative situation and acceptance referring to maintaining an open and receptive attitude toward internal emotional experiences; expressive suppression and venting belong to response modulation, where suppression involves sustained effort to inhibit emotional expression behaviors, while venting involves expressing, revealing, and releasing perceived emotions as much as possible (McRae & Gross, 2020; Yuan et al., 2021).

Trait anxiety refers to the tendency to evaluate internal stimuli or external events in an anxiety-provoking manner (Spielberger, 1966) and represents a vulnerability factor through which individuals experience more intense and frequent anxiety that may develop pathologically (Elwood et al., 2012). Previous research indicates that college students with high trait anxiety exhibit biases in their emotion regulation strategy usage habits (Pan et al., 2019). High trait-anxiety college students habitually use expressive suppression and less frequently use cognitive reappraisal (Zhang, 2011). Compared to reappraisal, high trait-

anxiety individuals more frequently employ experiential avoidance and demonstrate less flexible strategy usage (Toole et al., 2017). Beyond examining usage habits, recent research has expanded to investigate emotion regulation strategy choice preferences. Studies find that high trait-anxiety college students prefer cognitive reappraisal and venting over distraction, whereas distraction is the preferred choice for low trait-anxiety individuals (Cho et al., 2019). Research examining trait anxiety and strategy choice preferences from the perspective of implicit attitudes toward emotion regulation—whether emotions should be regulated and controlled—finds that higher anxiety levels correlate with more negative attitudes toward emotion control (Zhang, 2016), though this study did not distinguish between state and trait anxiety.

In summary, previous research confirms associations between trait anxiety and emotion regulation strategies but rarely distinguishes between usage habits and choice preferences, and even less frequently focuses on multiple specific strategies. Clearly, emotion regulation strategy usage habits and choice preferences are distinct concepts, yet they currently lack clear definitions. Accordingly, this study proposes that **emotion regulation strategy usage** refers to behavioral patterns in which individuals frequently employ certain strategies in daily life. Operationally defined, when an individual, under specific emotional states and among multiple available emotion regulation strategies, uses one strategy significantly more frequently than others, we say that the individual habitually uses this emotion regulation strategy under that emotional state, demonstrating inter-strategy differences in usage habits. **Emotion regulation strategy choice preference** refers to the psychological cognition underlying individuals' frequent selection of certain strategies in daily life. Operationally defined, when an individual, under specific emotional states and among multiple choosable emotion regulation strategies, shows significantly more favorable attitudes toward selecting one strategy over others, we say that the individual has a stronger choice preference for this emotion regulation strategy under that emotional state, demonstrating inter-strategy differences in choice preferences.

From a theoretical perspective, according to the extended process model of emotion regulation, choice preferences occur before the selection stage and primarily influence strategy selection, whereas usage habits occur before the implementation stage and primarily influence strategy execution. During actual emotion regulation, the selection and implementation stages interact and are subject to monitoring (Bonanno & Burton, 2013; Gross, 2015b; Eldesouky & Gross, 2019). This theoretical framework suggests an interaction between usage habits and choice preferences, a hypothesis supported by cognitive energetics theory, which posits that emotion regulation strategy selection is jointly determined by the driving force (willingness to use) and constraining force (difficulty of use) of strategy implementation (Milyavsky et al., 2019; Wang, 2020).

From a psychometric perspective, previous studies have primarily used questionnaires or experience sampling methods to assess individuals' frequent use of particular strategies (Eldesouky & English, 2018; Pan et al., 2019), whereas

strategy choice preferences have been evaluated mainly through emotion regulation choice paradigms or implicit experimental paradigms (Sheppes et al., 2011; Sang et al., 2018; Du et al., 2020). One study using both questionnaire and experimental methods to assess college students' strategy choice biases yielded contradictory conclusions (Min, 2016). Multiple studies have confirmed that questionnaires are suitable for assessing habitual strategy usage (Gross & John, 2003; Wang et al., 2007). If that study assessed emotion regulation strategy usage habits through questionnaires, then college students' distraction and reappraisal showed inconsistent patterns between usage habits and choice preferences, a possibility supported by some research (Sang et al., 2018; Cho et al., 2019). However, studies examining college students' reappraisal and suppression usage habits and choice preferences reported consistent conclusions (Zhu, 2009; Wang, 2020). In short, current empirical research cannot accurately determine the correlations between usage habits and choice preferences for specific strategies among college students.

This study explored potential correlations between emotion regulation strategy usage habits and choice preferences from both theoretical and empirical perspectives, but no consistent and stable conclusions have emerged. Based on this, the present research used questionnaires and experimental methods to separately assess emotion regulation strategy usage habits and choice preferences, exploring the relationship between these two constructs among college students and the mechanism of trait anxiety. We hypothesized that: (1) college students' emotion regulation strategy usage habits and choice preferences would be significantly positively correlated, showing no disjunction effect; (2) trait anxiety would affect the positive correlation between college students' emotion regulation strategy usage habits and choice preferences—that is, it would influence the disjunction effect, such that low trait-anxiety college students would show significant positive correlations between usage habits and choice preferences, whereas high trait-anxiety college students would not.

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2. Study 1: The Relationship Between Emotion Regulation Strategy Usage Habits and Choice Preferences

2.1 Participants Using G*Power 3.1 software (Faul et al., 2007) with parameters of effect size = 0.2, $\alpha = 0.01$, power = 0.95, number of groups = 1, number of measurements = 5, and correlation = 0.5, the required total sample size was calculated to be 48. To account for potential exclusion of invalid questionnaires and participants with Go/No-go Association Task (GNAT) accuracy below 75%, we recruited 75 university students, ultimately obtaining valid data from 67 participants (35 males, 32 females). All participants were native Chinese speakers, right-handed, had normal or corrected-to-normal vision, had not participated in similar studies, were unaware of the experimental purpose, and received compensation after the experiment. The study was approved by multiple psychology professors at the university, and informed consent was obtained

from each participant before testing, with a full debriefing provided afterward.

2.2 Materials 2.2.1 Emotion Regulation Strategy Word Stimuli
Study 1 used words to prime different emotion regulation strategies. The stimuli were drawn from the Chinese Emotion Regulation Word System (CERWS), which demonstrates high reliability and can be used to achieve emotion regulation goals (Yuan et al., 2021). This lexicon includes 149 emotion regulation words covering five strategies: cognitive reappraisal, expressive suppression, acceptance, venting, and distraction. This experiment selected words from this system.

2.2.2 Emotion Regulation Strategy Questionnaires
Study 1 assessed college students' usage habits for five emotion regulation strategies (see Table 1) using several questionnaires: the Emotion Regulation Questionnaire (ERQ), Acceptance and Action Questionnaire (AAQ), Adolescent Daily Emotion Regulation Questionnaire (ADERQ), and Adolescent Emotion Regulation Questionnaire (AERQ).

Table 1 Emotion Regulation Strategy Questionnaires
| Questionnaire | Items | Cronbach' s α | Source | |———|—-|———-|—-| | ERQ | - | - | Gross & John, 2003; Wang et al., 2007 | | ADERQ | - | - | Deng & Sang, 2011 | | AAQ | - | - | Hayes et al., 2004; Cao et al., 2013 | | AERQ | - | - | Zhang et al., 2020 |

2.3 Experimental Design Study 1 employed a within-subjects design. The independent variable was emotion regulation strategy (cognitive reappraisal vs. expressive suppression vs. acceptance vs. venting vs. distraction). The dependent variables were emotion regulation strategy usage habits (usage frequency scores, M) and choice preferences (discriminability index d').

2.4 Procedure Study 1 consisted of questionnaire and experimental phases. The experimental phase included learning, practice, and formal testing stages, each preceded by careful reading of instructions. During the learning stage, participants memorized all words presented in the practice and formal stages, including 10 negative emotion words, 50 emotion regulation strategy words, and 10 neutral bird words. Category labels appeared at the top center of the screen, with corresponding attribute words displayed below.

The practice and formal experiments used the Go/No-go Association Task (GNAT), an adaptation of the Implicit Association Test (IAT) (Nosek & Banaji, 2001). Participants completed 10 GNAT modules, with negative emotion on the left and five strategy categories on the right, or vice versa. The practice phase randomly presented 3 sets of words across the 10 modules (30 trials total). The formal experiment presented all 10 sets of words twice randomly across the 10 modules (200 trials total). The probability of compatible and incompatible trials was controlled at 50% each.

Using the negative emotion + distraction module as an example, the top left and right of the screen displayed "Negative Emotion" and "Distraction" (or reversed). Words appearing at the center could be negative emotion words, attribute words from the five emotion regulation strategies, or bird words, with the combined probability of negative emotion and distraction words equaling that of other words. Ideally, each of the 10 negative emotion words and 10 distraction words appeared once (20 signal trials, compatible, see Figure 1 left), while 20 words consisting of 4 randomly selected attribute words from birds and the other four strategies served as noise trials (incompatible, see Figure 1 [Figure 1: see original paper] right).

2.5 Statistical Analysis Participants' keypress responses for each trial were recorded in real-time using E-Prime 2.0. Data were processed using E-DataAid and analyzed with SPSS 22.0. Normally distributed continuous data were expressed as (mean ± standard deviation). Data with accuracy below 75% were excluded. Hit rate and false alarm rate were calculated for each participant. Hit rate equals hits divided by the sum of hits and misses: P(y/SN) = f1/(f1+f2). False alarm rate equals false alarms divided by the sum of false alarms and correct rejections: P(y/N) = f3/(f3+f4). The discriminability index d' is the difference between Z-hit rate and Z-false alarm rate. Z values were obtained through POZ conversion tables, with d' serving as the GNAT metric for statistical analysis. Comparing discriminability indices across different tasks effectively reflects the strength of associations between category concepts and their evaluations in individuals' memory (Chen, 2015; Liu, 2018).

2.6 Results Descriptive statistics for emotion regulation strategy choice preferences and usage habits are presented in Table 2 . Repeated measures ANOVA with emotion regulation strategy as the independent variable was conducted separately for usage habits and choice preferences. Results showed significant differences among college students across the five emotion regulation strategies in both usage habits ($F = 21.09$, $p < 0.001$, $^2 = 0.242$) and choice preferences ($F = 6.61$, $p < 0.001$, $^2 = 0.091$). Post-hoc tests revealed that college students used cognitive reappraisal and distraction significantly more frequently than expressive suppression, acceptance, and venting ($p < 0.001$). For choice preferences, the preference for expressive suppression and acceptance was significantly greater than for cognitive reappraisal ($p < 0.001$, $p = 0.001$) and venting ($p = 0.001$, $p = 0.017$), and distraction was also significantly preferred over cognitive reappraisal ($p = 0.014$).

Pearson correlation analysis between emotion regulation strategy usage habits and choice preferences showed a significant negative correlation for venting ($r = -0.30$, $p = 0.014$), indicating no disjunction effect. However, no significant correlations were found between usage habits and choice preferences for cognitive reappraisal, expressive suppression, acceptance, and distraction, indicating disjunction effects for these strategies.

To further examine the relationship between venting strategy usage habits and choice preferences, gender and grade were controlled as covariates in a linear regression with strategy usage frequency as the outcome variable and strategy discriminability index as the predictor (see Table 3). Results showed that venting choice preference significantly predicted its usage habits (t = -2.45, p = 0.017).

Table 2 Descriptive Statistics for Emotion Regulation Strategy Choice Preferences and Usage Habits (M ± SD)

Strategy	Usage Habits	Choice Preference (d')
Cognitive Reappraisal	5.06 ± 0.96	2.39 ± 0.99
Expressive Suppression	4.07 ± 1.27	2.96 ± 1.09
Acceptance	3.93 ± 1.15	2.84 ± 0.88
Venting	4.13 ± 0.95	2.51 ± 0.86
Distraction	5.25 ± 1.04	2.74 ± 0.71

Table 3 Linear Regression Results of Venting Choice Preference on Usage Habits (n = 67)

Predictor	β	t	Overall Fit
d' Venting	-0.28	-2.45	p = 0.017

2.7 Summary In terms of usage habits, college students employed cognitive reappraisal and distraction more frequently than expressive suppression, acceptance, and venting. Regarding choice preferences, they favored expressive suppression, acceptance, and distraction over cognitive reappraisal and venting. A significant negative correlation between venting strategy usage habits and choice preferences was observed, showing no disjunction effect, and choice preference significantly predicted usage habits. However, cognitive reappraisal, expressive suppression, acceptance, and distraction showed no significant correlations between usage habits and choice preferences, demonstrating disjunction effects that contradict Hypothesis 1 and warrant further investigation.

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3. Study 2: The Influence of Trait Anxiety on the Relationship Between Usage Habits and Choice Preferences

3.1 Participants Using G*Power 3.1 software (Faul et al., 2007) with parameters of effect size = 0.2, $\alpha = 0.01$, power = 0.95, number of groups = 2, number of measurements = 5, and correlation = 0.5, the required total sample size was calculated to be 48. To account for exclusions, 70 university students were recruited, yielding 67 valid participants. Based on Trait Anxiety Inventory scores sorted from high to low, the top 27% were assigned to the high trait anxiety group (N = 17, male = 6, M = 55.06, SD = 4.52) and the bottom 27% to the low trait anxiety group (N = 18, male = 11, M = 36.44, SD = 2.71). The two groups differed significantly (t(33) = 14.88, p < 0.001, Cohen' s d = 5.181).

3.2 Materials 3.2.1 Emotion Regulation Strategy Word Stimuli
The word stimuli were identical to those used in Study 1.

3.2.2 Trait Anxiety Inventory (STAI-trait)

The Trait Anxiety Inventory is suitable for assessing trait anxiety levels in college students. This study used the Chinese revised version (Shen, 1988). The scale contains 20 items using a 4-point scoring system (Spielberger, 1970). In this study, Cronbach' s α was 0.87.

3.2.3 Emotion Regulation Strategy Questionnaires

The same questionnaires used in Study 1 were employed.

3.3 Experimental Design Study 2 used a mixed experimental design. The between-subjects factor was trait anxiety level (high trait anxiety group vs. low trait anxiety group), and the within-subjects factor was emotion regulation strategy. The dependent variables were emotion regulation strategy usage habits and choice preferences.

3.4 Procedure The experimental procedure was identical to Study 1.

3.5 Statistical Analysis 3.5.1 Correlation Analysis Between Usage Habits and Choice Preferences by Trait Anxiety Level

Correlation analyses between usage habits and choice preferences for the high and low trait anxiety groups are presented in Table 4 . In the high trait anxiety group, expressive suppression and acceptance showed positive correlations between usage habits and choice preferences, whereas the low trait anxiety group showed negative correlations. For cognitive reappraisal and distraction, the high trait anxiety group showed negative correlations, while the low trait anxiety group showed positive correlations. Venting showed negative correlations in both groups, with a significant negative correlation in the low trait anxiety group (r = -0.60, p = 0.008).

Table 4 Correlation Analysis Between Usage Habits and Choice Preferences by Trait Anxiety Level

Strategy	High Trait Anxiety	Low Trait Anxiety
Cognitive Reappraisal	-0.35	0.42
Expressive Suppression	0.28	-0.31
Acceptance	0.33	-0.25
Venting	-0.35	-0.60**
Distraction	-0.22	0.18

3.5.2 Influence of Trait Anxiety on the Correlation Between Usage Habits and Choice Preferences

To further investigate whether trait anxiety affects the correlation between usage habits and choice preferences, Comprehensive Meta-Analysis V3 (CMA3.0) software was used. First, a homogeneity test was conducted on the overall effect size to determine whether to use a random-effects or fixed-effects model for subsequent analyses (Li, 2015; Shi et al., 2017). Using the correlation coefficient between usage habits and choice preferences as the effect size, the homogeneity test yielded Q = 19.093 (p = 0.147), indicating homogeneous effect sizes. Therefore, a fixed-effects model was adopted for Study 2.

When trait anxiety was dichotomized into high and low groups (see Table 6), results showed no significant differences in correlation coefficients between the high and low trait anxiety groups for cognitive reappraisal, expressive suppression, acceptance, or distraction (QB = 1.814, QB = 0.361, QB = 1.848, QB = 0.673, respectively, all $p > 0.05$). This indicates that trait anxiety does not affect the relationship between usage habits and choice preferences for these four strategies. However, for venting, the difference in correlation coefficients between high and low trait anxiety groups was significant (QB = 0.778, p = 0.007). The low trait anxiety group (r-bar = -0.60) showed a significantly stronger negative correlation than the high trait anxiety group (r-bar = -0.35), demonstrating that trait anxiety moderates the relationship between venting strategy usage habits and choice preferences.

Table 5 Fixed-Effects Model Analysis of the Relationship Between Usage Habits and Choice Preferences

Test	Value
Homogeneity Q	19.093
p-value	0.147

Table 6 Moderating Effect of Trait Anxiety on the Relationship Between Venting Usage Habits and Choice Preferences

Group	K	N	r-bar	95% CI	QB	df	p
High Trait Anxiety	1	17	-0.35	[-0.68, 0.08]	0.778	1	0.007**
Low Trait Anxiety	1	18	-0.60	[-0.83, -0.21]			

Note: K = number of independent effect sizes; N = sample size; 95% CI = 95% confidence interval for effect size r; QB = between-group homogeneity coefficient; df = between-group degrees of freedom; p = significance level of between-group homogeneity coefficient.

3.6 Summary Trait anxiety did not affect the correlations between usage habits and choice preferences for cognitive reappraisal, expressive suppression, acceptance, or distraction, but it did influence the correlation for venting. Specifically, as trait anxiety levels increased, the negative correlation between venting usage habits and choice preferences gradually decreased, and when trait anxiety reached high levels, venting choice preferences might become positively correlated with usage habits. These findings partially support Hypothesis 2.

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4. General Discussion

By examining the relationship between usage habits and choice preferences for five emotion regulation strategies among college students and the role of trait anxiety, this study found a significant negative correlation only for venting, with choice preference predicting usage habits. Trait anxiety moderated only the relationship for venting, showing no effect on the other four strategies.

4.1 Disjunction Effects Across Different Emotion Regulation Strategies Study 1 demonstrated disjunction effects between usage habits and choice

preferences for cognitive reappraisal, expressive suppression, acceptance, and distraction. This disjunction effect first confirms that usage habits and choice preferences are distinct constructs. Second, the disjunction effect may arise because questionnaire-based assessment of usage habits involves conscious participation and represents explicit emotion regulation, whereas GNAT-based assessment of choice preferences represents implicit emotion regulation—emotion regulation processes triggered and completed by external stimuli without conscious monitoring but with goal direction (Gyurak et al., 2011; Ye, 2018). In other words, the disjunction effect between usage habits and choice preferences may be caused by measurement differences between explicit and implicit emotion regulation.

However, Study 1' s finding that venting showed no disjunction effect challenges this interpretation. This may be because venting functions both as response modulation and as an enhancing regulation. Specifically, venting amplifies subjective feelings of both positive and negative emotion regulation. Its positive function lies in mobilizing more behavioral and psychological support or eliciting more positive help from others, but it also carries high risks, as venting both positive and negative emotions requires appropriate contexts (Huang & Guo, 2002). Additionally, domestic college students, influenced by collectivist culture, tend to suppress rather than vent emotions. Therefore, venting produces significantly different effects across contexts, which may lead to infrequent habitual use despite being preferred.

4.2 Trait Anxiety' s Influence on the Relationship Between Usage Habits and Choice Preferences Study 2 showed that trait anxiety did not moderate the relationship between usage habits and choice preferences for cognitive reappraisal, expressive suppression, acceptance, or distraction, indicating no effect on their disjunction effects. However, trait anxiety did moderate the relationship for venting: as trait anxiety increased, the negative correlation between venting usage habits and choice preferences gradually weakened, potentially becoming positive at high trait anxiety levels. Specifically, none of the five strategies showed significant correlations in the high trait anxiety group, and the low trait anxiety group also showed no significant correlations for cognitive reappraisal, expressive suppression, acceptance, or distraction. Notably, low trait-anxiety college students represented a special case for venting.

Further analysis revealed that low trait-anxiety college students habitually used venting significantly more than high trait-anxiety individuals but showed significantly lower choice preferences. This pattern may occur because low trait-anxiety college students' habitual use of venting to regulate certain emotions (e.g., anger) simultaneously releases overall negative emotions (e.g., depression or anxiety) that are aroused (Watson & Tellegen, 1995; Parlamis, 2012). However, they may not consciously recognize this effect, instead perceiving venting as a response-enhancing strategy that intensifies negative emotions, thus showing low choice preference. Additionally, as a response modulation strategy, venting can relatively quickly achieve hedonic regulation from a motivational

perspective (Tamir et al., 2008; Zhang et al., 2018), allowing low trait-anxiety individuals to effectively regulate immediate negative emotions, hence frequent usage. Yet because venting is a highly resource-demanding emotion regulation strategy at the response stage (Sang et al., 2018; Zhang et al., 2021), low trait-anxiety individuals rarely prefer it.

This study used questionnaires to measure emotion regulation strategy usage habits and the GNAT paradigm to assess choice preferences, exploring the relationship between these constructs and the role of trait anxiety. Results indicate disjunction effects between usage habits and choice preferences for cognitive reappraisal, expressive suppression, acceptance, and distraction among college students, but no disjunction effect for venting. Trait anxiety did not affect the disjunction effects for cognitive reappraisal, expressive suppression, acceptance, or distraction, but it did influence the disjunction effect for venting.

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Appendix 1: GNAT Paradigm Materials

Birds: red-crowned crane, peacock, woodpecker, swan, mandarin duck, parrot, wild goose, sparrow, thrush, oriole
Negative Emotions: anger, pain, fear, anxiety, tension, disappointment, grievance, remorse, depression, guilt
Cognitive Reappraisal: reflect, introspect, ponder, consider, reconstruct, differentiate, discern, reframe, analyze, blessing in disguise
Acceptance: accept, tolerate, embrace, calm, accommodate, natural, receive, allow, composed, inclusive
Expressive Suppression: prohibit, restrict, conceal, block, imprison, restrain, suppress, cover, control, poker-faced
Distraction: disperse, distract, diverge, leave, shift, divert, migrate, detach,

transform, split attention
Venting: unblock, release, express, articulate, reveal, unfold, vent, display, erupt, unable to contain

Note: Figure translations are in progress. See original paper for figures.