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The potential of Future Event Specificity Training (FEST) to decrease anhedonia and dampening of positive emotions: A randomised controlled trial

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Abstract

Impaired episodic future thinking (EFT), as reflected in reduced specificity, low levels of detail and less use of mental imagery, has been associated with depressive symptomatology. The beneficial impact of Future Event Specificity Training (FEST) on impaired EFT has recently been demonstrated, as well as on anhedonia, the core symptom of depression reflecting low positive affect. The current study aimed to replicate these previous findings. In addition, this study is the first to examine the potential of FEST to reduce engagement in dampening, a maladaptive response style characterized by reducing the intensity and/or frequency of positive emotional states which is linked to depressive symptoms and anhedonia. An RCT (FEST vs. waitlist control) was conducted in a large sample of Dutch-speaking undergraduate students (N = 155). In line with prior research, FEST resulted in significant improvements in EFT features. However, likely related to limited room for change detection, no significant changes were found in anhedonia and dampening. In the light of the positive impact of FEST on several EFT features, future studies should address methodological issues to create optimal conditions for potential change detection. Finally, further examination of the proposed theoretical change mechanisms aimed to reduce anhedonia and dampening is warranted.

Keywords: episodic future thinking, anhedonia, dampening, future event specificity training

The potential of Future Event Specificity Training (FEST) to decrease anhedonia and dampening of positive emotions: A randomised controlled trial

Depression is a prevalent mental disorder and a leading cause of disability worldwide (World Health Organisation, 2023). Its two core features involve disturbances in the negative and positive valence system (Dunn et al., 2019) which are persistent elevated negative affect (sad mood, distress) and diminished positive affect levels or anhedonia (APA, 2013) respectively. Although anhedonia is a marker of poor prognosis and illness course (associated with higher depression symptom severity; e.g., Ducasse et al., 2018), most current recommended depression treatments do not explicitly prioritize repairing anhedonia (Dunn & Roberts, 2016). Moreover, they seem to be only partially effective in repairing it, and the extent of positive affect repairment seems to be less marked compared to negative affect repairment (Alsayednasser et al., 2022; Dunn et al., 2020). In other words, more effectively targeting disturbances in the positive affect regulation system may bring us to a rosier future in terms of overall depression treatment outcomes (Dunn et al., 2020).

One promising way forward in this regard is enhancing episodic future thinking (EFT). EFT refers to the ability to imagine and mentally simulate experiences one may have in his/her personal future (Schacter et al., 2017). Impairments in EFT (e.g., reduced specificity, detail and mental imagery of future thoughts) and reduced anticipation of pleasure evoked by EFT have been associated with major depressive episodes (Hallford, Barry et al., 2020; Hallford, Sharma et al., 2020). Crucially, reduced pleasure anticipation is one key dimension of anhedonia which causes difficulties with motivation to engage in rewarding, goal-directed behaviours vital for good mental health (e.g., Ji et al., 2021; Hallford, Barry et al., 2020; Renner et al., 2019). So, boosting (impaired) EFT skills and increased evoked pleasure anticipation can be an important stepping-stone towards effectively alleviating anhedonia.

One group-based future thinking training programme that has been evaluated for this purpose is Future Event Specificity Training (FEST; Hallford, Yeow et al., 2020). So far, two randomised controlled trials have provided empirical support for its efficacy. First, participants from a community sample who followed a FEST programme (vs. passive control) reported an increase in the ability to mentally simulate specific episodic future thoughts, higher subjective levels of detail, greater use of mental imagery, greater perceived control over future events, and a higher perceived likelihood of their occurrence at follow-up (Hallford, Yeow et al., 2020). Crucially, these simulated episodic future thoughts in the FEST group were associated with higher levels of anticipated and anticipatory pleasure (Hallford, Yeow et al., 2020). All effects were of a moderate to large size. Second, in a sample of participants with a current major depressive episode and endorsing anhedonic symptoms, FEST was similarly effective (Hallford, Rusanov et al., 2022). In particular, FEST was associated with improved EFT characteristics, increased anticipatory and anticipated pleasure, and a substantially reduced likelihood of meeting anhedonia criteria and major depression criteria overall (Hallford, Rusanov et al., 2022).

Building on the evidence that FEST effectively impacts anhedonia, the unique contribution of the current study is to examine its potential to reduce dampening, a particular maladaptive response style that reduces the intensity and duration of positive affective mood states (Feldman et al., 2008). Examples of prototypical dampening thoughts are “This is too good to last”, “This positive feeling will be over soon” or “Others will think I am showing off”. Empirical evidence strongly suggests that dampening contributes to the maintenance of depressive symptomatology and anhedonia. That is, higher levels of dampening have been linked to higher depressive symptomatology and levels of anhedonia, robustly in cross-sectional studies and to a somewhat lesser extent in prospective studies (Bean et al., 2022). This correlational evidence is supported by experimental findings from lab studies in

community samples in which dampening has been induced during tasks of event anticipation, consummation and recall (e.g., Burr et al., 2017). In these studies, participants have tended to report reductions in happiness and increases in sadness, suggesting the detrimental role of dampening thoughts in depression. In addition, dampening may be a strategy that undermines, in part, the effectiveness of psychological depression treatments, particularly those incorporating elements aimed at lifting positive affect, like pleasant event scheduling aimed at increasing positive reinforcement (Dunn & Roberts, 2016). In this case, instead of experiencing positive anticipatory feelings, dampening may minimise them.

Two possible theoretical mechanisms are proposed here through which FEST may affect dampening. Firstly, EFT impairments observed in mental disorders like depression, and dampening could be interpreted as an expression of the same underlying tendency to avoid positivity. For instance, higher use of mental imagery has been linked to stronger emotional responses to mental representations of events (Holmes et al., 2016), and in depressed individuals, a paucity of rich mental representations of positive future events has been suggested to contribute to lower anticipatory pleasure (Hallford, Barry et al., 2020). So, reducing one's use of mental imagery could be a way to weaken positive emotional responses potentially elicited by mental representations. Therefore, FEST may have the potential to impact dampening via reducing positive affect avoidance by promoting and enhancing the use of EFT characteristics that evoke emotion. Analogously to how exposure therapy is used to reduce maladaptive avoidance behaviour in anxiety disorders (Hofmann & Smits, 2008), in FEST sessions individuals are exposed to richer mental representations of future positive events and accentuate evoked anticipatory feelings in a (self-)controlled training context. They systematically expose themselves to positive mood states, which itself may be a positive reinforcer. Consequently, the avoidance of positivity tendency may lower, which may be reflected in a reduced use of dampening.

Secondly, FEST's potential impact on dampening can be understood from a Predictive Processing (PP) framework. In essence, the PP theory proposes that an organism forms predictions of the world and strives to reduce the discrepancy between actual situations and predictions thereof, called prediction error minimization (PEM; Clark, 2013; Friston, 2010). For this purpose, accommodation or assimilation strategies are adopted, implying either updating the prediction in line with the stimulus, or actively adapting the stimulus in line with the prediction (Moors et al., 2021). However, when being confronted with repeated prediction errors (PEs) or persistent model disconfirmations, individuals may gradually lose confidence in the efficacy of their own actions (assimilation), which may generalize to feelings of perceived powerlessness as in depression (Van de Cruys & van Dessel, 2021). This may cause them to resort to accommodation strategies, resulting in adapting their mental predictive model to their (negative) experiences instead of actively trying to change their environment and experiences (Van de Cruys & Van Dessel, 2021). Put differently, depressed individuals may adjust their mental model to a negative predictive model (fed by prior negative experiences), on which new predictions will be based. We propose that dampening could be considered a cognitive strategy aimed at easily achieving PEM. Individuals suffering from depressive symptoms may grant too much precision to their mental model (overreliance) causing them to discard perceptual information (Everaert et al., 2021). A positive experience (perceived as low in precision) may be downplayed using dampening in order to remain in keeping with the negative predictive mental model.

In the context of this second explanation, FEST may lower the use of dampening by influencing predictions of the occurrence of future positive events. Practice in improving mentally simulated positive future events so they are richer and more realistic in nature may increase their perceived likelihood of occurrence (Szpunar & Schacter, 2013) which is supported by findings from previous trials (e.g., Hallford, Rusanov et al., 2022). Therefore,

increased expectations of positive future events would cause smaller PEs when a positive situation occurs, and lower the need to resort to dampen as a PEM strategy.

This study has three main aims. The first aim was to replicate the study of Hallford, Yeow et al. (2020) in a sample of Dutch-speaking undergraduate students. In particular, FEST was expected to improve the following EFT features: specificity, level of detail/vividness, mental imagery, perceived control and likelihood of occurrence, anticipatory and anticipated pleasure (Hypothesis 1, H1). The second aim was to examine whether FEST can reduce anhedonia (H2) and dampening (H3) levels. The third aim was to explore whether beneficial effects of FEST are also observed in overall depressive symptoms (H4a). Further, this study explored whether theoretical explanations for dampening reduction caused by FEST could be corroborated by reductions in i) levels of unpleasantness associated with positivity (H4b), as related to avoidance of positivity, and ii) increases in dispositional optimism/pessimism (H4c), as related to an adjustment in a prediction model for positive outcomes in one's life.

Method

Participants

After ethical approval (Social and Societal Ethics Committee, KU Leuven) and preregistration on Open Science Framework (https://doi.org/10.17605/OSF.IO/8N2SQ), participant recruitment started via the Experiment Management System of KU Leuven. Eligible participants were Dutch-speaking undergraduate psychology students (>17 years) with a minimum sum score of 12 (mild cut-off) on a dampening screening scale (Responses to Positive Affect scale, Feldman et al., 2008; see *Measures*). Cut-offs for study inclusion were based on Jacobson and Truax's (1991) operationalisation of pre- vs. post-treatment change (*Supplementary Material*). No other inclusion criteria were adopted. Spread over two rounds (March-May, October-December 2022), 155 participants completed the study with 75 participants in the FEST group (M_{age} = 18.80, SD_{age} = 1.05; 17-23 years; 86.67% female; 97.50% secondary education as highest educational achievement) and 80 in the control group

(M_{age} = 18.70, SD_{age} = 1.72; 17-31 years; 90% female; 97.34% secondary education as highest educational achievement).

Sample Size Planning, Randomization and Trial Design

As regards the first and second study aim, an a priori power analysis was run allowing detection of moderate between-group effects (d = 0.50) using two-tailed follow-up t-tests (α = .05 and β = .80; G*Power). This resulted in a required sample size of 128 (64 per group; 1:1 allocation ratio). Given the absence of prior studies to inform simulation-based power analyses (second and third aim), no additional power analysis was run. In anticipation of drop-out related to online formats (Melville et al., 2010) and based on prior drop-out rates (Hallford, Yeow et al., 2020), oversampling (17%) resulted in a required sample size of 148.

Similar to Hallford, Yeow et al. (2020), this study used a between (training vs. passive control) and within-subjects (baseline, post-training, follow-up two weeks later) design to examine the effect of FEST on the dependent variables. Primary outcomes (first and second aim) were administered at all timepoints: EFT specificity, level of detail, mental imagery, anticipated and anticipatory pleasure, perceived control, perceived likelihood of occurrence associated with simulated future events, and anhedonia and dampening. Basic mental health (depressive symptoms, anxiety, and stress) was fully assessed at baseline to detect possible baseline group differences. At post-training and follow-up, only depressive symptoms were administered (third aim). Other secondary outcomes (third aim) were level of unpleasantness associated with experiencing positive feelings in general and during the assessment phase (administered at baseline and at follow-up), and optimism/pessimism (administered at all timepoints). Finally, at post-training and follow-up, participants were asked about the extent of engagement with the training material. At post-training, perception of the FEST was assessed, and at follow-up participants were asked about the perceived impact of FEST.

Training Programme

FEST is adapted from Memory Specificity Training (Raes, Williams, et al., 2009; Dalgleish et al., 2014), applying its essential elements to self-referent future events instead of memories. Similar to the study of Hallford, Yeow et al. (2020), participants followed two online 90-minutes sessions via MS Teams, in groups of 6 to 9 participants. In essence, participants were invited to simulate specific future self-referent positive events in response to cue words (e.g., bike). Relying on positive reinforcing feedback, the trainer encouraged participants to strive for high levels of details/vividness and specificity, and to focus on positive emotions elicited by the simulated positive future events. Details can be found in the manual in Dutch (or in English) on https://osf.io/mq6y3/. Compared to the original (English) FEST, three minor changes were made (*Supplementary Material*). FEST was offered in a standardized manner by three graduate clinical psychology students and author LB (clinical psychologist), supervised by author FR (clinical psychologist and behavioural therapist).

Procedure

First, participants who were interested in taking part in the study were asked to give informed consent, fill in contact information and complete the dampening screening questionnaire. Next, eligible participants were invited to sign up for a multipart study, consisting of three one-hour slots for completion of the online self-report scales (Qualtrics) and two 90-minutes slots for the FEST sessions. Shortly after baseline assessment, participants were informed about the result of the random allocation (online random number generator applied by author LB) to either the FEST or control group. Further communication with participants took place via email (e.g., distribution of surveys). To minimise drop-out, participants were rewarded depending on their time investment (credit/hour). Full completion of the assessments was rewarded by three credits and completion of the FEST by an additional three credits. As the renumeration for study participation was contingent on the condition, both the researcher(s) and the participants were aware of the condition.

Measures

Primary Outcomes

The Dutch version of the Episodic Future Thinking Test (EFT-T; Hallford et al., 2019) measured participants' ability to generate specific future events. Due to the primary focus on PA, instructions of the original test were slightly adapted. Participants were instructed to generate positive future events in response to alternating positive and neutral (vs. negative) cue words. Each assessment, a different set of eight cues was presented (*Supplementary Material*). Similarly to the original EFT-test, selected cue words were balanced in valence, arousal and frequency of occurrence, based on Moors et al.'s (2012) norms for Dutch words.

Specificity (specific vs. non-specific) was coded by author LB by means of the coding template used in Hallford, Yeow, et al. (2020). Response scale ratings for irrelevant or erroneous generated events (e.g., 'I cannot think of anything') were considered as missing values. Author EL rated 22% of all generated events at baseline. Inter-rater reliability reflected substantial agreement (Cohen's kappa = .78). For specificity, acceptable to good internal consistencies were found (α range across timepoints: α's = .71-.76).

Participants rated subjective level of detail (α's = .82-.86) and mental imagery (α's = .82-.87), as well as the level of anticipated (α's = .71-.80) and anticipatory pleasure (α's = .74-.78), perceived control (α's = .68-.78), and perceived likelihood of occurrence (α's = .71-.78) associated with the generated future events, on response scales ranging from 1 (*not at all*) to 9 (*very much*). Wording of the response scales can be found in the *Supplementary Material*.

Anhedonia was measured via the *Leuven Anhedonia Self-Report Scale* (LASS, 2nd version; Nelis et al., 2018). This 12-item self-report scale taps into symptoms reflecting consummatory (i.e., pleasure in ongoing experiences), anticipatory (i.e., pleasure from anticipation to a future positive event), and motivational (i.e., drive motivation to pursue positive outcomes) aspects of anhedonia. Participants rated the applicability of statements (e.g., "I found little pleasure in

things that I used to enjoy") for the last week (vs. two weeks in the original instructions) on a 5-point scale ranging from 1 (*completely false*) to 5 (*completely true*). Scores at the higher end of the continuum (range 12-60) reflect higher levels of anhedonia. In the current sample, excellent internal consistencies were found for the three time points (α's = .93-.96).

Dampening was administered via the dampening subscale of the *Responses to Positive Affect* scale (RPA, Feldman et al., 2008). The Dutch version of the dampening subscale of the RPA (Feldman et al., 2008) consists of seven items (Raes, Daems et al., 2009). Participants rated item applicability (e.g., "When you feel happy, how often do you think about things that could go wrong?") on a 4-point scale going form 1 (*almost never*) to 4 (*almost always*), with higher scores reflecting higher levels of dampening thoughts. First, the original instructions of the RPA (validated) were administered assessing participants' general tendency to use dampening thoughts (general version: α's = .83-.88). Then, the same items were administered but only in relation to the past week (past week version: α's = .85-.88). In this way, participants only considered experiences that took place during or after the FEST programme.

Secondary Outcomes

Basic mental health, defined as depressive, anxiety and stress symptoms, at baseline, and depressive symptoms at post-training and follow-up assessment were measured via the respective subscales of the *Depression, Anxiety and Stress Scale* (DASS-21; Lovibond & Lovibond, 1995). This scale is composed of 21 items (7 items per subscale) and assesses the extent of depressive symptoms (e.g., "I felt down-hearted and blue"), anxiety (e.g., "I felt I was close to panic"), and stress (e.g., "I found it difficult to relax") experienced over the past week. Participants rated symptoms on a 4-point scale from 0 (*not at all* or *never*) to 3 (*very much* or *most of the time*). At baseline, good internal consistencies were found for the three subscales (α's = .85-.89). For the depression subscale, good to excellent internal consistencies were observed at post-training and follow-up (α's = .88-.91).

Levels of unpleasantness associated with experiencing positive feelings in general, and during the assessment phase were assessed at baseline and at follow-up via four questions (*Supplementary Material*). A 7-point rating scale going from 1 (*not unpleasant at all*) to 7 (*extremely unpleasant*) was used.

The *Life Orientation Test – Revised* (LOT-R; Scheier et al., 1994; Dutch version, ten Klooster et al., 2010) was administered to assess optimism/pessimism. This 10-item scale consists of three positively, three negatively formulated and four filler items. The items were administered to assess optimism (e.g., "I'm always optimistic about my future") and pessimism (e.g., "If something can go wrong for me, it will") respectively. Items were rated on a 5-point rating scale, going from 0 (*strongly disagree*) to 4 (*strongly agree*). At the three assessment points, acceptable internal consistencies were found for optimism (α's = .68-.71) and pessimism (α's = .64-.75). Finally, participants reported on training perception, perceived impact and adherence via open questions and rating scales (details, *Supplementary Material)*.

Analytic Strategy

Preliminary analyses were run to detect groups differences on demographics. Afterwards, as preregistered and in line with the approach adopted by Hallford, Yeow et al. (2020), mixed ANOVAs and follow-up between-group *t*-tests were run to detect group differences at both timepoints. Hypotheses were examined with intention-to-treat analyses. Pairwise deletion was applied in case of missing values, and in case of homoskedasticity assumption violations robust ANOVAs were run ("WRS2" R Package v 1.1-4, Mair & Wilcox, 2020). In addition, we decided post-hoc to run ANCOVAs to control for the potential impact of baseline individual differences. For the AN(C)OVA models, Greenhouse-Geisser correction was applied to within-subjects factors violating the sphericity assumption ("rstatix" package v. 0.7.2; Kassambara, 2023). Furthermore, post-hoc decisions led to the implementation of piecewise multilevel models (MLMs; details on model composition can be found in the

Supplementary Material). Time, as a Level-1 variable nested within persons as a Level-2 variable, condition and their cross-level interactions acted as predictors (fixed effects). Time was coded via two dummy variables (T2 and T3). MLMs allow to rule out variance in the effect of time and condition on the dependent variables that could be attributed to differences at the person level (random effects). In addition, MLMs are less sensitive to the impact of missing values. All analyses were rerun after listwise exclusion of outliers ($Q1/3 \pm 1.5$ x *IQR).* Uncorrected *p*-values were compared with a significance level $\alpha = .05$. In case of significant effects, the Benjamini-Hochberg (1995) corrected significance level ($q_{\text{BH corrected}}$) is reported on as well (see *Results*).

Results

Preliminary analyses

Figure 1 shows the participant flow. In Round 1 and 2, 0.09% ($n = 5$) and 15% ($n = 4$) of participants who completed baseline assessment respectively did not complete the training due to no-show in the initial or rescheduled training session(s) or due to formal study withdrawal. In compliance with the ethical agreements, participants did not have to provide the research team with a reason for study withdrawal. No harms or unintended training effects were reported. Table 1 shows the descriptive statistics by condition. The *Supplementary Material* contains details about group comparison on demographics, and correlations of the study variables at baseline (Table S1).

Main analyses

Detailed results of the preregistered mixed ANOVAs and follow-up Welch's two sample *t*-tests (due to unequal group variances), together with the results of the post-hoc MLMs, are presented in Table S2 (*Supplementary Material*). Results of the post-hoc mixed ANCOVAs[1] generally led to the same conclusions (details, Table S3 in *Supplementary Material*).

[1] Mixed ANCOVAs should be considered as a restricted version of multilevel models (Hoffman & Rovine, 2007). Therefore, the results are not discussed in detail here. Details can be found in the *Supplementary Material.*

For specificity, the mixed ANOVA showed a significant time x condition interaction (p < .001) and follow-up *t*-tests were significant (ps < .001). That is, significant mean differences of a large effect size in favour of the FEST group (vs. control) were found at both time points (ps < .001, $d_{T2/T3}$ = 1.03/0.89). For level of detail, mental imagery, perceived control and perceived likelihood of occurrence ratings related to the simulated events, mixed ANOVAs resulted in significant time x condition interactions (ps < .001) and follow-up *t*-tests showed higher reported levels of these outcomes at post-training and follow-up for the FEST group (ps < .001). For level of detail and mental imagery, these latter effects were of a medium effect size (d = [-0.79;-0.62]). For perceived control and perceived likelihood of occurrence, medium to large effects ($d_{T2/T3}$ = -0.84/-0.72) and large effects ($d_{T2/T3}$= -0.86/-0.82) were found. For all the aforementioned outcomes, results were post-hoc confirmed by the significant time (dummy-coded) x condition interactions obtained via the MLMs (ps < .001).

For anticipated pleasure, no significant time x condition interaction was found via the mixed ANOVA (p = .33), which was confirmed by the absence of significant interactions for the MLMs (ps > .28). At post-training, the follow-up *t*-test showed a small-sized group difference that did not reach significance (p = .20, d = -0.21). However, at follow-up, the observed small-sized group difference (p = .044, d = -0.34) in favour of FEST fell just above significance level after correction for multiple testing ($q_{\text{BH corrected}}$ = .036) and it did withstand correction for multiple testing after outlier removal (p = .03, $q_{\text{BH corrected}}$ = .04).

For anticipatory pleasure, a significant time x condition interaction was found via the mixed ANOVA (p = .03), which withstood correction for multiple testing ($q_{\text{BH corrected}}$ = .043). The post-hoc MLM showed a significant time x condition interaction at follow-up (p = .03), which remained significant after correction for multiple testing ($q_{\text{BH corrected}}$ = .043). However, the follow-up *t*-tests showed no evidence for significance of the small-sized differences in

favour of FEST (*ps* > .09, $q_{\text{BH corrected}}$ = .036; $d_{T2/T3}$ = -0.20/-0.23). Figure 2 summarizes these findings related to H1.

For anhedonia, results of the mixed ANOVA and follow-up *t*-tests (*ps* > .05, $d_{T2/T3}$ = 0.09/-0.01) showed no effects indicating significant decreases across time for the FEST group. Notably, the T2 x condition interaction found via the MLM (*p* = .04), indicating a decrease in anhedonia from baseline to post-training in the FEST group, did not withstand correction for multiple testing ($q_{\text{BH corrected}}$ = .008) and was no longer detected after outlier removal (*p* = .07). After outlier removal, instead a T3 x condition interaction was found via the MLM (*p* = .02), which again did not withstand correction for multiple testing ($q_{\text{BH corrected}}$ = .008). For dampening, no significant time x condition interactions were found for both measures via the mixed ANOVAs (*ps* > .05). Also follow-up *t*-tests did not yield evidence for significance of the detected small-sized effects (*p*'s > .05, general: $d_{T2/T3}$ = 0.19/0.30; past week: $d_{T2/T3}$ = 0.11/0.21). Noteworthily, for the general version of the dampening scale and after outlier removal, via the MLM a T3 x condition effect was found (*p* = .03), pointing towards a decrease in dampening from post-training to follow-up in the FEST group. However, it did not withstand correction for multiple testing ($q_{\text{BH corrected}}$ = .008).

For depressive symptoms, the non-significant time x condition interaction of the mixed ANOVA (*p* > .05, $q_{\text{BH corrected}}$ = .008) became significant after outlier removal (*p* = .002) and remained significant after correction for multiple testing ($q_{\text{BH corrected}}$ = .02). However, after correction for multiple testing, none of the follow-up *t*-tests yielded evidence for significance of the small-sized mean group differences at both time points (*ps* > .05, $q_{\text{BH corrected}}$ = .008; $d_{T2/T3}$ = 0.09/0.19). Only after outlier removal, the T3 x condition interaction found via MLM (*p* = .0005), which suggests a decrease in depressive symptoms from post-training to follow-up for the FEST group, remained significant after correction for multiple testing ($q_{\text{BH corrected}}$ = .008). For levels of unpleasantness, only measured at baseline and follow-up, related to being

exposed to positivity (in general or during the EFT-test) no significant time x condition interaction was found ($F(1,143) = 0.10$, $p_{uncorrected} = .75$; $d_{T3} = 0.02$, 95% CI [-0.34; 0.34]).

For optimism, the mixed ANOVA, pointed towards a significant time x condition interaction after outlier removal ($p = .016$), that fell on the verge of the corrected significance level after correction for multiple testing ($q_{BH\ corrected} = .01667$). However, follow-up *t*-tests did not yield evidence for significance of the small-sized differences between groups ($d_{T2/T3}$ = -0.21/-0.08; *ps* > .05). In support of the detected effect via the mixed ANOVA, after outlier removal, the significant T2 x condition interaction found via the MLM remained significant after correction for multiple testing ($p = .003$, $q_{BH\ corrected} = .008$). The estimate points towards a significant increase in levels of optimism from baseline to post-training in the FEST group. Finally, for pessimism, no significant time x condition effect was found via the mixed ANOVA ($p = .17$), and also the small-sized differences between groups at both timepoints ($d_{T2/T3} = 0.36/0.32$) according to the follow-up *t*-tests were not significant after correction for multiple testing ($ps > q_{BH\ corrected} = .008$). The absence of significant changes in levels of pessimism across time was confirmed by the non-significant time x condition interactions of the MLM (*ps* > .05). Results for H2 and H3 are visually displayed in the *Supplementary Material* (Figure S1).

Post-hoc exploratory analyses

Given previous strong improvements in anticipated/anticipatory pleasure following FEST, post-hoc analyses were conducted for reported anticipated and anticipatory pleasure in response to neutral cues only. EFT-test instructions merely focused on positive event simulation related to neutral (vs. negative in prior studies) or positive cues, potentially resulting in restriction of range. Although hypotheses could not be confirmed across analyses, observed trends were in line with the detected effects above (*main analyses*) and our hypotheses. Detailed results (Table S4, Table S5) are reported on in the *Supplementary*

Material. Additionally, using a post-hoc exploratory mediation analysis we explored the role of dampening as a potential underlying working mechanism of FEST's expected impact on anhedonia. However, no support was found for such an indirect pathway from condition to levels of anhedonia (at follow-up) via dampening (at post-training) (*Supplementary Material*).

Training Perception, Perceived Impact and Adherence

Overall, participants' ratings on the 7-point scales (1 = *totally disagree*, 7 = *totally agree*) reflected positive perceptions towards the training, namely the training was easy to understand (M = 6.39, SD = 0.93; 95% scored ≥ to 5), helpful (M = 5.68, SD = 1.26; 88% scored ≥ to 5), sufficiently long (M = 6.29, SD = 0.91; 95% scored ≥ to 5), and worth recommending to others (M = 5.68, SD = 1.26; 83% scored ≥ to 5). Concerning perceived impact of the training, 90.6% responded to the optional open question (coded by the authors into impact vs. no impact). Of these responses, 55.9% reported it had no (clear) impact, while 44.1% expressed it had a positive impact to a certain extent (e.g., enjoy positivity more, hope for the (personal) future, easier to imagine situations, to put things in perspective, and to think about pleasant situations). A detailed overview of participants' answers (and the binary classification) can be found in the *Supplementary Material* (Table S6). Finally, in terms of the level of home practice or adherence, 86.7% responded to at least one of the questions (n = 65), with the majority (61.5%; n = 40) indicating that they had practiced their specific skills outside of the training in some manner. However, overall and based on the information available, frequency of home practice after the training remained probably rather limited, especially during the second follow-up week. That is, 30 (70%) and 17 (38%) participants indicated to have practiced at least a few days a week during the first follow-up week ($n_{\text{answered this question}}$ = 43) and the second follow-up week ($n_{\text{answered this question}}$ = 45), respectively. Information regarding practice methods and the reasons for not practicing (e.g., forgetting or failing to perceive the added benefits) can be found in the *Supplementary Material* (Table S7).

Discussion

The first study aim was the replication of the initial study of Hallford, Yeow et al. (2020). H1 was partially confirmed by our findings. In particular, FEST resulted in significant increases in EFT specificity, levels of detail, mental imagery, perceived control, and perceived likelihood of occurrence at post-training and follow-up. For those outcomes, similar moderate to large effect sizes were found as those observed in prior research (Hallford, Yeow et al., 2020). However, contrary to previous studies (Hallford, Yeow et al., 2020; Hallford, Rusanov et al., 2022), no consistent evidence was found demonstrating the beneficial impact of FEST on anticipated and anticipatory pleasure. One possible explanation is a ceiling effect due to the explicit focus on generation of positive specific future events in the assessment phase of the current study. Baseline levels of anticipated and anticipatory pleasure (M = 7.61/7.08) were indeed considerably higher compared to previous studies from which the measurement approach was replicated (M = 4.52/4.37), which may have left only little room for the detection of pre to post/follow-up improvements. In line with this explanation, the observed effects did not all reach significance, but the direction of the estimates corroborated our hypotheses. That is, small-sized group differences at post-training and follow-up were found in favour of the FEST group. In addition, although depending on sample composition (i.e., after outlier removal), effects that reached significance again lent support for our hypotheses. Finally, when only considering pleasure ratings related to generated events in response to neutral cues (exploratory analyses), effect sizes of the between-group differences at follow-up increased (i.e., small-to-medium size). Detected effects were in line with the results of the main analyses.

Future studies, especially non-clinically oriented, may refrain from instructing participants to generate positive future events, as in community samples this may be a relatively simple task causing a ceiling effect. Disregarding negative cues might also limit detectability of

significant increases in anticipatory and/or anticipated pleasure ratings. It may even be that FEST is partially driven by cultivating cognitive reappraisal of emotion-eliciting simulated future events in response to negative cues (i.e., perceiving negative events in a more positive or less negative way). Such cognitively reappraised 'negative' future events may evoke more anticipated/anticipatory pleasure compared to those generated at baseline. This dovetails with evidence for the adaptivity of positive reappraisal reflected in positive associations with mental wellbeing (Kraiss et al., 2020), positive emotions (Tugade & Frederickson, 2004), and optimism (Zou et al., 2022), and negative associations with anhedonia (Young et al., 2022).

Concerning implications related to H1, the current study confirmed that FEST can be implemented to effectively train individuals in generating specific future events, and to increase their (subjective) use of details and mental imagery. For anticipatory/anticipated pleasure, the possible ceiling effect did likely not leave sufficient room for detectable significant improvements. In the light of previous findings and the direction of the observed effects in favour of the FEST group, the importance of striving for rich mental representations of positive future events to evoke anticipatory/anticipated pleasure remains recommended.

Additionally, the current study confirmed that FEST can effectively increase perceived control and perceived likelihood of occurrence of future events. It should be emphasized that, in contrast to the other EFT features, individuals were not explicitly instructed to focus on those features during training which suggests transference of trained EFT skills to other skills. Increases in perceived control of simulated positive future events are especially interesting in the context of anhedonia treatment as previous research suggests its importance in promotion of adaptive behaviours towards motivational goals (MacAulay et al., 2014). In particular, increases in feelings of perceived control of simulated positive future events may boost approach behaviour, which is linked to reward wanting, one of the three impaired reward processing subtypes in anhedonia (Borsini et al., 2020).

The second study aim was to find additional support for the effectiveness of FEST to lower anhedonia and to examine its effectiveness to reduce dampening. Concerning anhedonia, no support was found for our hypothesis (H2). It should be noted that the MLMs suggested effects in the expected direction, but they did not withstand correction for multiple testing. However, previous research involved patients with clinical depression and significant anhedonic symptoms that could potentially be alleviated (Hallford, Rusanov et al., 2022). Despite the selection of our community sample based on a propensity for engaging in dampening and dampening's connection to anhedonia, no heightened anhedonic symptoms at baseline were observed in comparison to normative data. It is possible that anhedonic symptoms in the current sample were not sufficiently severe to show substantial improvement via FEST as implemented in the current study design. Therefore, the absence of significant effects (across analyses) could be explained by a floor effect.

For dampening, our hypothesis (H3) could not be confirmed either when taking into account all performed analyses and applying correction for multiple testing. Similarly to anhedonia, one plausible explanation for the absence of significance concerns the distribution of dampening thoughts in community samples. Noteworthily, non-significant small(-to-medium) effect sizes were observed for the general version of the dampening scale that are in line with our hypothesis. In addition, after outlier removal, a reduction in dampening thoughts from post-training to follow-up in the FEST group was detected via the MLM. However, this T3 x condition effect became non-significant after correction for multiple testing. It should be noted that despite selection of participants was based on their elevated dampening tendency, the majority only sporadically engaged in dampening as a response style. As such, this was not a "high dampeners" sample that might have benefited from intervention. Further, if decreases in dampening were possible, it may not be realistic to expect a (close to) absolute absence of dampening thoughts after only two sessions of FEST. Moreover, it is important to

bear in mind that FEST attempts to target dampening in an indirect way. However, maladaptive engagement in dampening may be a rather habitual, ingrained response style that operates outside of one's conscious awareness. Therefore, for FEST to be effective for this, it might require acknowledging dampening as a phenomenon (psycho-education) first and increasing meta-awareness (Bean et al., 2022). Additionally, in future intervention studies people might be asked to consciously activate dampening thoughts during training, while focusing on simulating realistic, personally-relevant, emotionally-evocative positive future events and allow themselves to enact these mentally. This might promote cognitive distancing (Beck et al., 1979) in evaluating dampening thoughts in a more objective way, as well as this exposure approach having an inhibitory learning component (Craske et al., 2014). However, especially in the light of the abovementioned factors that may have tempered potential change detection, the detected non-significant effects at follow-up are all in line with our hypothesis. These findings underscore the need for research to explore FEST's impact on dampening in greater detail.

In addition, instead of merely focusing on the *frequency* of dampening thoughts as outcome variable, future studies could focus on the importance individuals give to these thoughts and to what extent they impact their emotional world. For instance, FEST may result in higher perceived control over one's life and emotional world, resulting in dampening thoughts being experienced as less uncontrollable or impactful. Eventually, individuals may give (more) credit to positive experiences as a reliable information source (instead of discarding via dampening), which may result in an updated predictive model incorporating positive sensory data as well. This is inspired by prior research showing that higher mindfulness was not related to a lower occurrence of rumination, but rather to the perception of it as being less uncontrollable (Raes & Williams, 2010). Similarly, the mere focus on

(global) levels of dampening thoughts in the current study could partially explain the absence of strong baseline associations between of EFT characteristics and dampening.

The third study aim was to examine the impact of FEST on three secondary outcomes (i.e., depressive symptoms, levels of unpleasantness, optimism/pessimism). First, concerning depressive symptoms (H4a), the absence of significant effects across analyses is corroborated by the finding of Hallford, Rusanov et al. (2022) that only at three-month follow-up significantly fewer participants of the FEST group met the criteria for a Major Depressive Episode relative to the control group. This delayed impact of FEST may suggest the requirement of a longer time interval for FEST to pay off in terms of depressive symptom reduction. In addition, only a minority of participants in the current sample reported clinically significant depressive symptoms (11.61% severe and 9.03% extremely severe levels; Lovibond & Lovibond, 1995), restricting room for considerable symptom reduction. Again, the effects detected after outlier removal that withstood correction for multiple testing were all in support of our hypothesis. Second, the absence of reductions in reported feelings of unpleasantness associated with experiencing positive events/feelings in general and during the EFT-tests (H4b) is likely due to a floor effect. The positively skewed distribution of the unpleasantness ratings suggests that for individuals with a mild dampening tendency (i.e., a significant subset of our sample) experiencing positivity per se, at least at a conscious level, is not considered that unpleasant. For those individuals, dampening may have to do with avoidance of positivity (and anticipated consequences) exclusively under particular circumstances (e.g., particular colleagues). In other contexts (e.g., friends), those individuals may not experience the urge to dampen (i.e., good discriminative stimulus control). However, for individuals with a more pronounced dampening tendency, dampening may be implemented in an overgeneralized and maladaptive way irrespective of context elements (cf. process of poor discriminative stimulus control in generalized anxiety disorder; McGowan &

Behar, 2013). Relatedly, positivity in general (vs. e.g., being proud or excited) may have become an unpleasant and non-desirable state irrespective of context and expected outcomes (cf. fear generalization, e.g., Beckers et al., 2023). While no significant decreases in reported unpleasantness were observed over time, the positive association with dampening could be interpreted as preliminary support for the idea that dampening serves as a method to avoid positivity.

Third, for dispositional optimism or pessimism (H4c), no consistent evidence was found across analyses that indicated a significant change over time in the FEST group compared to the control group. However, although non-significant, the small effect sizes for the group differences, for optimism especially at post-training, were in line with our hypothesis. In addition, the detected time x condition effects via the mixed ANOVA and MLM after outlier removal pointed towards a short-term increase in reported levels of optimism in the FEST group. Concerning optimism, it should be noted that some other positive psychological interventions (PPIs) using mental imagery have been shown to have the potential to significantly increase dispositional optimism (Ji et al., 2017; Malouff & Schutte, 2017). However, in contrast to FEST, these interventions' main objective was to impact optimism, primarily via focusing on imagination of possible scenarios in a structured and controlled way to maximize this specific effect, e.g., providing participants with predefined positive everyday situations to imagine, instructing participants to imagine their best possible future self who has reached all his/her goals in several life domains. In light of these typical features of effective optimism enhancing interventions, future studies on FEST could explore whether participants could reap greater benefits from simulation of major future life events in a more structured, goal-directed way (even though current instructions already invited participants to simulate value-based future events). Although no significant robust increase/decrease in optimism/pessimism was observed following the FEST, strong negative/positive baseline

associations with dampening were found. This can be interpreted as preliminary support for the relevance of future studies to consider dampening as a PEM strategy.

In addition to the limitations and issues noted above, this study does have several strengths. Firstly, by replicating previous findings in a large Dutch-speaking community sample and with a new group of trainers, it strengthens the generalizability of FEST as an effective way of enhancing several EFT characteristics. In addition, this is the first study to experimentally explore whether dampening can be reduced using a low-burden group training focusing on EFT improvement. Future studies might want to reconsider ways of measuring dampening (e.g., reporting on idiosyncratic dampening thoughts vs. predefined items) or explore whether enriching the traditional FEST programme with a dampening module (cf. psycho-education) might be beneficial. Finally, to the authors' best knowledge, this study attempted to theoretically explain dampening in two innovative ways and provided preliminary support for the proposed theoretical frameworks (i.e., associations with feelings of unpleasantness related to exposure to positivity and optimism/pessimism as expected).

The current findings should be interpreted within the confines of some other limitations. First, the extent to which effects of FEST on EFT features are maintained after a two-week interval remains unclear, although a clinical trial of FEST suggests they do and even become more pronounced after a longer period of time (Hallford, Rusanov et al., 2022). Furthermore as mentioned earlier, FEST may necessitate a more extended time interval for its underlying mechanisms to become fully operational and for its complete potential to manifest in significant improvements in symptomatology. Second, demand effects cannot be ruled out given the high similarity between the content of the training and assessment phases for participants in the training group. Relatedly, the lack of blindness of participants to condition might have artificially inflated training effects linked to social desirability and/or placebo effects. However, participants were not informed about study hypotheses, and they were

asked to complete the surveys honestly. Third, the effectiveness of FEST might be reduced to a certain extent due to suboptimal practical circumstances. In particular, although invited multiple times, a considerable number of participants did not switch on their camera during the online meetings, which limited interactions to some degree. Compared to previous studies on FEST group size was slightly larger, which might have reduced personal interaction and guided future thinking as well. However, it should be noted that trainers ensured that all participants contributed to the training (i.e., sharing generated events via audio, frequently inviting them to ask each other to further elaborate on simulated future events) and the expected effects for important EFT features were observed. However, there are several other training adaptations that could be considered to enhance the potential of FEST, such as reducing group sizes, incorporating real-life sessions, or adopting a more individualized approach, which may involve not using predetermined cue word sets. Fourth, practical constraints did not allow controlling for the quality of all generated events during the FEST and as part of the homework. In future studies, it is advisable to improve the meticulous tracking of participant engagement with the training, including the completion of homework assignments and the utilization of supplementary materials over the course of the study. One potential approach is to collect worksheets and assess their completion objectively using a predefined scoring template. Additionally, it may be beneficial to implement strategies to promote active engagement in the training, such as incorporating daily diary exercises that participants can complete via their personal smartphones. Finally, and most importantly, future studies on the impact of FEST on anhedonia and dampening in community samples should ideally incorporate comprehensive screening for both outcomes. These studies should provide more sensitivity to detect significant improvements in the target outcomes resulting from FEST. Results derived from post-hoc analyses should be interpreted with their post-hoc nature in mind, emphasizing the importance of preregistering the most suitable analytic

strategy in future replication studies. In addition, it would be worthwhile to design future studies that allow to investigate whether dampening serves as a mediator to explain the impact of FEST on anhedonia.

Conclusion

In summary, this study found support for the effectiveness of FEST to increase the specificity, detail, use of mental imagery, perceived control and likelihood of occurrence related to simulated, personally-relevant future events. Concerning anticipated and anticipatory pleasure, anhedonia and dampening, the absence of clear changes as a result of FEST may be explained by limited sensitivity to change detection in the current study. In the light of the positive impact of FEST on several EFT features and the prior support for the effectiveness of FEST to tackle anhedonia in clinical samples (Hallford, Rusanov et al., 2022), future studies should address methodological issues to create optimal conditions for potential change detection. Even under suboptimal circumstances, patterns that were detected in the current study consistently supported our hypotheses and therefore imply the relevance of further research. Finally, further examination of the proposed underlying working mechanisms of FEST aimed at anhedonia and dampening reduction may be interesting.

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Data Availability Statement: Non-involved researchers can be granted access to the coded, pseudonymized dataset in a restricted access repository on OSF after agreement with the study's confidentiality rules. Analysis code is publicly available at https://osf.io/nxa79.

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Tables and Figures

Table 1

Means and Standard Deviations for the Study Variables (Means and Sum scores) Across Time

	Control group *M (SD)*			FEST group *M (SD)*		
	Baseline	Post-training	Follow-up	Baseline	Post-training	Follow-up
EFT-Level of detail*	6.68 (1.19)	6.69 (1.18)	6.69 (1.31)	6.71 (1.00)	7.48 (0.78)	7.41 (0.78)
EFT-Mental imagery*	7.03 (1.21)	6.82 (1.32)	6.78 (1.44)	6.93 (1.07)	7.57 (0.88)	7.50 (0.88)
EFT-Anticipated pleasure*	7.47 (0.94)	7.64 (0.74)	7.51 (0.88)	7.64 (0.83)	7.80 (0.74)	7.79 (0.79)
EFT-Anticipatory pleasure*	7.19 (1.00)	7.40 (0.83)	7.35 (0.93)	7.12 (0.94)	7.57 (0.78)	7.55 (0.83)
EFT-Perceived control*	6.23 (1.19)	6.41 (1.22)	6.46 (1.36)	6.32 (1.11)	7.35 (1.01)	7.31 (1.00)
EFT-Perceived likelihood of occurrence*	6.26 (1.25)	6.25 (1.41)	6.26 (1.32)	6.58 (1.25)	7.35 (1.13)	7.26 (1.13)
EFT-Specificity*	0.82 (0.23)	0.69 (0.26)	0.70 (0.25)	0.81 (0.21)	0.93 (0.13)	0.91 (0.15)
LASS (anhedonia)	28.4 (10.6)	25.5 (12.2)	27.2 (12.5)	30.4 (10.5)	27.5 (9.95)	27.2 (12.0)
RPA (dampening - general)	15.1 (4.59)	13.9 (4.30)	13.5 (4.65)	14.3 (3.93)	13.1 (3.87)	12.2 (4.20)
RPA (dampening - past week)	13.9 (4.86)	12.8 (4.87)	12.3 (4.57)	13.5 (4.45)	12.4 (4.45)	11.4 (4.39)
DASS (depressive symptoms)	5.92 (5.27)	6.79 (4.98)	6.16 (5.46)	6.49 (4.78)	6.36 (4.67)	5.19 (4.81)
DASS (anxiety)	6.63 (4.97)	-	-	5.52 (4.10)	-	-
DASS (stress)	8.95 (4.59)	-	-	9.03 (4.76)	-	-
Unpleasantness related to positivity*	2.17 (1.21)	-	2.15 (1.19)	2.16 (1.08)	-	2.13 (1.15)
LOTR (optimism)	5.70 (2.30)	5.68 (2.44)	5.93 (2.58)	5.44 (2.41)	6.18 (2.22)	6.13 (2.23)
LOTR (pessimism)	6.06 (2.22)	6.25 (2.21)	5.79 (2.55)	5.80 (2.44)	5.41 (2.45)	4.97 (2.62)

Note. * refers to mean values calculated across the response scales completed by the participants. For the other study variables, sum scores were calculated.

Figure 1

Flowchart of Participants

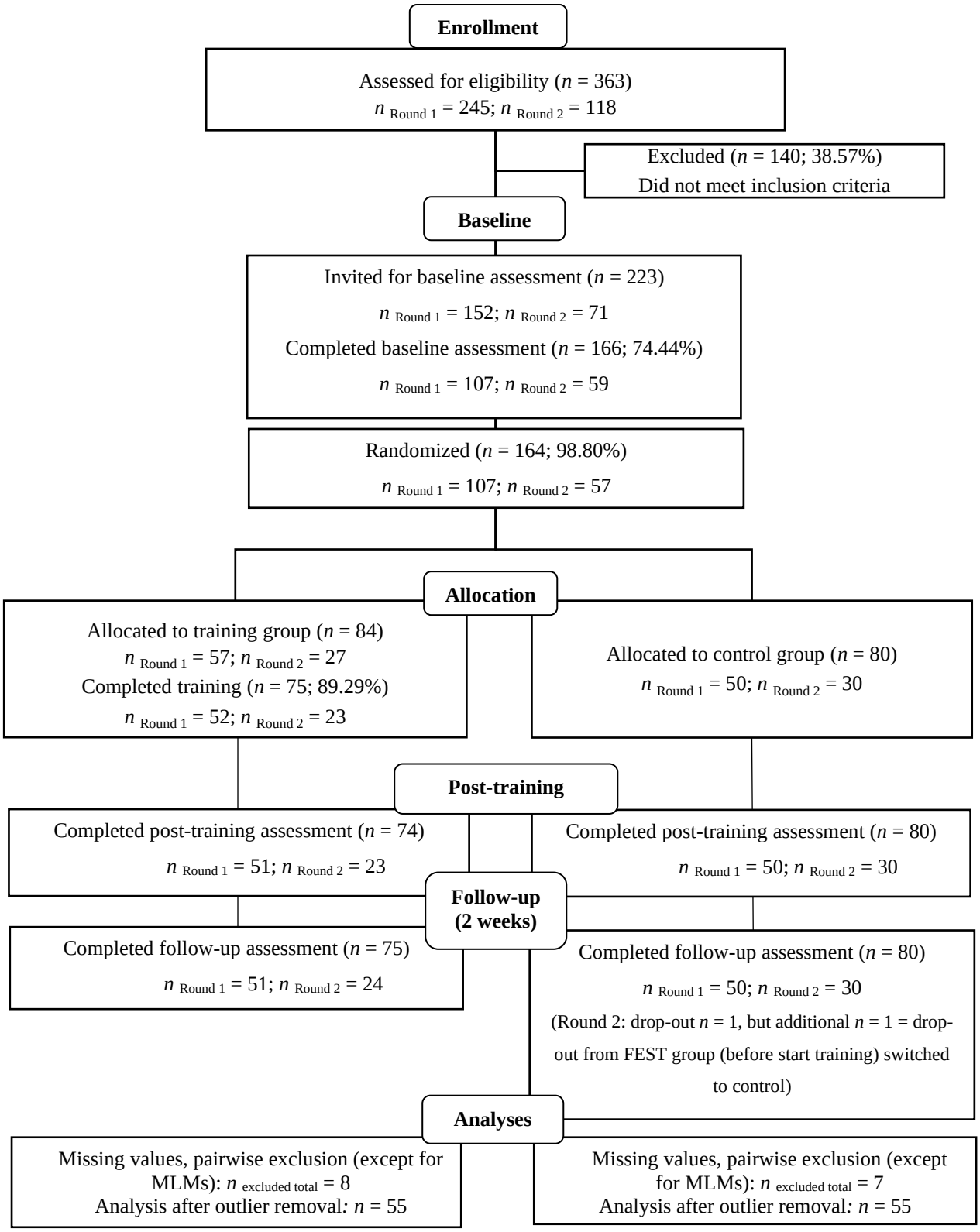
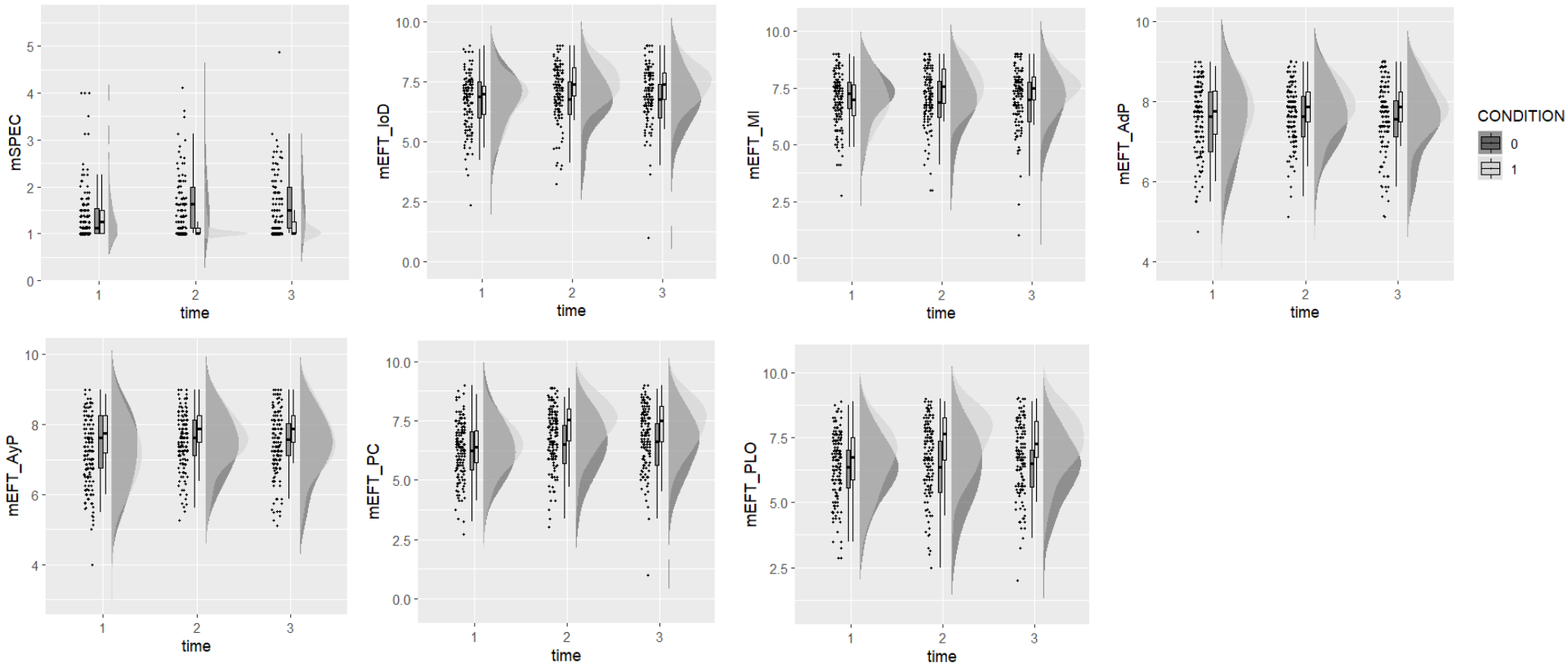


Figure 2

Visual Presentation of the Results Related to Hypothesis 1 Using Raincloud Plots



Note. Condition: 0 = control group, 1 = FEST group; Time: 1 = pre-training, 2 = post-training, 3 = follow-up; mSPEC = specificity, mEFT_loD = EFT level of detail, mEFT_MI = EFT mental imagery, mEFT_AdP = EFT anticipated pleasure, mEFT_AyP = EFT anticipatory pleasure, mEFT_PC = EFT perceived control, mEFT_PLO = EFT perceived likelihood of occurrence