

Single-case Experimental Design Evaluation of Repetitive Negative Thinking-Focused Acceptance and Commitment Therapy in Generalized Anxiety Disorder with Couple-related Worry

Francisco J Ruiz*, Diana M García Beltrán, Andrea Monroy Cifuentes

Fundación Universitaria Konrad Lorenz, Colombia

Juan C Suárez Falcón

Universidad Nacional de Educación a Distancia, España

ABSTRACT

Young adults suffering from generalized anxiety disorder (GAD) show high levels of worry about different domains, with couple relationships being the most frequent one. Excessive worry in this domain might lead to couple dysfunction, which is associated with lower outcomes of cognitive behavioral therapy. The current study analyzes the effect of an individual, 3-session, acceptance and commitment therapy (ACT) protocol focused on repetitive negative thinking (RNT) in the treatment of GAD with couple relationship as the main worry domain. Three young adults with GAD participated in this study. A delayed multiple-baseline design was implemented. All participants completed a 5 to 7-week baseline without showing improvement trends in couple-related worry (Experiences in Close Relationships -Anxiety; ECR-A) and general pathological worry (Penn State Worry Questionnaire; PSWQ). Afterwards, they received the ACT protocol, and a 3-month follow-up was conducted. All 3 participants showed evidence of intervention effects on the ECR-A and PSWQ. The standardized mean difference effect sizes for single-case experimental design were very large for the ECR-A ($g = 5.93$) and PSWQ ($g = 3.19$). No adverse events were found. Brief, RNT-focused ACT protocols for treating GAD with couple relationship as the main worry domain deserve further empirical tests.

Key words: Acceptance and Commitment Therapy, Relational Frame Theory, generalized anxiety disorder, repetitive negative thinking, couple relationship.

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Novelty and Significance

What is already known about the topic?

- Psychological interventions are efficacious for generalized anxiety disorder (GAD).
- Treatment of GAD with couple as the main worry domain has obtained poorer effects.
- Brief protocols of acceptance and commitment therapy (ACT) focused on repetitive negative thinking (RNT) have shown promising results in the treatment of emotional disorders.

What this paper adds?

- First test of brief RNT-focused ACT protocols for treating severe GAD with couple as the main worry domain.
- The intervention showed a very strong effect in diminishing worry about the couple domain.
- The intervention also showed to be highly effective in reducing general pathological worry.

Generalized anxiety disorder (GAD) is considered the basic anxiety disorder (Barlow, 2002). The lifetime prevalence of GAD is approximately 4 to 7% and leads to significant disability (Kessler, 2000; Wittchen & Hoyer, 2001), increasing the risk factors for the development of medical conditions such as neurological, cardiovascular,

* Correspondence: Francisco J. Ruiz, Fundación Universitaria Konrad Lorenz, Carrera 9 bis, N° 62-43. Bogotá, Colombia. Email: franciscoj.ruizj@konradlorenz.edu.co

pulmonary, dermatological, and endocrine diseases (Allgulander, 2012). GAD tends to be a chronic disorder, with episode duration commonly averaging a decade or longer (Kessler, 2000) and with fewer than 20% of those who suffer it experiencing a complete remission of their symptoms when not seeking treatment actively (Wittchen, 2002). This disorder is also associated with high rates of comorbidity (Brown, Campbell, Lehman, Grisham, & Mancill, 2001; Kessler, Waters, & Wittchen, 2004), especially with depression (Judd *et alii*, 1998; Lamers *et alii*, 2011). GAD is also known for being a difficult to treat disorder, as a large proportion of individuals treated with Cognitive Behavioral Therapy (CBT) do not show clinically significant changes, and rates of relapse are high (Gould, Safren, Washington, & Otto, 2004; Waters & Craske, 2005).

The main characteristic of GAD is the excessive level of worry. All individuals engage in worry to some degree because it might allow anticipating future danger, planning, experimenting with ideas before implementing them, and evaluating alternative options (Matthews, 1990). However, worry loses its adaptive function when it becomes excessive, chronic, and it is felt as uncontrollable (Borkovec, Ray, & Stoeber, 1998). While worry in other anxiety disorders tends to be contextualized, worry in GAD is usually generalized to multiple domains including work, interpersonal problems, couple relationships, etc.

The most frequent worry domains in individuals with GAD are family and interpersonal issues (Roemer, Molina, & Borkovec, 1997), with worry focusing more on couple relationships in young adults (Gould & Edelstein, 2010), as this is usually a very important area for them (e.g., Romo, 2008). The concerns about the couple relationship are often focused on the partner's feelings, the future and stability of the relationship, conduct of jealousy, etc. (Martínez León *et alii*, 2013). This excessive worry of individuals with GAD may provoke couple dysfunctions (Priest, 2013). For instance, some studies have revealed that people suffering from GAD present a higher rate of divorce and less couple satisfaction (Hunt, Issakidis, & Andrews, 2002). Research has found that GAD shows strong associations with couple issues, being the emotional disorder that most affect the couple relationship quality (Whisman, 2007; Zaider, Heimberg, & Iida, 2010). Additionally, GAD patients with couple issues have been found to be more difficult to treat in individual therapy, obtaining poorer outcomes than patients with GAD without couple problems (Durham, Allan, & Hackett, 1997; Priest, 2013; Whisman & Baucom, 2012). Accordingly, Priest (2013) has proposed that couple therapy might be a good alternative for individuals with GAD with couple-related issues and worry. However, sometimes the enrollment of the couple might be difficult or unacceptable for individuals suffering from GAD. For this reason, individual therapies for GAD might focus on couple-related worry in cases in which this is the main area of concern for the patient.

Third wave therapies such as acceptance and commitment therapy (ACT; Hayes, Strosahl, & Wilson, 1999) have shown to be effective in the treatment of GAD (e.g., Arch *et alii*, 2012; Avdagic, Morrisey, & Boschen, 2014; Wetherell *et alii*, 2011). ACT is rooted in a functional-contextual approach to human language and cognition known as relational frame theory (RFT; Hayes, Barnes-Holmes, & Roche, 2001). According to RFT, relational framing is an operant behavior that is the basis of human language and cognition. Relational framing consists of relating stimuli based on arbitrary relational cues. There are different patterns of relational framing such as relating stimuli through cues of coordination ("is," "same as," etc.), opposition ("opposite to"), comparison ("more than," "less than"), hierarchy ("includes," "part of"), causal ("if... then"), deictic (I-You, Here-There, Now-Then), etc. Relational framing allows responding to one stimulus on

the basis of its relations with other stimuli, which can lead to the transformation of the stimulus function.

In RFT terms, rules and thoughts are relational networks consisting of stimuli that are framed through different relational cues. For instance, an individual might derive the thought “My couple is losing interest in me.” This thought might provoke contacting aversive functions due to the opposite relation between this relational network and the person’s values, which are hierarchical relational networks of positive reinforcers (Gil-Luciano, Calderón Hurtado, Tovar, Sebastián, & Ruiz, 2019). The derivation of that thought might lead the person to respond to those functions by engaging in worry about the couple relationship. Importantly, these relational networks can be also framed through different relations. Following the previous example, the individual might frame the thought “My couple is losing interest in me” in hierarchy with the deictic “I.” In less technical words, the person might realize that the thought is only one event that he or she is experiencing, which might help the person to choose engaging in valued actions instead of engaging in counterproductive worry.

The aim of ACT is to foster psychological flexibility, which has been defined in RFT terms as the generalized repertoire of framing ongoing private events in hierarchy with the deictic I, which typically reduces the derived discriminative functions of private events and allows the emergence of appetitive augmental functions (i.e., value-oriented actions) and actions connected to them (Luciano *et alii*, 2011; Luciano, Valdivia Salas, & Ruiz, 2012; Ruiz & Perete, 2015; Törneke, Luciano, Barnes-Holmes, & Bond, 2016). In less technical words, psychological flexibility is the ability to nonjudgmentally contact ongoing private experiences while remaining committed to actions connected to valued directions.

The application of ACT in GAD has been justified because worry has been conceptualized as an experiential avoidance strategy (e.g., Roemer & Orsillo, 2002). More recently, Ruiz, Riaño Hernández, Suárez Falcón, and Luciano (2016) have suggested that repetitive negative thinking (RNT; Ehring & Watkins, 2008; Harvey, Watkins, Mansell, & Shafran, 2004) in the form of worry and rumination are experiential avoidance strategies and that: (a) triggers of RNT are built into the individual’s learning history and become hierarchically related, to the extent that one of the strongest triggers (i.e., the thought/emotion at the top of the hierarchy) symbolically contains all the rest (Gil-Luciano *et alii*, 2019; Luciano, 2017); (b) unconstructive RNT is an especially maladaptive experiential avoidance strategy because it tends to be the first reaction to fear, unattained goals, and incoherence; (c) RNT tends to prolong negative affect; (d) which usually leads to engagement in additional experiential avoidance strategies in an attempt to finally reduce discomfort; and (e) the repetition of this reinforcing cycle generates an inflexible and maladaptive repertoire in reaction to triggers.

The practical implication of this account for GAD is that ACT protocols primarily focused on disrupting unconstructive worry in response to the trigger at the top of the hierarchy should produce quick changes and be particularly effective (Gil-Luciano *et alii*, 2019; Ruiz *et alii*, 2016). On the one hand, if the intervention succeeds in disrupting worry, the experiential avoidance loops would be cut from the very beginning, which would enhance the fostering of valued behaviors. On the other hand, according to the RFT research on transformation of functions through hierarchical relations (Gil, Luciano, Ruiz, & Valdivia Salas, 2012, 2014), the alteration of the discriminative avoidant functions to engage in worry of the most relevant triggers at the top of the hierarchy would most likely lead to altering the functions of triggers at lower levels of the hierarchy.

The study by Ruiz *et alii* (2016) presented an initial step forward in the above-mentioned direction by analyzing whether a one-session, RNT-focused, ACT protocol was sufficient to significantly reduce worry and rumination in participants suffering from mild to moderate emotional disorders. A two-arm, randomized multiple-baseline design with 11 participants was implemented. The RNT-focused ACT protocol was designed following the RFT account of psychological flexibility (Luciano *et alii*, 2011; Luciano *et alii*, 2012; Ruiz & Perete, 2015; Törneke *et alii*, 2016). The results showed significant reductions in at least three out of the four RNT measures during the 6-week follow-up in nine participants. Effect sizes were very large in all RNT-related measures and in emotional symptoms. This initial study was extended by Ruiz, Flórez *et alii* (2018) by conducting a multiple baseline design in which 10 participants with moderate emotional disorders received a 2-session, RNT-focused ACT protocol. The results showed that 9 of the 10 participants showed clinically significant changes and the effect sizes were very large for emotional symptoms, pathological worry, experiential avoidance, cognitive fusion, and valued living.

The aim of this study is to advance over the previous studies by testing the efficacy of a 3-session, RNT-focused ACT protocol in young adult participants suffering from severe GAD with couple relationship with the main worry domain. This is a good test for this approach in view of the reduced efficacy of cognitive behavioral therapy with individuals with these characteristics (Durham *et alii*, 1997; Priest, 2013; Whisman & Baucom, 2012). A delayed multiple-baseline design was conducted with 3 young adult participants who presented the diagnosis of GAD and couple relationship as the main worry domain. The SCRIBE statement (Tate *et alii*, 2016) was followed to guide the reporting of this single-case experimental design.

METHOD

Participants

Participants were recruited through advertisements in social media beginning with the questions: “Do you spend too much time distressed about the past or future? Do you want to be more focused on the things that are important to you?” Seventy-five individuals showed interest in the study and were asked to respond to an online survey. Initial inclusion criteria were: (a) more than 18 years old; (b) at least 12 months entangled with thoughts, memories, and worries; (c) significant interference in at least 2 life domains, with the couple relationship being the most affected one; and (d) presenting extremely severe scores in depression or anxiety according to the Depression Anxiety and Stress Scale -21. The initial exclusion criterion was current psychological or psychiatric treatment, including taking psychotropic medication.

The application of the initial inclusion and exclusion criteria produced the rejection of 70 potential participants: 60 individuals did not report couple as the main life area affected, 1 was younger than 18 years, 1 was receiving psychological treatment, 2 were entangled with thoughts, memories, and worries for less than 1 year, and 6 did not show extremely severe scores on depression and/or anxiety. Of the remaining 5 potential participants, 1 did not attend the informative session and 1 did not accept the conditions of the study. In summary, 3 participants met the initial inclusion criteria and attended an interview conducted by the second or third author.

In this interview, the terms and conditions of the study were explained to the participants. Afterwards, the experimenter applied the Mini-International Neuropsychiatric

Interview (MINI; Sheehan *et alii*, 1998; Spanish version by Ferrando, Bobes, Gibert, Soto, & Soto, 2000) and a structured interview designed for the current study containing questions to explore participants' functioning in the area of couple relationship. To participate in the study, individuals had to present a primary diagnosis of GAD according to the MINI and the clinician's judgement. Exclusion criteria were: (a) showing high suicidal ideation according to the MINI; (b) showing substance abuse according to MINI; and (c) reporting the presence of partner violence. None of the participants were excluded from further participation.

The final sample consisted of 3 participants. Table 1 shows demographical data of the participants, details of the problem, and diagnostic categories met according to the MINI. Table 2 presents the main triggers and experiential avoidance strategies of each participant.

Table 1. Demographical Data, Problem Details, and Diagnostic Categories according to the MINI.

	Sex	Age	Sexual orientation	Study/Employ	Life areas affected	Time with problem (years)	Previous therapy	Diagnostic categories
P1	F	20	Hetero	Under-graduate	6	2	No	GAD, depression (relapse)
P2	M	24	Homo	Under-graduate	6	3	No	GAD, depression, agoraphobia, obsessive-compulsive disorder
P3	F	22	Hetero	Graduate	4	1.5	Yes (Grief)	GAD, maniac episode (past)

Notes: GAD= Generalized anxiety disorder; F= Female; M= Male.

Table 2. Main Triggers for RNT and Experiential Avoidance Strategies of each Participant

	Main triggers for RNT	Experiential avoidance strategies
P1	Fear of being abandoned by my couple; Fear of not feeling what I'm supposed to feel	Worry/Rumination, sleeping, writing poems, reading, thought suppression.
P2	Fear of being rejected; Am I doing things right?; Is he the perfect match?; Searching for the perfect couple	Worry/Rumination, smoking, sleeping, talking to people, casual sex, listening to music.
P3	Fear of being alone and going crazy; Why am I not normal?	Worry/Rumination, talking to people, chatting, keeping busy, eating sweets, dating ex-boyfriends, writing, reading, watching TV, drawing mandalas

Design and Variables

A delayed multiple-baseline design across participants was implemented. The independent variable of the study was the staggered introduction of a 3-session ACT protocol. Following recent guidelines, the minimum number of data points for baseline was set at 5 (Kratochwill & Levin, 2014). The protocol was implemented on a weekly basis. Afterward, a 12-week follow-up was conducted. Dependent variables were divided into primary and secondary outcome measures. As the main aim of this study was to explore the effect of the ACT protocol on treating GAD with worries about the couple area as the main problem, outcome measures were couple-related worry and general pathological worry. Secondary outcome measures were scores on psychological distress, cognitive fusion, and valued living in the couple area. Blinding procedures were not implemented because the study only involved one intervention, and the dependent measures were taken through automatic emails through the Internet.

Primary Outcomes Measures

Experiences in Close Relationships-Anxiety (ECR-A; Brennan, Clark, & Shaver, 1998; Spanish version by Alonso Arbiol, Balluerka, & Shaver, 2007). The ECR is a 36-item,

7-point Likert (7= strongly agree; 1= strongly disagree) self-report instrument designed to measure two adult romantic attachment styles: Anxiety (i.e., fear of rejection and abandonment by romantic partners that is characterized by high levels of worry) and Avoidance (i.e., feeling uncomfortable when depending on or being close to the beloved person). Only the Anxiety subscale was administered in this study. The Spanish version of the ECR-A showed good internal consistency, with Cronbach's alpha between .82 and .85. Mean score on the ECR-A in a Spanish sample was 65.28 ($SD= 13.6$).

Penn State Worry Questionnaire-11 (PSWQ-11; Meyer, Miller, Metzger, & Borkovec, 1990; Spanish version by Sandín, Chorot, Valiente, & Lostao, 2009). The PSWQ is a 16-item, 5-point Likert (5= very typical of me; 1= not at all typical of me) self-report instrument that was designed to evaluate the permanent and unspecific degree of worry that characterizes GAD. A reduced, 11-item version was used in this study, as recommended by Sandín *et alii* (2009) in view that PSWQ reverse scored items are difficult to understand for Spanish speaking participants, which worsens the psychometric properties of the instrument. The PSWQ-11 internal consistency is excellent, and the test shows good test-retest reliability and discriminant validity. The PSWQ-11 possesses excellent internal consistency in Colombia (Ruiz, Monroy Cifuentes, & Suárez Falcón, 2018), with a Cronbach's alpha of .95. The mean score in a Colombian nonclinical sample ($N= 710$) was 27.47 ($SD= 10.44$), whereas in a clinical sample ($N= 107$), it was 36.26 ($SD= 10.13$). A threshold score of 37/38 was found adequate for identifying severe GAD, whereas a threshold of 32/33 was adequate for moderate GAD.

Secondary Outcome Measures

General Health Questionnaire-12 (Goldberg & Williams, 1988; Spanish version by Rocha, Pérez, Rodríguez Sanz, Borrell, & Obiols, 2011). The GHQ-12 is a 12-item, 4-point Likert-type scale that is frequently used as screening for psychological disorders. Respondents are asked to indicate the degree to which they have recently experienced a range of common symptoms of distress, with higher scores reflecting greater levels of psychological distress. The Likert scoring method was used in this study, with scores ranging from 0 to 3 assigned to each of the four response options. The GHQ-12 possesses good psychometric properties in Colombia (Ruiz, García Beltrán, & Suárez Falcón, 2017). Specifically, Cronbach's alpha was .91 both in a nonclinical sample ($N= 372$) and a clinical sample ($N= 344$). Mean scores for the nonclinical and clinical samples were 11.87 ($SD= 7.47$) and 16.54 ($SD= 7.86$), respectively. According to the receiver operating characteristic (ROC) curves, a threshold score of 11/12 was optimal to identify emotional disorders.

Cognitive Fusion Questionnaire (Gillanders *et alii*, 2014; Spanish version by Ruiz, Suárez Falcón, Riaño Hernández, & Gillanders, 2017). The CFQ is a 7-item, 7-point Likert-type scale (7= always; 1= never true) consisting of sentences describing instances of cognitive fusion. This scale has been validated in English for a wide variety of clinical and nonclinical populations. The Spanish version by Ruiz *et alii* (2017) has shown similar psychometric properties and factor structure to the original version (alpha of .93 in general population). The mean score on the CFQ in a Colombian clinical sample ($N= 277$) was 31.53 ($SD= 10.86$), whereas the score in a general nonclinical sample was 23.80 ($SD= 9.51$).

Valuing Questionnaire-Couple Area (VQ; Smout, Davies, Burns, & Christie, 2014; Spanish version by Ruiz, Suárez Falcón, & Gil Luciano, 2018). The VQ is a 10-item, 6-point Likert (6= completely true; 0= not at all true) self-report instrument designed to assess general valued living during the past week. The VQ has two subscales: Progress (i.e., enactment of values, including clear awareness of what is personally important and perseverance) and Obstruction (i.e., disruption of valued living due to avoidance of unwanted experience and distraction from values). The Spanish version has shown good psychometric properties. The VQ items were slightly modified to specify valued living in relation to the couple area. This version of the VQ can be obtained at <https://osf.io/8ervm/>.

ACT Protocol

The protocol consisted of three sessions. The first session lasted approximately 90 minutes, and the second and third sessions lasted about 60 minutes. The protocol was

based on the RFT definition of psychological flexibility and formation of the self (Luciano *et alii*, 2012; Törneke *et alii*, 2016). Specifically, the protocol aimed at developing the ability of framing the main ongoing triggers for worry/rumination through a hierarchical relation with the deictic I so as to provoke a reduction of their discriminative avoidant functions and allow the derivation of augmental rules that specify abstract, delayed, probabilistic, and positively reinforcing consequences and behavior in coordination with them. In less technical words, we aimed at developing the ability to discriminate ongoing triggers for worry/rumination, take distance from them (i.e., defusion), and behave according to what is most important at that moment for the individual in the long term (i.e., values).

Table 3 presents the content of the three protocol sessions (a complete description of the protocol can be obtained at <https://osf.io/8ervm/>). The aims of Session 1 were: (a) to present the intervention rationale, (b) to identify the hierarchical triggers to engage in RNT and other experiential avoidance strategies related to it, (c) to promote the realization of the counterproductive effect of engaging in RNT and related experiential avoidance strategies, and (d) to identify the RNT process and defusion training. The aims of Session 2 were: (a) to review the advances in disengaging from RNT and engaging in valued actions, (b) multiple-exemplar training in identifying triggers for RNT and defusing from them, and (c) to identify further valued actions to engage in instead of RNT. Lastly, the aims of Session 3 were: (a) to review the advances in disengaging from RNT and engaging in valued actions, (b) values clarification through experiential exercises, (c) planning committed action, and (d) closing the intervention.

During the intervention, participants were given 5 audio files (30 minutes approximately) in order to practice what was worked on during the sessions on a daily basis. The audio file provided at the end of Session 1 aimed at developing the skill to notice the difference between engaging in RNT and not engaging and letting the triggers be while choosing to behave in a valued direction. Following the rationale of the “go around exercise,” participants were encouraged to engage in RNT for several minutes while noticing the thinking process and that they could disengage from the process at every moment. Subsequently, participants were invited to repeat the exercise but now letting the triggers for RNT be and putting them in imaginary balloons while imagining themselves engaging in valued actions. Participants were provided with 3 audio files at the end of Session 2 similar to the three first exercises conducted: (a) the centering/defusion exercise, (b) the free association exercise, and (c) the “daydreaming and worrying exercise.” An additional audio file was provided at the end of Session 3 with a values exercise that summarized the content of this session.

Procedure

The study was conducted in the Clinical Psychology laboratory of a Colombian university. The procedures of the study were approved by an Internal Ethic Committee. All measures were administered online through Typeform (www.typeform.com). Participants who showed interest in the research and met the initial inclusion criteria were invited to an assessment and informative session. If individuals were eligible, the study functioning was presented and all informed consents were signed. Then, the experimenters applied the MINI interview and a structured interview with focus on the couple area designed for the current study. Lastly, the first baseline evaluation was conducted. Afterward, participants provided baseline data on a weekly basis for 5 to 7

Table 3. Summary of the ACT protocol.

Phase	Aims	Therapeutic interactions
Session 1	1. Presentation of the intervention rationale.	<ul style="list-style-type: none"> - Work proposal: developing the skill to identify entanglement with our thoughts and learn to focus on what is really important in our lives (with special focus on couple relationship). - Hierarchical relations between the self and thoughts/emotions (remembering thoughts in different life moments and observing the flow of thoughts). - Dike metaphor: Thoughts are like leaves on a stream, but we can choose to build a dike to stop the leaves and analyze them to the point of creating whirlpools of thoughts. - Cards exercise: Write down ongoing thoughts, observe them, and choose to build a dike or let them pass.
	2. Identification of the main triggers to initiate worry/rumination and other experiential avoidance strategies related to them.	<ul style="list-style-type: none"> - Worry begins when fear of a future event appears: "What is the fear that is the "daddy" of all your fears?" - Rumination begins when one needs an explanation about something that happened: "What is the explanation you need that is the "daddy" of all?" - Explore the consequences of worry/rumination and experiential avoidance strategies connected to them.
	3. Promoting the discrimination of the counterproductive effect of engaging in worry/rumination and other experiential avoidance strategies.	<ul style="list-style-type: none"> - Socratic dialogue: (a) In which direction are you going when you worry/ruminate and you try to avoid/control your thoughts? (b) Are they helpful at the short term? (c) And at the long term? and (d) Are the thoughts even stronger than before? Physical metaphor: Pushing triggers away. "The experimenter writes the participant's triggers on a piece of paper and puts it near the participant's face. When participants begin to push the piece of paper away with their hands, the experimenter resists. - Questions: (a) How much strength do your thoughts have when you push? (b) Can you do something important while pushing? (c) How much stronger would they be if you pushed 1 more year? (d) And 5 more years?
Session 2	4. Identification of the RNT process and defusion training.	<ul style="list-style-type: none"> - Go around exercise: While reading a book, the therapist shows a trigger for RNT on a card and the participant stops reading and begins the RNT process going around a chair in circles. Every time the participant makes a loop, she says the next thought of the chain and chooses to make another loop (the same process is repeated 10 times). Then, the participant is invited to read again and choose just to observe the triggers for RNT and go back to reading without entangling with them. - Exploration of RNT and valued actions during the last week.
	1. Review	<ul style="list-style-type: none"> - Centering/defusion exercise: focusing on breathing and the surrounding noises while noticing who is choosing to do that. Then, practice putting ongoing thoughts on balloons and letting them be. - Free association exercise (based on Wells, 2009): The therapist reads 12 words separated by 7 s. The participant has to notice what thought comes to her mind and chooses between entangling with it or putting on a balloon and letting it be. - Daydreaming and worry exercise (based on Wells, 2009): The participant was invited to daydream during 2 minutes. Each 20 s, the therapist asked the participant to notice what she was thinking and how she was able to choose between following or stopping the process. The same process was repeated with worry. - Eye-contact exercise (Hayes <i>et al.</i>, 1999): The participant and therapist looked into each other's eyes for 2 minutes while noticing every thought and emotion and choosing to continue. - Subtracting exercise: The participant was invited to count backwards from 100 to 0 by subtracting 3, while noticing the sensation of being wrong and choosing to continue. - Writing with the nondominant hand: The participant wrote for 3 minutes with her nondominant hand while noticing the discomfort, not entangling with it and choosing to continue. - Pink elephant exercise (based on Hayes <i>et al.</i>, 1999): The participant was invited to avoid thinking about a pink elephant.
	2. Multiple exemplar training in identifying triggers for RNT and defusion exercises.	<ul style="list-style-type: none"> - The therapist asked the participant to list some valued actions that she could do instead of being entangled with her thoughts ("things that make her proud at the end of the day"). - Exploration of RNT and valued actions during the last week.
Session 3	3. Identification of valued actions.	<ul style="list-style-type: none"> - Brief centering exercise/defusion exercise: Focusing on physical sensations and breathing. - Autobiographic film exercise: The participant is asked to imagine moments in life in which she did not fight with the "daddy" and what were her dreams and the things that made her proud of herself. Then, the participant was invited to think about her current life and to see what things make her proud in relation to her family, work/training, friendships and hobbies, self-care and health. Then, participant is asked to think about what things do not make her proud. - Future film exercise: The participant is asked to imagine how she would like her life to be in 1, 5, and 10, 15 or 20 years. Then, she was asked to imagine how her life would be if she gets entangled with the "daddy". - Defusion exercises with the triggers of RNT: The participant was invited to imagine herself putting triggers on balloons.
	1. Review	<ul style="list-style-type: none"> - Garden metaphor (Wilson & Luciano, 2002): Summary of the information gathered during the previous exercises and planning committed actions.
	2. Values and defusion exercises.	<ul style="list-style-type: none"> 2. Summary of the work conducted. 3. Motivation to provide follow-up data.
Closing the protocol.	3. Establishing committed actions.	<ul style="list-style-type: none"> 1. Garden metaphor (Wilson & Luciano, 2002): Summary of the information gathered during the previous exercises and planning committed actions.
	4. Closing the protocol.	<ul style="list-style-type: none"> 2. Summary of the work conducted. 3. Motivation to provide follow-up data.

weeks, depending on therapists and participants' availability. The recruitment process was prolonged during one month, but the study began for the participants as soon as they attended the informative session and signed the informed consents. The latter decision was made because of two reasons: (a) the limited number of potential participants due to the relatively restrictive inclusion criteria, and (b) ethical considerations regarding the severity of the participants' emotional symptoms.

At the end of baseline collection, participants' scores on the primary outcome measures (i.e., ECR and PSWQ) were analyzed with the Theil-Sen slope (Sen, 1968; see the Data Analysis section) to explore whether there were statistically significant tendencies during the baseline. As no significant tendencies were found within participants' baselines, all participants were scheduled to initiate the protocol implementation. The protocol was implemented in an individual format and on a weekly basis. During the intervention, participants were also assessed every week, but this changed during the 3-month follow-up, where participants provided data every two weeks. The first and second authors served as therapists.

Data Analysis

In order to explore the presence of statistically significant trends during the baseline in the outcome variables (ECR and PSWQ), the Theil-Sen slope (Sen, 1968; Vannest, Parker, Davis, Soares, & Smith, 2012) was computed at the end of the five weeks of baseline. The Theil-Sen slope is a nonparametric linear regression slope that does not assume any particular data distribution. The Theil-Sen slope was computed using the on-line calculator provided by Vannest, Parker, and Gonen (2011).

Following a bottom-up analysis of single-case experimental designs (SCED) (Parker & Vannest, 2012), the results were first graphed and, subsequently, statistical analyses for SCDE were selected and computed. In general, the data showed baselines with no significant trends and important change levels and/or improvement trends after the beginning of the intervention. Participants' scores usually reached stability at the last 3 follow-up observations, which are the most relevant ones in terms of clinical significance of the findings. Accordingly, we decided to focus the statistical analysis on all baseline data and the last three follow-up points (see a similar rationale in Au *et alii*, 2017; Parker & Vannest, 2012). This analysis also has the advantage of facilitating the comparison between the current study and the usual effects reached in typical clinical trials that follow group designs.

Although significant advances have been produced in recent years regarding the statistical analysis of SCED, there is still no consensus about what is the most adequate statistical test for this type of data. Indeed, influential authors (e.g., Manolov, Gast, Perdices, & Evans, 2014) recommend reporting the results of several statistical procedures as is usual in structural equation modeling. Accordingly, we selected two different, but complementary statistical methods: (a) the *JZS+AR* Bayesian hypothesis testing for single-subject designs (de Vries & Morey, 2013, 2015), and (b) the standardized mean difference statistic for single-case designs (Hedges, Pustejovsky, & Shadish, 2012, 2013).

The *JZS+AR* Bayesian model (de Vries & Morey, 2013) is an adaptation of the *JZS* t-test (Rouder, Speckman, Sun, Morey, & Iverson, 2009) and accounts for the serial dependence typical of single-subject designs with an auto-regressive [*AR*(1)] model. It provides a *Bayes factor* (*Bar*), which quantifies the relative evidence in the data for the hypothesis of no intervention effect (i.e., the true mean in the baseline equals the true

mean in the intervention phase: $Bar > 1$) and for the hypothesis of intervention effect (i.e., the true means of both phases differ: $Bar < 1$). In addition, this model provides an estimation of the effect size consisting of standardizing the difference in true means between phases. All analyses regarding the JZS+AR model were conducted in the BayesSingleSub R package (de Vries & Morey, 2015).

The standardized mean difference effect size for SCED (g) proposed by Hedges *et alii* (2012) shares the same metric as Cohen's d effect size typically used in group designs, which has the advantage of facilitating the direct comparison and integration of the results obtained with both types of experimental designs. This effect size has a formal mathematical development, requires at least three cases for computation, and assumes normally distributed outcomes and lack of time-trends. The standardized mean differences for single-case designs were computed with the SPSS macro developed by Shadish, Hedges, and Pustejovsky (2014) and correspond to the between group Cohen's d at follow-up.

RESULTS

Raw data of this study can be obtained at <https://osf.io/8ervm/>. Figure 1 shows the scores' evolution on the main outcome measures (ECR-Anxiety and PSWQ scores).

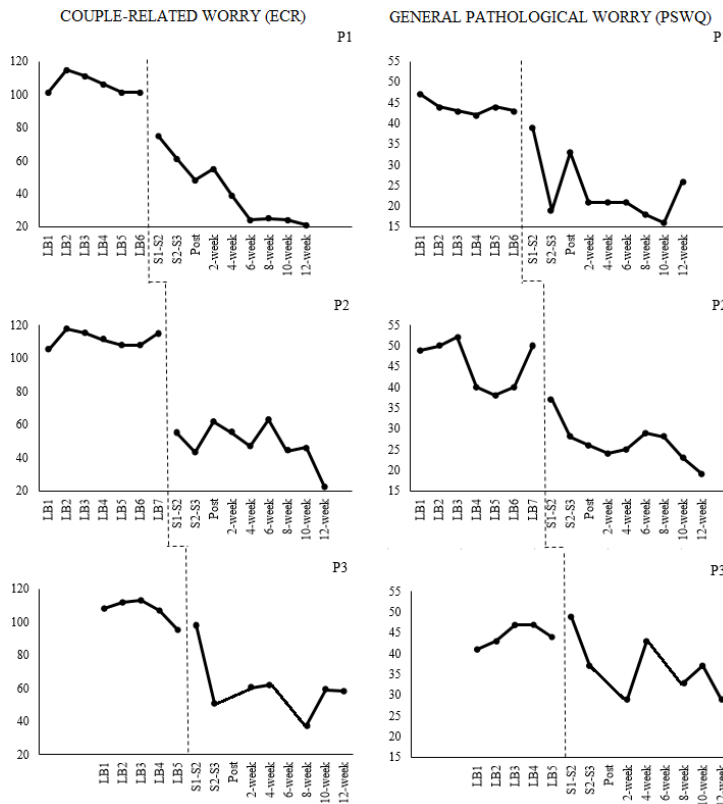


Figure 1. Participants' evolution in couple-related worry and general worry across the study.

As expected, no significant trends were found during baseline. Visual inspection shows that the ACT protocol was effective in decreasing scores of both the ECR and PSWQ in all participants.

Table 4 shows the effect sizes and B_{ar} on the $JZS+AR$ Bayesian model. All participants showed evidence of intervention effect in ECR and PSWQ. Additionally, all participants showed intervention effect in cognitive fusion (CFQ) and couple-related values obstruction (VQ-Obstruction). Two participants showed intervention effect in the GHQ-12 (P1 and P2) and couple-related values progress (P1 and P3).

Table 4. Results in the $JZS+AR$ Analysis for each Participant and Measure

		P1	P2	P3
ECR -Anxiety	δ	13.70	8.13	5.07
	B_{ar}	.000	.000	.013
PSWQ (pathological worry)	δ	6.18	3.42	2.64
	B_{ar}	.003	.027	.112
GHQ-12 (psychological distress)	δ	2.90	1.24	.106
	B_{ar}	.078	.495	2.118
CFQ (cognitive fusion)	δ	2.31	2.43	6.09
	B_{ar}	.131	.096	.006
VQ -Progress valued couple	δ	3.34	.084	1.03
	B_{ar}	.036	2.18	.704
VQ -Obstruction valued couple	δ	2.74	1.32	1.50
	B_{ar}	.070	.475	.409

Notes: CFQ= Cognitive Fusion Questionnaire; ECR= Experiences in Close Relationships; GHQ-12= General Health Questionnaire -12; PSWQ= Penn State Worry Questionnaire; VQ= Valuing Questionnaire.

Overall, participants commented to their therapists in the last follow-up that they were making better decisions in relation to their couples and other life areas.

Table 5 shows that Hedges' g s for SCED were extremely large for primary outcome measures (ECR-Anxiety: $g = 5.93$; PSWQ: $g = 3.19$). The effect sizes were also very large for cognitive fusion (CFQ: $g = 2.54$) and couple-values obstruction (VQ-Obstruction: $g = 2.12$), whereas for psychological distress (GHQ-12: $g = 1.17$) and couple-values progress (VQ-Progress: $g = 1.36$), they were large.

Table 5. Results for each Measure in the Standardized Mean Difference Statistic for Single-Case Designs.

	Hedges' d for SCED		
	g	$var(g)$	95% CI
ECR -Anxiety	5.93	4.39	[1.83, 10.04]
PSWQ (pathological worry)	3.19	1.04	[1.19, 5.18]
GHQ-12 (psychological distress)	1.17	.20	[-.29, 2.05]
CFQ (cognitive fusion)	2.54	.65	[-.96, 4.12]
VQ -Progress valued couple	1.36	.21	[-.47, 2.25]
VQ -Obstruction valued couple	2.12	.36	[-.95, 3.29]

Notes: CFQ= Cognitive Fusion Questionnaire; ECR= Experiences in Close Relationships; GHQ-12= General Health Questionnaire -12; PSWQ= Penn State Worry Questionnaire; VQ= Valuing Questionnaire.

DISCUSSION

Young adults with GAD usually present a high level of couple-related worry that tends to provoke dysfunctions in this area and others such as work, friendships, family, etc. (Whisman, 2007; Zaider *et alii*, 2010). Further, research has shown that GAD individuals with couple-related worry and issues in this area are more difficult

to treat and experience less clinical improvements (Durham *et alii*, 1997; Priest, 2013; Whisman & Baucom, 2012). Following previous studies that tested RNT-focused ACT protocols (Ruiz *et alii* 2016; Ruiz, Flórez, *et alii*, 2018), this study analyzed the effect of a brief, 3-session ACT protocol focused on disrupting worry as the first and predominant response to the triggers at the top of the hierarchy. Three young adults with the following characteristics participated in this study: (a) they stated being entangled with thoughts, memories, and worries for at least 12 months; (b) the entanglement interfered in at least 2 life domains, with couple relationship being the most affected one; (c) they presented extremely severe scores in depression and/or anxiety according to the DASS-21; (d) they presented GAD according to the MINI. Participants showed stable levels of couple-related anxiety and pathological worry during the baseline. Afterward, participants received a 3-session RNT-focused ACT protocol.

The results from the JZS+AR indicated that there was evidence of an intervention effect in all 3 participants in both outcome measures (i.e., ECR-Anxiety and PSWQ). Regarding process measures, all 3 participants showed intervention effect for cognitive fusion and couple-related values obstruction, where 2 of the 3 participants did so in psychological distress (P1 and P2) and couple-related values progress (P1 and P3). The standardized mean difference effect sizes for SCED were extremely large for the outcome measures (ECR-Anxiety: $g = 5.93$; PSWQ: $g = 3.19$) and smaller for the process measures (CFQ: $g = 2.54$; GHQ-12: $g = 1.17$; VQ-Progress: $g = 1.36$; VQ-Obstruction: $g = 2.12$). Importantly, these effect sizes are in the same metric as the between-group Cohen's d , which allows the comparison of the current findings with empirical evidence in the treatment of GAD provided by group designs.

The effect sizes obtained by the intervention were very large and are in the range of the ones obtained by RNT-focused ACT protocols in previous studies (Ruiz *et alii* 2016; Ruiz, Flórez, *et alii*, 2018). This contrasts with the data from recent meta-analysis that yielded a weighted effect size of $d = 0.80$ in the treatment of GAD (Cuijpers, Cristea, Karyotaki, Reijnders, & Huibers, 2016) and $d = 1.81$ in the reduction of GAD worry as measured by the PSWQ (Hanrahan, Field, Jones, & Davey, 2013). Following Ruiz *et alii* (2016), the large effects found in this study could be due to three main reasons: (a) the protocol addressed the three angles to promote psychological flexibility (Törneke *et alii*, 2016) simultaneously during the sessions; (b) it emphasized identifying and working with the trigger for RNT at the top of the self-hierarchy (Gil-Luciano *et alii*, 2019), and (c) it was focused on disrupting the first and most pervasive reaction to triggers (i.e., worry/rumination). However, further studies are necessary to isolate the effect of these characteristics of RNT-focused ACT protocols.

Although the results of this study are very promising, some limitations are worth noting. Firstly, we used a delayed multiple-baseline design because of the difficulty to recruit participants and for ethical reasons in view of the participants' high level of emotional symptoms. This design does not allow the same level of experimental control as the concurrent multiple-baseline design (Harvey, May, & Kennedy, 2004). However, some characteristics of this study make this limitation less relevant: (a) participants were experiencing emotional symptoms for at least 12 months, which ensured that symptoms were not momentary; (b) although there are only 5-7 measurement points of baseline, they represent weekly measures which indicated that the baseline showed no improvement trend across one to two months; and (c) maturation confounding effects seem to be not especially relevant when considering adult behavior. Secondly, a general limitation of usual multiple baseline designs is that they lack active control conditions

that control for the non-specific effects of therapy. Thirdly, the current study relied solely on self-report measures. Further studies should evaluate the intervention effect including independent clinician-administered assessments. Fourthly, the age range of the participants was very narrow and all of them were undergraduate or graduates. This limits the external validity of the study. Accordingly, further studies should be conducted with a more diverse adult population.

Lastly, due to the strict inclusion criteria, the number of participants recruited was the minimal for conducting a multiple-baseline design. We wanted to test the efficacy of the brief ACT protocol in participants who, according to the empirical evidence, would be relatively difficult to treat in view of the high level of emotional symptoms, the presence of comorbidity, and the difficulties in the couple relationship area. Accordingly, this study can be seen as a preliminary exploration of the potential of brief RNT-focused ACT protocols in individuals with GAD who present couple-related worry as the main problem. Further studies should test the efficacy of the intervention in a higher number of participants.

In conclusion, this study constitutes an initial and promising step in the analysis of brief RNT-focused ACT protocols for the treatment of emotional disorders. Further studies might conduct randomized controlled trials to compare the effect of the ACT protocol versus wait-list control conditions or brief versions of empirically established treatments.

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