



Review

Acceptance and commitment therapy for anxiety and OCD spectrum disorders: An empirical review



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ABSTRACT

A fair amount of research exists on acceptance and commitment therapy (ACT) as a model and a treatment for anxiety disorders and OCD spectrum disorders; this paper offers a quantitative account of this research. A meta-analysis is presented examining the relationship between psychological flexibility, measured by versions of the Acceptance and Action Questionnaire (AAQ and AAQ-II) and measures of anxiety. Meta-analytic results showed positive and significant relationships between the AAQ and general measures of anxiety as well as disorder specific measures. Additionally, all outcome data to date on ACT for anxiety and OCD spectrum disorders are reviewed, as are data on mediation and moderation within ACT. Preliminary meta-analytic results show that ACT is equally effective as manualized treatments such as cognitive behavioral therapy. Future directions and limitations of the research are discussed.

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Anxiety disorders are characterized by an increased sensitivity to threat, persistent and repetitive thoughts, physiological arousal, and avoidance behaviors (Craske et al., 2009). Approximately 33.7% of adults and 32.4% of adolescents report the presence of an anxiety disorder within their lifetimes (Kessler, Petukhova, Sampson, Zaslavsky, & Wittchen, 2012). Cognitive behavior therapy (CBT), including exposure exercises, are the most supported treatments for anxiety disorders (Hofmann & Smits, 2008; Norton & Price, 2007; Tolin, 2010), and should be considered first line treatments. Nevertheless, these treatments are not successful for all individuals. This is one of the reasons there has been growing interest in

examining additional treatment options for anxiety and obsessive compulsive and related disorders.

Many of these additional treatment options have been conceptualized under the larger umbrella of CBT, and are often referred to as “newer generations of CBT” (Twohig, Woidneck, & Crosby, 2013), “contextual CBT” (S.C. Hayes, Villatte, Levin, & Hildebrandt, 2011), and “third wave behavior therapy” (Hayes, 2004). One contextual CBT that has demonstrated promise in this domain is acceptance and commitment therapy (ACT; Hayes, Strosahl, & Wilson, 2012). This means that while ACT is part of the CBT tradition, it is arguably a distinct form of CBT just like other versions of CBT such as exposure with response prevention or dialectical behavior therapy (Twohig et al., 2013).

One key feature of ACT is that it is based on the pragmatic philosophical framework of science that underlines modern behavioral psychology known as functional contextualism (Hayes et al., 2012). Relatedly, much of its development comes from basic behavioral

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research including research on language and cognition, specifically relational frame theory (RFT) and rule-governed behavior (Hayes et al., 2012). In this model, attention is placed on the context and the function of psychological events rather than the content, form, and frequency with which they occur (S.C. Hayes et al., 2011). ACT aims to increase *psychological flexibility* (Hayes, Luoma, Bond, Masuda, & Lillis, 2006), which is the ability to contact the present moment without restraints, within the existing context, in order to change or persist in value driven actions. Responding rigidly to internal experiences (due to a general intolerance of internal distress and/or a strong reliance on verbal rules), referred to as *psychological inflexibility*, can be problematic because it restricts behavior and opportunities for external reinforcement, resulting in a lower quality of life. Alternatively, the ability to flexibly attend to and interact with anxiety allows actions to be based on what is important to the person and can increase behavioral flexibility. Within this model, psychological inflexibility is a pragmatically useful target in the treatment of many forms of clinical issues.

This clinical model aims to increase psychological flexibility through six core processes of change. These processes are not in and of themselves ACT, but are accessible constructs to target psychological flexibility (Twohig et al., 2013). Furthermore, these processes link basic learning principles to therapeutic techniques. The six processes within this model include acceptance, defusion, self as context, present moment awareness, values, and committed action (Hayes et al., 2006). A recent meta-analysis examined laboratory based component studies that explored the function of these intervention processes within ACT and contextual CBT models. Of the 66 component studies reviewed, results showed significant effect sizes for acceptance, defusion, present moment awareness, and values compared to inactive control components (Levin, Hildebrandt, Lillis, & Hayes, 2012), supporting the potential clinical utility of targeting each of these processes.

To our knowledge, no study has quantitatively reviewed the extant literature on the relationship between psychological inflexibility and anxiety symptomatology (although see Hayes et al., 2006 for an early meta-analysis), or quantitatively reviewed the effects of ACT relative to comparison conditions specifically for anxiety and OCD spectrum disorders. In the current review, a meta-analysis was conducted examining the relationship between psychological inflexibility and measures of anxiety. Additionally, a systematic review was conducted on all outcome data to date on ACT for anxiety and OCD spectrum disorders, as well as data on mediation and moderation effects. Finally, a preliminary meta-analysis was conducted on ACT randomized controlled trials (RCTs) for anxiety disorders to examine potential aggregated between group effect sizes. The primary aims of this study are to provide an integrated empirical review of the ACT literature as it applies to anxiety and OCD spectrum disorders, highlighting the relationship of ACT's key process of change and clinical targets in anxiety symptomatology, the impact of ACT in targeting this process for various anxiety disorders, as well as providing an initial quantitative summary of effect sizes.

1. Methods

1.1. Procedure: meta-analysis of the relation between psychological inflexibility and anxiety

A meta-analysis was conducted on studies examining the relationship of anxiety symptoms to the Acceptance and Action Questionnaire (AAQ and AAQ-II), the standard measure used to assess psychological flexibility/inflexibility. The original AAQ (Hayes et al., 2004) is a 9-item self-report measure of psychological inflexibility. Lower scores are associated with lower levels of

psychological inflexibility and experiential avoidance (a key sub-process that contributes to inflexibility). This measure has been shown to have good convergent and discriminant validity (Hayes et al., 2004). Revisions were made to the AAQ to create the AAQ-II (Bond et al., 2011), which is a 7-item self-report measure of psychological inflexibility. Items are rated on a 7-point scale ranging from *never true* to *always true* with higher scores indicating greater psychological inflexibility. While there is no established cutoff for the AAQ-II, scores that fall above a range of 24–28 are associated with higher levels of psychological distress (Bond et al., 2011). Bond et al. (2011) reported good test–retest reliability ($r = .81$) at a three-month interval and good internal consistency ($\alpha = .78$ – $.87$). Moderate to high convergent validity has been demonstrated with the BDI-II, the BAI, the SCL-90-R, and the White Bear Suppression Inventory (WBSI) with correlations ranging from .58 to .71.¹ The AAQ-II has better psychometric consistency than the original AAQ; the correlation with the original AAQ is strong ($r = .82$; Bond et al., 2011).

To synthesize the relationship between the AAQ and other measures of anxiety, anxiety disorders, and OCD-spectrum disorder symptoms, correlation data for the AAQ/AAQ-II and anxiety symptoms were retrieved through the web database, EBSCOhost (i.e., PsychINFO, PsycArticles). The search criteria included the descriptors of “Acceptance and Action Questionnaire,” “experiential avoidance,” “psychological inflexibility,” “anxiety,” “anxiety disorder,” and specific anxiety/OCD spectrum disorders (i.e., “GAD,” “OCD,” “compulsive skin picking,” “PTSD,” “social anxiety,” “social phobia,” “panic disorder,” “specific phobia,” “OCD spectrum disorders,” “trichotillomania,” “Tourette disorder,” “tic disorders”) and included all years up to June of 2013. Of the 183 articles that were identified in the original search, 49 articles were included in this review. Some articles contained more than one study, thus a total of 63 studies were included in the analysis. Articles were included that reported a correlation between the AAQ/AAQ-II and measures of anxiety symptoms. All variations of the AAQ were included in this study including the published versions of the AAQ and AAQ-II, as well as the 16-item version of the AAQ, the 10-item version of the AAQ-II, and translations of the AAQ in Spanish, German, and Albanian. Cross-referencing was conducted using the search criteria to identify additional articles.

Articles were excluded if they did not include any version of the AAQ or AAQ-II ($n = 33$), did not include a measure of anxiety ($n = 12$), did not report Pearson's r correlations between AAQ or AAQ-II and measures of anxiety ($n = 56$), described data that were previously published ($n = 3$), was in a language other than English and had no translation ($n = 12$), or was a commentary or review of another published article or book ($n = 18$). If correlational data were reported at baseline and at follow-up, only baseline data were included. In situations where a total score as well as subscales (e.g., PAS total and subscales) were reported, only the total score was included in this analysis. However, if the total score for the measure was not reported, subscales were used. Broader measures of functioning that include anxiety subscales (BSI, SCL-90, DASS) were reported only if they included the anxiety subscale. See Tables 1 and 2 for correlations as well as definitions of measures.

Effect sizes were calculated using Comprehensive Meta-Analysis (Borenstein & Rothstein, 1999) and, based on recommended procedures, Pearson r coefficients were transformed into Fisher's z scales for all analyses, and transformed back into Pearson r coefficients in reported results (Borenstein, Hedges, Higgins, & Rothstein, 2009). When a study reported multiple relevant correlations, effect sizes were aggregated into a mean score for that study.

¹ Complete measure names are provided in Table 2.

Table 1
Correlations between measures of psychological inflexibility (PI) and general anxiety symptoms.

	Population	N	PI measures	Anxiety measures	Correlation
Andrew and Dulin (2007)	Older Adults (NC)	195	AAQ ^a	GAI	0.43**
Bardeen, Fergus, and Orcutt (2013) – Study 2	Adults from General Public (NC)	993	AAQ-II	DASS-Anxiety	0.65***
Berman, Wheaton, McGrath, and Abramowitz (2010)	Adult Outpatients Diagnosed with Anxiety (C)	42	AAQ-II ^b	BAI	0.43** ^f
Boelen and Reijntjes (2008) – Study 2	College Students (NC)	97	AAQ ^c	STAI-S ^c	0.59***
Boelen and Reijntjes (2008) – Study 3	Adult Outpatients (C)	60	AAQ ^c	SCL-90-Anxiety ^c	0.57***
Briggs and Price (2009)	Adults from the Community and College Students (NC)	313	AAQ	HADS-Anxiety	0.65**
Costa and Pinto-Gouveia (2011)	Adult Outpatients Experiencing Chronic Pain (C)	70	AAQ-II ^b	DASS-Anxiety	0.31***
Czech, Katz, and Orsillo (2011)	College Students (NC)	53	AAQ-II ^b	STAI-S	0.41** ^f
Esteve, Ramírez-Maestre, and López-Martínez (2012)	Adult Outpatients Experiencing Chronic Pain (C)	299	AAQ ^d	HADS-Anxiety ^d	0.17**
Fergus et al. (2012) – Study 2	Adult Outpatients Diagnosed with Anxiety (C)	115	AAQ-II	BAI	0.24**
Fledderus, Bohlmeijer, and Pieterse (2010)	Adults with Psychological Distress (C)	93	AAQ-II ^{b,c}	HADS-Anxiety ^c	0.60** ^f
Fledderus, Oude Voshaar, Ten Klooster, and Bohlmeijer (2012)	Adults with Mild to Moderate Depression (C)	376	AAQ-II ^{b,c}	HADS-Anxiety ^c	0.31** ^f
Fulton et al. (2012)	College Students (NC)	395	AAQ	DASS-21-Anxiety	0.40***
Gloster, Klotsche, Chaker, Hummel, and Hoyer (2011) – Sample 1	Adult Outpatients Diagnosed with Panic Disorder with Agoraphobia (C)	368	AAQ-II	HAM-Anxiety	0.29** ^f
Gloster et al. (2011) – Sample 2	Adult Outpatients Diagnosed with Social Anxiety (C)	209	AAQ-II	DASS-21-Anxiety ^e	0.59** ^f
Gloster et al. (2011) – Sample 3	College Students (NC)	495	AAQ-II	DASS-21-Anxiety ^e	0.53** ^f
Gloster et al. (2011) – Sample 4	Unemployed Adults (NC)	95	AAQ-II	BSI-Anxiety ^a	0.61** ^f
Hayes et al. (2004) – Sample 2	Adult Outpatients (C)	419	AAQ	BAI	0.58***
Hayes et al. (2004) – Sample 3	College Students (NC)	202	AAQ	BAI	0.35***
Kashdan, Barrios, Forsyth, and Steger (2006) – Study 1	College Students (NC)	382	AAQ	STAI-T	0.65**
Kelly and Forsyth (2009)	Female College Students (NC)	43	AAQ	STAI-S	0.57*
				STAI-T	0.64*
Langer, Cangas, Pérez-Moreno, Carmona, and Gallego (2010)	College Students (NC)	265	AAQ-II ^{b,d}	SCL-90-R-Anxiety ^d	0.45**
Levin, Lillis, and Hayes (2012)	Male College Students (NC)	157	AAQ-II	DASS-21-Anxiety	0.54***
Maack, Tull, and Gratz (2012)	College Students Reporting at Least One Traumatic Event (C)	291	AAQ	DASS-21-Anxiety	0.43***
Mahaffey, Wheaton, Fabricant, Berman, and Abramowitz (2013)	College Students (NC)	406	AAQ-II ^b	DASS-21-Anxiety	0.50** ^f
Manos et al. (2010)	Residential Inpatient and Intensive Outpatient Adults Diagnosed with OCD (C)	108	AAQ	BAI	0.24*
Márquez-González, Losada, Fernández-Fernández, and Pachana (2012)	Older Adults (NC)	302	AAQ ^d	GAI ^d	0.39**
Masuda and Tully (2012)	College Students (NC)	550	AAQ ^a	BSI-18-Anxiety	0.38** ^f
Roemer, Salters, Raffa, and Orsillo (2005) – Study 2	Adult Outpatients Diagnosed with GAD (C)	19	AAQ ^a	DASS-Anxiety	0.47*
Tull, Gratz, Salters, and Roemer (2004)	Adult Females Reporting at Least One Traumatic Sexual Event (C)	160	AAQ ^a	BSI-18-Anxiety	0.53**
Wheaton, Fabricant, Berman, and Abramowitz (2013)	Adults with Hoarding Disorder, Anxiety Disorder, and Matched Controls (C and NC)	95	AAQ-II	DASS-21-Anxiety	0.49**
Zettle (2003)	College Students Experiencing Math Anxiety (C)	12	AAQ ¹	STAI-T	0.74**

Note: AAQ: Acceptance and Action Questionnaire (Hayes et al., 2004); AAQ-II: Acceptance and Action Questionnaire-II (Bond et al., 2011); BAI: Beck Anxiety Inventory; BSI-Anxiety: Brief Symptom Inventory-Anxiety Scale; BSI-18-Anxiety: Brief Symptom Inventory-18-Anxiety Scale; DASS-Anxiety: Depression, Anxiety, and Stress Scales-Anxiety Scale; DASS-21-Anxiety: Depression, Anxiety, and Stress Scales-21-Anxiety Scale; GAI: Geriatric Anxiety Inventory; HADS-Anxiety: Hospital Anxiety and Depression Scale-Anxiety Subscale; HAM-Anxiety: Hamilton Anxiety Scale; SCL-90-Anxiety: Symptom Checklist-Anxiety Subscale; SCL-90-R-Anxiety: Symptom Checklist-Revised-Anxiety Subscale; STAI-S: State-Trait Anxiety Inventory-State; STAI-T: State-Trait Anxiety Inventory-Trait.

NC: non-clinical sample; C: clinical/at-risk sample.

^a AAQ (Acceptance and Action Questionnaire) 16 Item Unpublished Version.

^b AAQ-II (Acceptance and Action Questionnaire-II) 10 Item Unpublished Version.

^c Dutch Translation.

^d Spanish Translation.

^e German Translation.

^f Scores adjusted so scores of greater psychological flexibility is related to greater symptom severity.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Effect sizes were also calculated separately for measures assessing general symptoms of anxiety and measures of more specific anxiety disorder symptomatology. Random effects models were used given heterogeneity across studies on factors including sample type and

measures. Q-tests based on analysis of variance were conducted to compare differences in effect sizes between non-clinical and clinical/at-risk samples (Borenstein et al., 2009). Recommended methods were used to test for publication bias including funnel

Table 2
Correlations between measures of psychological inflexibility (PI) and specific anxiety disorder symptoms.

	Population	N	PI measures	ADS measures	Correlation
Abramowitz, Lackey, and Wheaton (2009)	College Students Scoring ≥ 21 on OCI-R (C)	91	AAQ-II ^b	OCI-R-W	0.21 [†]
				OCI-R-C	0.04
				OCI-R-OR	–0.05
				OCI-R-OB	0.08
Begotka, Woods, and Wetterneck (2004)	Adults Reporting Diagnoses of Trichotillomania (C)	436	AAQ	OCI-R-N	0.10
				MGH-HS	0.24 ^{**}
Breen and Kashdan (2011)	College Students (NC)	170	AAQ-II ^b	SIAS	0.67 ^{**}
Briggs and Price (2009)	Adults from the Community and College Students (NC)	313	AAQ	VOCI	0.53 ^{**}
Buhr and Dugas (2012)	College Students (NC)	251	AAQ	PSWQ	0.59 ^{***}
Cowdrey and Park (2012)	Adults without a History of Psychological Problems (NC)	275	AAQ-II	GAD-7	0.58
Dickens et al. (2012)	Adult Outpatients with Long-Term Medical Conditions (C)	190	AAQ	PSWQ	0.64 ^{***}
Fergus et al. (2012) – Study 2	Adult Outpatients Diagnosed with Anxiety (C)	115	AAQ-II	SIAS	0.40 ^{**}
				PAS	0.27 ^{**}
				DOCS	0.45 ^{**}
Flessner and Woods (2006)	Adults Engaging in Repetitive Skin Picking (C)	92	AAQ	SPS	0.60 ^{**}
Glick and Orsillo (2011)	College Students (NC)	109	AAQ ^a	SIAS	0.38 ^{**}
Gloster et al. (2011) – Sample 1	Adult Outpatients Diagnosed with Panic Disorder with Agoraphobia	368	AAQ-II	PAS ^c	0.16 ^{†,e}
Gloster et al. (2011) – Sample 3	College Students (NC)	495	AAQ-II	OCI-R	0.49 ^{†,e}
Gold, Marx, and Lexington (2007)	Adult Gay Males Reporting at Least One Traumatic Sexual Event (C)	74	AAQ	PDS	0.39 ^{***}
Gold, Dickstein, Marx, and Lexington (2009)	Adult Lesbian Females Reporting at Least One Traumatic Sexual Event (C)	72	AAQ	PDS	0.55 ^{***}
Hayes et al. (2004) – Sample 4	College Students (NC)	202	AAQ	IES-A	0.26 ^{***}
				PDS-RE	0.18 ^{***}
				PDS-AR	0.17 ^{***}
				PDS-A	0.26 ^{***}
				FQ-S	0.55 ^{***}
Hayes et al. (2004) – Sample 5	Adult Outpatients Diagnosed with Agoraphobia (C)	41	AAQ	FQ-B/I	0.49 ^{***}
				FQ-A	0.44 ^{**}
				TSI	0.55 ^{***}
Hayes et al. (2004) – Sample 6	College Students (NC)	202	AAQ	IES-A	0.24 ^{***}
				PAS	0.18 ^{†,e}
Kämpfe et al. (2012)	Adult Outpatients Diagnosed with Panic Disorder with Agoraphobia (C)	369	AAQ-II ^{b,c}	PAS	0.18 ^{†,e}
Kashdan, Breen, Afram, and Terhar (2010)	College Students (NC)	148	AAQ	SIAS	0.25 [†]
Kashdan and Kane (2011)	College Students Reporting at Least One Traumatic Event (C)	176	AAQ	PCL-C	0.36 ^{**} , ^e
Lee, Orsillo, Roemer, and Allen (2010)	Adult Outpatients Diagnosed GAD and Adults from the Community without GAD (C and NC)	90	AAQ ^a	PSWQ	0.87 ^{**}
Maack et al. (2012)	College Students Reporting at Least One Traumatic Event (C)	291	AAQ	PCL	0.32 ^{***}
Mahaffey et al. (2013)	College Students (NC)	406	AAQ-II ^b	SPIN	0.29 ^{**} , ^e
Manos et al. (2010)	Adult Residential Inpatients and Intensive Outpatients Diagnosed with OCD (C)	108	AAQ	Y-BOCS-SR	0.16
				OCI-R-W	0.11
				OCI-R-C	0.09
				OCI-R-OR	0.23 [†]
				OCI-R-OB	0.10
				OCI-R-N	0.04
				PDEQ-SR	0.25 ^{***}
PDS	0.31 ^{***}				
Marx and Sloan (2005)	College Students Reporting at Least One Traumatic Event (C)	185	AAQ	PDS	0.31 ^{***}
Morina, Stangier, and Risch (2008)	Adults Reporting War Related Traumatic Events (C)	84	AAQ ^d	IES-R ^d	0.47 ^{**}
Orcutt, Pickett, and Pope (2005)	College Students (NC)	229	AAQ	DEQ	0.37 [†]
Palm and Follette (2011)	Adult Women Experiencing Interpersonal Victimization (C)	92	AAQ	PCL-C	0.40 ^{**}
Pickett, Bardeen, and Orcutt (2011)	Female College Students Reporting at Least One Traumatic Event (C)	851	AAQ-II ^b	DEQ	0.52 ^{***}
Plumb, Orsillo, and Luterek (2004) – Study 2	College Students Reporting at Least One Traumatic Event (C)	160	AAQ ^a	PDS-T	0.37 ^{***}
				PDS-S	0.55 ^{***}
Plumb et al. (2004) – Study 3	Male Adult Veteran Inpatients Diagnosed with PTSD (C)	37	AAQ ^a	CAPS	0.32 [†]
Roemer et al. (2005) – Study 1	Female College Students (NC)	240	AAQ ^a	PSWQ	0.57 ^{***}
				GAD-Q-IV	0.43 ^{***}
Roemer et al. (2005) – Study 2	Adult Outpatients Diagnosed with GAD (C)	19	AAQ ^a	PSWQ	0.35
Santanello and Gardner (2007)	College Students (NC)	125	AAQ ^a	SIAS	0.25 ^{**}
				PSWQ	0.46 ^{***}
Thompson and Waltz (2010)	College Students Reporting at Least One Traumatic Event (C)	191	AAQ	PDS-A	0.34 ^{**}
Tull et al. (2004)	Adult Females Reporting at Least One Traumatic Sexual Event (C)	160	AAQ ^a	PCL	0.49 ^{**}
Tull, Jakupcak, Paulson, and Gratz (2007)	Adult Males Reporting at Least One Episode of Interpersonal Violence (C)	113	AAQ	PCL	0.31 ^{**}

Table 2 (Continued)

	Population	N	PI measures	ADS measures	Correlation
Tull and Roemer (2003)	Adult Females Reporting at Least One Traumatic Sexual Event (C)	160	AAQ ^a	PCL-C-A	0.42**
				PCL-C-I	0.40**
				PCL-C-H	0.42**
				PCL-C-EN	0.37**
Wetterneck, Burgess, Short, Smith, and Cervantes (2012)	Adults from the Community and College Students (NC)	494	AAQ-II ^b	S-SAS	0.34** ^e
				SCS	0.36** ^e
Zettle (2003)	College Students Experiencing Math Anxiety (C)	12	AAQ ^a	MARS	0.64*

Note: AAQ: Acceptance and Action Questionnaire (Hayes et al., 2004); AAQ-II: Acceptance and Action Questionnaire-II (Bond et al., 2011); CAPS: Clinician Administered PTSD Scale; DEQ: Distressing Events Questionnaire; DOCS: Dimensional Obsessive–Compulsive Scale; FQ-S: Fear Questionnaire–Social Phobia Subscore; FQ-B/I: Fear Questionnaire–Blood/Injury Phobia Subscore; FQ-A: Fear Questionnaire–Agoraphobia Subscore; GAD-Q-IV: Generalized Anxiety Disorder Questionnaire–IV Severity Score (average of the distress and interference ratings); GAD-7: Generalized Anxiety Disorder Assessment; IES-A: Impact of Event Scale–Avoidance; IES-R: Impact of Event Scale–Revised; MGH-HS: Massachusetts General Hospital Hair-Pulling Scale; MARS: Mathematics Anxiety Rating Scale; OCI-R: Obsessive–Compulsive Inventory–Revised; OCI-R-W: Obsessive–Compulsive Inventory–Revised–Washing Subscale; OCI-R-C: Obsessive–Compulsive Inventory–Revised–Checking Subscale; OCI-R-OR: Obsessive–Compulsive Inventory–Revised–Ordering Subscale; OCI-R-OB: Obsessive–Compulsive Inventory–Revised–Obsessing Subscale; OCI-R-N: Obsessive–Compulsive Inventory–Revised–Neutralizing Subscale; PAS: Panic and Agoraphobia Scale; PCL: PTSD Checklist; PCL-C: PTSD Checklist–Civilian Version; PCL-C-A: PTSD Checklist–Civilian Version–Avoidance; PCL-C-I: PTSD Checklist–Civilian Version–Intrusion; PCL-C-H: PTSD Checklist–Civilian Version–Hyperarousal; PCL-C-EN: PTSD Checklist–Civilian Version–Emotional Numbing; PDS: Posttraumatic Stress Diagnostic Scale; PDS-AR: Posttraumatic Stress Diagnostic Scale–Arousal Criteria; PDS-A: Posttraumatic Stress Diagnostic Scale–Avoidance Criteria; PDS-S: Posttraumatic Stress Diagnostic Scale–PTSD Symptom Severity; PDS-RE: Posttraumatic Stress Diagnostic Scale–Re-experiencing; PDS-T: Posttraumatic Stress Diagnostic Scale–Trauma Severity; PDEQ-SR: Peritraumatic Dissociation Experiences Scale–Self Report; PSWQ: Penn State Worry Questionnaire; SCS: Sexual Compulsivity Scale; SIAS: Social Interaction Anxiety Scale; SPIN: Social Phobia Inventory; SPS: Skin Picking Scale; S-SAS: Sexual Symptom Assessment Scale; TSI: Trauma Symptom Inventory; VOCl: Vancouver Obsessional Compulsive Inventory; Y-BOCS-SR: Yale–Brown Obsessive Compulsive Scale–Self-Report.

NC: non-clinical sample; C: clinical/at-risk sample.

^a AAQ (Acceptance and Action Questionnaire) 16 Item Unpublished Version.

^b AAQ-II (Acceptance and Action Questionnaire-II) 10 Item Unpublished Version.

^c German Translation.

^d Albanian Translation.

^e Scores adjusted so scores of greater psychological flexibility is related to greater symptom severity.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

plots, trim and fill and fail safe N (Borenstein et al., 2009). The number of studies (k) and total number of participants (n) are reported for each aggregated effect size. Pearson r aggregated effect sizes were interpreted using recommended cutoff scores for small (.10), medium (.30), and large effects (.50; Cohen, 1988).

2. Results

Overall, aggregating across 63 studies, there was a significant medium correlation between the AAQ and measures of anxiety ($r = .45$, 95% CI = .41, .49, $z = 18.58$, $p < .001$, $k = 63$, $n = 13,788$). When separating studies based on the type of anxiety measure, there was a significant medium correlation between the AAQ and measures of general anxiety symptoms (e.g., GAI, BAI; $r = .48$, 95% CI = .42, .53, $z = 14.92$, $p < .001$, $k = 32$, $n = 7679$). There was also a significant medium correlation between the AAQ and measures of specific anxiety disorder symptoms (e.g., OCD or panic symptoms; $r = .42$, 95% CI = .36, .47, $z = 13.41$, $p < .001$, $k = 40$, $n = 8236$).

Additional analyses were conducted with measures of specific anxiety disorders. There was a significant large correlation between the AAQ and measures of GAD (e.g., PSWQ, GAD-7; $r = .61$, 95% CI = .49, .71, $z = 8.10$, $p < .001$, $k = 7$, $n = 1190$), significant medium correlations between the AAQ and measures of social phobia (e.g., SIAS, SPIN; $r = .41$, 95% CI = .26, .53, $z = 5.18$, $p < .001$, $k = 7$, $n = 1114$), PTSD (e.g., PDS, CAPS; $r = .39$, 95% CI = .33, .44, $z = 12.25$, $p < .001$, $k = 17$, $n = 3279$), and OCD (e.g., OCI-R, VOCl; $r = .36$, 95% CI = .20, .51, $z = 4.14$, $p < .001$, $k = 5$, $n = 1122$) and a significant small correlation between the AAQ and panic/agoraphobia (e.g., PAS, FQ-A; $r = .21$, 95% CI = .12, .28, $z = 4.88$, $p < .001$, $k = 4$, $n = 893$).

Analyses were also conducted with specific, commonly used measures of anxiety (e.g., STAI, BSI). There were significant large correlations between the AAQ and STAI ($r = .60$, 95% CI = .52, .68, $z = 11.08$, $p < .001$, $k = 5$, $n = 587$), DASS Anxiety scale ($r = .51$, 95% CI = .43, .58, $z = 11.17$, $p < .001$, $k = 10$, $n = 3130$), and BSI Anxiety scale ($r = .50$, 95% CI = .35, .63, $z = 5.74$, $p < .001$, $k = 3$, $n = 805$), as well as significant medium correlations between the AAQ and

HADS Anxiety scale ($r = .45$, 95% CI = .19, .65, $z = 3.25$, $p = .001$, $k = 4$, $n = 1081$) and BAI ($r = .38$, 95% CI = .20, .53, $z = 4.00$, $p < .001$, $k = 5$, $n = 886$).

Additional analyses compared the relationship of the AAQ to anxiety measures in clinical/at risk samples versus non-clinical sample. For the purpose of the meta-analysis a clinical/at risk sample was defined as a sample of participants seeking treatment for or diagnosed with an anxiety or other psychological disorder as well as a sample of participants selected based on risk factors for anxiety disorders (e.g., elevated distress, history of experiencing traumatic events). A non-clinical sample was defined as any general sample of college students or community members. When examining effect sizes separately between non-clinical and at-risk/clinical samples, there were significant medium correlations between the AAQ and measures of anxiety among non-clinical samples ($r = .47$, 95% CI = .42, .53, $z = 14.69$, $p < .001$, $k = 27$, $n = 7388$) and clinical samples ($r = .41$, 95% CI = .35, .46, $z = 12.72$, $p < .001$, $k = 34$, $n = 6215$) with no significant difference between clinical and non-clinical samples ($Q = 2.82$, $df = 1$, $p = .09$). When only examining measures of general anxiety symptoms, there was a significant large correlation between the AAQ and measures of general anxiety among non-clinical samples ($r = .52$, 95% CI = .45, .57, $z = 13.38$, $p < .001$, $k = 16$, $n = 4943$) and a medium correlation among clinical samples ($r = .43$, 95% CI = .34, .51, $z = 8.37$, $p < .001$, $k = 15$, $n = 2641$), but no difference between effect sizes in these two subgroups ($Q = 2.76$, $df = 1$, $p = .097$). When only examining measures of specific anxiety disorder symptoms, there were significant medium correlations between the AAQ and specific anxiety disorder symptoms among non-clinical samples ($r = .43$, 95% CI = .36, .51, $z = 9.94$, $p < .001$, $k = 14$, $n = 3659$) and clinical samples ($r = .38$, 95% CI = .31, .44, $z = 10.18$, $p < .001$, $k = 25$, $n = 4487$) with no significant difference between clinical and non-clinical samples ($Q = 1.15$, $df = 1$, $p = .28$).

Tests for publication bias. Recommended procedures were used to test for potential publication bias including examining funnel plots and using fail safe N and trim and fill methods (Borenstein et al., 2009). Visual inspection of the funnel plot combining all 63

studies indicated a fairly symmetrical distribution. Trim and fill analyses with the overall aggregate effect size ($k=63$) did not indicate any adjustment to the effect size estimate. The fail safe number of studies with a correlation of 0 needed to make the overall effect non-significant was 4761 and the number needed to make the correlation less than .10 was 245 (the cutoff for a small effect size). Thus, there appeared to be no to minimal impact of publication bias on the relationship of the AAQ to anxiety symptoms.

2.1. Review of the research evidence for ACT and anxiety disorders

To date there are almost 100 RCTs of ACT, some of which have found ACT to be an effective treatment for both anxiety and depression (e.g., Arch, Wollitzky-Taylor, Eifert, & Craske, 2012; Bohlmeijer, Fledderus, Rokx, & Pieterse, 2011; Forman, Shaw, et al., 2012; L. Hayes, Boyd, & Sewell, 2011). Multiple meta-analyses have found positive effect sizes for ACT in treating a range of problems (e.g., Hayes et al., 2006, 2012; Öst, 2008; Powers, Zum Vörde Sive Vörding, & Emmelkamp, 2009; Ruiz, 2010). A recent review concluded that there is preliminary support for ACT as a treatment and model for conceptualizing anxiety (Sharp, 2012). Similarly, the latest meta-analysis on this topic examined 19 studies that utilized mindfulness and acceptance-based interventions for anxiety disorders (Vøllestad, Nielsen, & Nielsen, 2012). Findings showed that of the mindfulness and acceptance-based interventions included in the meta-analysis, effect sizes from pre- to post-treatment for anxiety symptoms for within and between groups were 1.08 and 0.83, respectively. Of note, this meta-analysis examined depressive symptoms and included several studies that were exclusively mindfulness-based approaches to therapy (Vøllestad et al., 2012).

This section provides fuller information on the work done thus far with ACT and anxiety disorders. There are a few treatments that are largely based on ACT and contain a large percentage of ACT techniques but are named other things including AABT (acceptance-based behavior therapy), AEBT (acceptance enhanced behavior therapy), and MAGT (mindfulness and acceptance-based group therapy). These protocols come from a limited number of laboratories and are considered as part of ACT in other reviews (e.g., S.C. Hayes et al., 2006, 2011; Powers et al., 2009). These protocols were reviewed and were confirmed to highly overlap with ACT with a large proportion of the treatment protocols involving traditional ACT procedures, and the few remaining procedures being consistent with ACT. A narrative review of the ACT outcome research is provided, divided by anxiety area.

Mixed anxiety disorders. Several studies have examined the effectiveness of ACT for clinical samples with a heterogeneous/mixed array of anxiety disorders. Forman, Herbert, Moitra, Yeomans, and Geller (2007) compared the efficacy of cognitive therapy (CT) versus ACT in treating adults with anxiety and depression. Of the 57 participants, no differences were found between conditions at post for overall outcomes including measures of depression, anxiety, functioning, and quality of life. Results at 18-month follow-up, however, indicated slightly greater maintenance of treatment effects for CT relative to ACT on quality of life ($\eta^2 = .02$), general functioning ($\eta^2 = .04$), and depression ($\eta^2 = .04$), though not anxiety (Forman, Shaw, et al., 2012).

Another RCT compared CBT to ACT in the treatment of a mixed anxiety sample of 128 individuals who met criteria for one or more DSM-IV anxiety disorders (Arch, Eifert, et al., 2012). A total of 85 participants completed treatment, and there was no difference by condition on completer and non-completer status. Overall, improvements on self-reported anxiety measures (PSWQ, FQ, CSR, and ASI) pre- to post-treatment were similar across disorders and treatment received. At 12-month follow-up, individuals in the CBT condition reported greater increases in quality of life measures than those in the ACT condition ($ES=0.34$); but those in the ACT

condition had lower CSR scores at 12-month follow-up ($ES=1.10$). Consistent with their prediction, individuals in the ACT condition reported greater psychological flexibility as measured by the AAQ ($ES=.56$; Arch, Eifert, et al., 2012; Arch, Wollitzky-Taylor, et al., 2012). Of note, analysis from post-treatment to 12-month follow-up showed that individuals treated with ACT had greater psychological flexibility, as measured by the AAQ, while those treated with CBT had higher quality of life scores, as measured by the QOLI.

One RCT randomized 24 individuals with math anxiety to receive ACT or systematic desensitization (Zettle, 2003). Results showed equivalent reductions in self-reported math and test anxiety in both groups. Another pilot RCT compared ABBT to CT for the treatment of test anxiety (Brown et al., 2011). Sixteen individuals were randomized to receive a one-time, 2-h group intervention to cope with test anxiety. ABBT improved test performance significantly more than individuals in the CT group ($ES=.39$), with both ABBT and CT demonstrating a reduction in self-reported anxiety following the intervention ($p=.23$, $ES=.11$). There were no significant differences, however, between groups on the PHLMS-awareness, PHLMS-acceptance, DDS, or AAQ. In addition to the studies reviewed, there are also some case series showing ACT is useful across a variety of anxiety disorders (Codd, Twohig, Crosby, & Enno, 2011; Eifert et al., 2009) and in effectiveness studies (Lappalainen et al., 2007; Strosahl, Hayes, Bergan, & Romano, 1998).

Generalized anxiety disorder. While not vast, research has been conducted utilizing ACT as a treatment for GAD. One RCT for individuals over the age of 60 years randomly assigned 21 participants to either twelve sessions of CBT or ACT. Between group differences were not examined due to low sample size. The results indicated that those in the ACT condition showed improvements on measures of worry and depressive symptoms but did not show a statistical change in anxiety ratings (Wetherell et al., 2011).

After finding promising results for ABBT for GAD in a small open trial (Roemer & Orsillo, 2007), a larger RCT was conducted comparing ABBT to a waitlist control condition (Roemer, Orsillo, & Salters-Pedneault, 2008). Of the 31 randomized, 25 completed the study. Results indicated significant reductions from pre to post for ACT relative to waitlist on primary outcomes measures of anxiety, which were maintained at 3-month and 9-month follow-up. The AAQ decreased from pre-treatment with a mean of ($M=74.77$) to post-treatment ($M=53.23$, $ES=1.65$), and were maintained at a 3-month ($M=54.03$, $ES=1.63$) and 9-month ($M=52.82$, $ES=1.80$) follow-up. In addition, at post-treatment, 77% of those in the ACT condition no longer met criteria for GAD, relative to only 17% not meeting criteria for GAD in the waitlist.

Post-traumatic stress disorder. Research on ACT for PTSD is currently in its infancy. Three case studies for adults (Batten & Hayes, 2005; Orsillo & Batten, 2005; Twohig, 2009) and a multiple-base line for adolescents (Woidneck, Morrison, & Twohig, 2013), however, have shown preliminary support for ACT as an intervention for PTSD. The first published case study involved treating a 51-year old war veteran who was not willing to engage in prolonged exposure therapy. The authors did not report any standardized results but, instead, reported promising subjective clinical findings found throughout treatment (Orsillo & Batten, 2005). Another case study examined the utility of ACT for a woman suffering from PTSD and substance abuse. Results indicated improvements in psychological flexibility over the course of treatment with her AAQ dropping 10 points from pre-treatment (i.e., AAQ=36) to 12-month follow-up (i.e., AAQ=26). Additionally, self-report measures of distress were no longer clinically significant (Batten & Hayes, 2005). Finally, in a case study by Twohig (2009), the efficacy of ACT was examined for a 43-year-old Caucasian female suffering from PTSD and major depressive disorder after being non-responsive to CBT. Results indicated clinically significant improvements on

PTSD severity, depression, and anxiety at post-treatment and significant reductions in psychological inflexibility at post-treatment. Specifically, results showed a greater decrease in a measure of psychological flexibility compared to a measure of trauma related thoughts and beliefs. To our knowledge only one study has examined ACT for adolescents with PTSD. In this study, ACT appeared to be a promising intervention for adolescents presenting with post-traumatic stress symptomology (Woidneck et al., 2013). A 57% reduction of clinician rated PTSD symptomology was seen from pre to post-treatment and 71% from pre to follow-up with the seven participating clients in two multiple baseline designs. The ACT process measure utilized in this study, the AFQ-Y, showed 57–65% reductions pre to post, and a 42–56% increase in psychological flexibility.

Social phobia/anxiety. ACT was shown to be effective in reducing levels of anxiety in social situations in two case studies (Brady & Whitman, 2012; Codd et al., 2011). In an open-trial, the effectiveness of a 12-week program integrating ACT and exposure therapy was examined (Dalrymple & Herbert, 2007). Nineteen individuals diagnosed with social anxiety disorder (SAD) were seen for twelve weekly individual ACT sessions. For the 17 individuals who completed treatment, results indicated significant reductions in severity of social phobia and anxiety symptoms at post-treatment (Social Phobia and Anxiety Inventory, SPAI: ES = 1.05) and at 3-month follow-up (SPAI: ES = 1.41), and fear of negative evaluation at post-treatment (Brief FNE: ES = 1.20; LSAS-Fear: ES = 0.72) and at 3-month follow-up (Brief FNE: ES = 1.61; LSAS-Fear: ES = 1.22). Similarly, significant reductions in psychological inflexibility were evidenced at post-treatment (AAQ: ES = 0.93) and at 3-month follow-up (AAQ: ES = 0.75; Dalrymple & Herbert, 2007).

Two recent studies have examined the use of internet-based ACT for SAD. The first feasibility study examined the use of Second Life, a virtual environment, to treat SAD, through an open trial (Yuen, Herbert, Forman, Goetter, Comer, et al., 2013). Fourteen individuals diagnosed with SAD were administered 12 weekly, 1-h sessions of ABBT hosted on Second Life. Results showed improvements from pre-treatment to 12 week follow-up on major social anxiety measures (SPAI-SP, LSAS-fear, LSAS-avoidance) as evidenced by large effect sizes between $d = 1.14$ and 1.50 . In addition, both clinicians and participants rated the treatment as highly acceptable. A second open trial treated 24 individuals with a diagnosis of SAD via videoconferencing, to deliver 12 weekly 1-h sessions of ABBT (Yuen, Herbert, Forman, Goetter, Juarascio, et al., 2013). A majority of participants (95%) rated the treatment as acceptable and had positive reports of video-conferencing despite some technical difficulties. Pre- to post-treatment gains were made on social anxiety symptoms (SPAI, ES = 1.91; LSAS-Total, ES = 1.4; Brief-FNE, ES = 1.23) as well as depression (BDI-II = ES = .86). AAQ-II scores dropped significantly from pre-treatment to follow-up (ES = .87).

Another open trial tested an ABBT variant, which emphasized using ACT to integrate and enhance exposure and behavioral activation for adults with comorbid depression and social anxiety disorder (Dalrymple et al., 2014). Eighteen individuals in this study were also receiving pharmacotherapy in a hospital setting. Results, of the completers, showed a reduction in social anxiety symptoms (LSAS fear, ES = .92; LSAS avoid, ES = .96; SPAI-SP, ES = 1.04), depression symptoms (QIDS-CR, ES = 1.28; QIDS-SR, ES = .68), and psychological inflexibility (AAQ-II, ES = 1.05) while increasing quality of life (QOLI, ES = .78) and overall functioning (WHO-DAS, ES = .71; Dalrymple et al., 2014).

Ossman, Wilson, Storaasli, and McNeill (2006) conducted a preliminary open trial of ACT group therapy for social anxiety. Twenty-two individuals were divided into three groups, each receiving the same intervention consisting of ten 2-h weekly sessions of ACT. For the 12 individuals who completed treatment, results indicated significant reductions in social phobia symptoms

at 3-month follow-up (SPAI-SP, ES = 0.83). Additionally, psychological inflexibility significantly decreased at 3-month follow-up (AAQ, ES = 1.71) and effectiveness in pursuing valued social relationships significantly increased at 3-month follow-up (VLQ: ES = 0.80).

A small sample of adults with social anxiety ($N = 11$) were semi-randomly assigned (based on scheduling availability) to ACT group therapy, CBT group therapy (CBGT), or an inactive control (Block & Wulfert, 2000). No statistical analyses were conducted due to the small sample. Visual analysis of the data suggested a reduction in most participants' social anxiety measures (SPS, FNE, FQ) from pre-, post-, and 3-month follow-up for both the ACT and CBGT conditions, but not the control condition. Both the ACT and CBGT showed an increase in willingness ratings, but the inactive control ratings were mixed.

Finally, an open trial of mindfulness and acceptance-based group therapy (MAGT) for social anxiety was conducted (Kocovski, Fleming, & Rector, 2009). Forty-two individuals were divided into five treatment groups consisting of twelve 2-h group sessions. For the 29 individuals who completed treatment, results indicated significant reductions on all measures of social anxiety at post-treatment (LSAS, ES = 1.00; SPS, ES = 1.09; SIAS, ES = 1.03; SPIN, ES = 1.02) and at 3-month follow-up (LSAS, ES = 1.00; SPS, ES = 1.17; SIAS, ES = 1.00; SPIN, ES = 1.02). Additionally, there were significant decreases in psychological inflexibility at post-treatment (AAQ, ES = 0.97) and at 3-month follow-up (ES = 1.17; Kocovski et al., 2009).

Panic disorder. There are currently two published studies on the use of ACT with panic disorder. The effectiveness of ACT-enhanced exposure therapy was examined in an open trial for 11 adults with panic disorder with and without agoraphobia (Meuret, Twohig, Rosenfield, Hayes, & Craske, 2012). Treatment consisted of four sessions of ACT with a heavy focus on acceptance, defusion, and values based behavior followed by six sessions of exposure therapy presented from an ACT theoretical model. Results indicated significant reductions in anxiety sensitivity (ES = 0.26), agoraphobic cognitions (ES = 0.46), and a significant increase in mindfulness (ES = 0.38) within the initial four sessions. While these changes continued into the second phase of treatment (sessions 5–10; ES = 0.15, 0.28, and 0.23, respectively), the changes between phases did not significantly differ. Eight of the participants completed treatment and were considered treatment responders with at least a 30% decrease in panic disorder severity. In a case study, López (2000) implemented a 12 session protocol of ACT for panic disorder with agoraphobia, which resulted in a moderate decrease in worry as well as significant decreases in anxiety severity and avoidance and escape behavior.

Specific phobia. To date, only one laboratory-based study on the use of ACT with specific phobia has been conducted. Wagener and Zettle (2011) randomly assigned 36 undergraduates who reported midlevel anxiety on the Fear of Spiders Questionnaire to a control-based approach, an acceptance-based approach, or an information-based approach describing how to respond to distress toward spiders. Each treatment protocol was presented on a compact disc and lasted approximately 20 min. After the protocol was completed, participants were asked to place their hands in a container that may or may not contain a spider and in which the likelihood of containing a spider increases as participants place their hand in more jars. Results indicated that participants who received the acceptance-based approach completed significantly more jars ($M = 7.3$) than participants who received the information-based approach ($M = 5.4$).

Obsessive compulsive disorder and OC spectrum disorders. Currently, one case study, three multiple baseline studies, and one RCT examining the use of ACT for obsessive compulsive disorder (OCD) have been conducted. In the case study, two adults with OCD were treated using ACT and results indicated that there were

94% and 95% reductions in OCD symptoms (Y-BOCS) and significant increases in psychological flexibility (based on questions developed for this study) from pre- to post-treatment (Twohig, Whittal, Cox, & Gunter, 2010).

In a multiple baseline study, four individuals with OCD completed eight sessions of ACT without traditional exposure exercises (Twohig, Hayes, & Masuda, 2006b). Results indicated that all four participants evidenced reductions in the frequency of compulsions (92.7% reductions from pre- to post-treatment, 89.1% pre-treatment to follow-up), features of OCD (68% from pre- to post-treatment, 81% from pre to follow-up), experiential avoidance (22.8% pre- to post-treatment, 44.8% pre-treatment to follow-up), anxiety (59.8% pre- to post-treatment, 77.6% pre-treatment to follow-up), and depression (68.2% pre- to post-treatment, 93.5% pre-treatment to follow-up; Twohig et al., 2006b). In another multiple baseline design, five adults with the scrupulosity subtype of OCD displayed a 74% reduction in compulsions from pre- to post-treatment and an 80% reduction from pre-treatment to the 3-month follow-up (Dehlin, Morrison, & Twohig, 2013). There were reductions in OCD severity (Y-BOCS) as well: 51% at post-treatment, 54% at follow-up. Psychological inflexibility was reduced by 40% at post-treatment and 43% at follow-up. In the first attempt to use ACT for adolescents with OCD, a drop in compulsions (40% at post-treatment; 44% at 3-month follow-up) and Child Y-BOCS scores (28% at post-treatment; 42% at follow-up) was evidenced in a multiple baseline design (Armstrong, Morrison, & Twohig, 2013).

In an RCT, ACT was compared to progressive relaxation training (PRT; Twohig, Hayes, et al., 2010). ACT saw greater reductions in OCD severity (Y-BOCS) in an adult sample at post-treatment ($ES = 0.77$) and at the 3-month follow-up ($ES = 1.10$). Additionally, psychological flexibility improved significantly from pre- to post-treatment in the ACT condition ($ES = 0.59$), but not in the PRT condition, although both conditions became equal on flexibility at follow-up ($ES = 0.22$; Twohig, Hayes, et al., 2010).

Per reassignment and additions to the *DSM-5*, all disorders from the OCD category will be reviewed here (American Psychiatric Association, *DSM-5 Task Force*, 2013). This also appears to be clinically useful as OCD and OC-spectrum disorders are generally treated in the same facilities. A fair amount of work has been done with OCD and OC-spectrum disorders, with much of it using the same 8–10 session protocol. To date, ACT-enhanced habit reversal training (HRT) has been evaluated through four published studies for adults with trichotillomania (TTM) and chronic skin picking (CSP). In one multiple baseline study after seven sessions, four of five participants showed a reduction in hair pulling from pre- to post-treatment with no statistically significant changes in psychological flexibility (Twohig & Woods, 2004). In a RCT comparison to a waitlist, ten sessions of ACT-enhanced HRT was also found to reduce the frequency and severity of TTM at post-treatment; however, only the frequency was maintained at the 3-month follow-up. Participants in the ACT-enhanced HRT group displayed a decrease in psychological flexibility from pre- to post-treatment ($ES = .35$). Results showed for those in the ACT-enhanced HRT a 13% reduction on AAQ scores, while individuals in the waitlist condition displayed a 6% increase on AAQ scores (Woods, Wetterneck, & Flessner, 2006). Using the same treatment protocol, Flessner, Busch, Heideman, and Woods (2008) determined in a multiple baseline design that habitual behaviors decreased from pre-treatment to post-treatment regardless of the order of treatment (i.e., whether treatment started first with ACT or HRT). Twohig, Hayes, and Masuda (2006a) completed a multiple baseline study examining ACT alone which resulted in four out of five adults with CSP showing a reduction in skin picking at post-treatment with only one of those four maintaining that rate at 3-month follow-up. Additionally, three of those five participants increased

on psychological flexibility at post-treatment and maintained or continued to increase on psychological flexibility at follow-up.

The only study examining the effectiveness of ACT-enhanced HRT for tic disorders was a RCT conducted with adolescents and compared ACT-enhanced HRT to HRT alone (Franklin, Best, Wilson, Loew, & Compton, 2011). Results indicated no significant differences between groups on any outcome measure. While still unclear where it will be categorized, one multiple baseline study tested an eight session ACT program for adults with compulsive pornography viewing (Twohig & Crosby, 2010). Four out of five participants decreased pornography viewing at post-treatment, while all five decreased viewing at a 3-month follow-up. Additionally, psychological flexibility increased by 26% at post-treatment and slightly increased at the 3-month follow-up.

2.2. Mediation and moderation

In general, there has been support for psychological flexibility mediating results for ACT (Hayes et al., 2006). The data applied to anxiety are limited and will be reviewed here. Using the data from the Arch, Eifert, et al. (2012) and Arch, Wolitzky-Taylor, et al. (2012) ACT versus CBT for mixed anxiety disorders RCT, analyses of mediation (Arch, Wolitzky-Taylor, et al., 2012) and moderation (Wolitzky-Taylor, Arch, Rosenfield, & Craske, 2012) have been published. Results of the mediation analyses generally showed that both anxiety sensitivity and cognitive defusion were significantly changed by ACT and CBT, but the changes were greater in ACT, with the findings for defusion approaching significance (Arch, Wolitzky-Taylor, et al., 2012). The study of moderation showed that CBT performed better than ACT for those with moderate baseline anxiety sensitivity and with those without comorbid disorders. ACT performed better than CBT for those with comorbid mood disorders at baseline (Wolitzky-Taylor et al., 2012).

Additionally, results of the Forman et al. (2007) study examining the efficacy of cognitive therapy (CT) versus ACT in treating adults with anxiety and depression indicated that outcomes for each condition were related to distinct processes of change. Specifically, CT outcomes at post were more related to changes in observing and describing in comparison to ACT. Conversely, ACT outcomes at post were more related to changes in awareness, acceptance, and psychological inflexibility in comparison to CT (AAQ: $ES = .13$; Forman et al., 2007). In the RCT by Zettle (2003) comparing ACT to systematic desensitization for math anxiety, results indicated that pre-treatment levels of psychological inflexibility were related to decreases in anxiety at post-treatment only in the ACT condition.

The GAD outcome study by Roemer et al. (2008) was further analyzed for processes of change (Hayes, Orsillo, & Roemer, 2010). Results showed that session-by-session changes in acceptance and values were related to responder status at the end of ACT, and that changes in these two processes predicted outcome above and beyond worry. Finally, using a sample of college students diagnosed with depression or anxiety (Forman et al., 2007) who were either treated with ACT or CBT, session-by-session data showed that while both groups improved equivalently on all measures, more cognitive techniques such as cognitive restructuring and challenging mediated outcomes for the CBT condition, and acceptance strategies mediated outcomes for those in the ACT condition. Interestingly, dysfunctional thinking and defusion were mediators for both conditions (Forman, Chapman, et al., 2012).

2.3. Preliminary meta-analysis of RCTs testing ACT for anxiety disorders

In order to further summarize the outcome research of ACT for anxiety disorders quantitatively, a preliminary meta-analysis was conducted of the published ACT RCT studies on anxiety disorders

to date. Studies were included in the preliminary outcome meta-analysis if they met the following criteria: (a) participants were randomized to ACT versus one or more comparison conditions (i.e., RCT), (b) necessary data to calculate between group effect sizes were provided in the publication or provided upon request from the study author, and (c) the study was published in English or a translated version was available. Studies were excluded from the meta-analysis if they were (a) non-randomized studies (e.g., pre-post open trial, quasi-experimental design; n excluded = 10), (b) multiple baseline and single-case studies (n excluded = 11), (c) brief laboratory-based studies (i.e., Wagener & Zettle, 2011), or (d) did not provide the necessary data to compute an effect size ($n = 1$). Nine ACT RCTs with a total sample size of $N = 404$ met inclusion criteria and were incorporated into the meta-analysis.

Effect sizes were again computed using the Comprehensive Meta-Analysis program. Means and standard deviations were collected by treatment condition for each primary and secondary outcome measure as well as process measure at pre-treatment, post-treatment, and, when available, follow-up time points. If the necessary data were not provided in the original article the primary study author was contacted. Between group effect sizes were calculated into Hedges's g , which were interpreted as small (.2), medium (.5), and large (.8) effects based on recommended cutoffs (Cohen, 1988). When multiple outcomes were provided for a study, they were averaged into a composite effect size score. Due to the variety of methods, populations and comparison conditions used in the included studies, random effects models were used in calculating the aggregate effect size across studies. Comparison conditions were categorized as either a waitlist control (two studies) or manualized treatment comparison condition (seven studies including CT, CBT, habit reversal training, progressive relaxation training, and systematic desensitization). Outcome variables were also categorized based on the research article as primary outcomes (e.g., Y-BOCS, PSWQ), secondary outcomes (e.g., BDI, QOLI) and process of change measures (e.g., AAQ, mindfulness measures).

Aggregating across all nine RCTs and across all outcome/process measures, there was a non-significant small effect size favoring ACT over other comparison conditions ($g = .40$, 95% CI = $-.16$, $.96$, $z = 1.40$, $p = .16$, $k = 9$). However, the analysis also indicated significant heterogeneity across studies ($Q = 50.32$, $df = 8$, $p < .001$). Of these studies, only two compared ACT to a waitlist condition, both indicating significant large effect sizes favoring ACT over waitlist across all outcomes (Roemer et al., 2008, $g = 4.22$, $p < .001$; Woods et al., 2006, $g = 1.07$, $p = .01$). Analyses were repeated using only the seven studies that compared ACT to another manualized treatment for anxiety disorders. There was no significant effect size difference comparing ACT to manualized treatment across all outcomes ($g = .02$, 95% CI = $-.22$, $.26$, $z = .15$, $p = .88$, $k = 7$) and no significant heterogeneity across studies ($Q = 7.02$, $df = 6$, $p = .32$), nor was there a significant effect size when just examining primary outcomes ($g = .02$, 95% CI = $-.24$, $.27$, $z = .13$, $p = .89$, $k = 7$) or process of change measures ($g = .12$, 95% CI = $-.17$, $.41$, $z = .83$, $p = .41$, $k = 5$). Theoretically ACT is hypothesized to potentially have a greater impact on psychological inflexibility as measured by the AAQ relative to the other treatment comparisons. However, when specifically comparing ACT to manualized treatment conditions on the AAQ, there was also no significant effect size ($g = .08$, 95% CI = $-.21$, $.37$, $z = .54$, $p = .59$, $k = 5$). Lastly, when only including the five studies using empirically supported cognitive behavioral treatments for anxiety disorders (CT, CBT, HRT; excluding PRT and systematic desensitization), the effect size on primary outcomes was $g = .00$ (95% CI = $-.24$, $.25$, $z = .02$, $p = .99$, $k = 5$) and there was no significant effect size on the AAQ specifically ($g = .13$, 95% CI = $-.12$, $.39$, $z = 1.02$, $p = .31$, $k = 3$).

Overall, these very preliminary meta-analysis results suggest that although ACT may produce a large effect relative to no active treatment, it showed equivalent impacts on primary outcomes and

targeted process measures compared to manualized treatment and CBT more specifically. Importantly, these meta-analytic findings are very preliminary and likely affected by the small sample size, the small number of studies, as well as the observed heterogeneity across studies.

3. Discussion

The aim of this paper was to synthesize the current state of the research on ACT for anxiety and OC spectrum disorders. This included a meta-analytic review of studies examining the relationship between the core ACT process of change (psychological flexibility) and anxiety symptomatology. Results showed positive and significant relationships between the AAQ and general measures of anxiety and specific measures of disorder severity. These findings are consistent with the literature in regards to the strength and direction of the correlations; however, this meta-analysis provides a quantitative summary of the large body of existing literature, providing knowledge on the stability and size of the effect. Furthermore, within this meta-analysis, specific correlations across a number of anxiety disorders were provided.

Next, the empirical basis of ACT for the treatment of anxiety and OC spectrum disorders was reviewed. Results showed that there is modest support for a unified ACT protocol for mixed anxiety disorders. Evidence is also modest for the use of ACT with GAD, OCD, some OC spectrum disorders, and social phobia. Evidence is currently lacking for the use of ACT with PTSD, simple phobia, and panic disorder. Finally, although there is a large body of research on psychological flexibility as a mediator for ACT more generally (Hayes et al., 2006, 2012), modest support for mediation for ACT with anxiety disorders was presented.

Additionally, aggregating across nine RCTs and all outcome/process measures, a preliminary meta-analysis was conducted in which a non-significant small effect size was found in favor of ACT relative to other comparison conditions. ACT showed equivalent improvements to manualized treatments, including CBT specifically, and no significant difference on process of change measures. While this meta-analysis is lacking in sample size, number of studies included, and homogeneity, results highlight the fundamental need for further research examining an overarching mechanism of change across cognitive behavioral approaches for anxiety disorders.

Together, these findings have several clinical implications. Given the empirical evidence, the most pertinent issue is to understand when ACT can be utilized in a useful and an ethical manner. Of importance, CBT involving exposure exercises is still the first line intervention for anxiety disorders. However, in situations where CBT is ineffective or refused, ACT could be considered a viable second option. Evidenced based-behavioral practice (EBPP) suggests making treatment decisions considering the best available evidence, therapist expertise, and client characteristics including preference, all within the context in which they occur (e.g., Gibbs, 2003). Following principles indicated in EBPP, there may also be situations where ACT is a better fit for a particular client presentation. While the moderation research for anxiety disorders is limited, a recent study showed that ACT was more effective than CBT for cases that had co-occurring mood disorders, or for cases where the level of cognitive distortion was high (Wolitzky-Taylor et al., 2012). Similarly, if a client is hesitant, resistant, or somewhat non-compliant with difficult exercises, such as exposure exercises, the addition of ACT procedures may help increase treatment engagement. This is based on research on the effectiveness of individual ACT processes in increasing willingness to engage in panic inducing activities over control groups (Eifert & Heffner, 2003; Levitt, Brown, Orsillo, & Barlow, 2004), experiencing distressing emotions

including anxiety and depression (Campbell-Sills, Barlow, Brown, & Hofmann, 2006), and experience obsessive-like thoughts over control conditions (Marcks & Woods, 2005, 2007).

A further clinical implication suggested by this review is the application of ACT principles and techniques within well-established treatment protocols, such as exposure exercises. Similar to the Arch, Eifert, et al. (2012) and Arch, Wolitzky-Taylor, et al. (2012) trial, ACT can include traditional exposure exercises as the use of such behavioral methods are an intrinsic part of the ACT model and treatment protocols (Hayes et al., 2012). However, ACT may be implemented in other ways, for example studies have successfully implemented ACT without any in-session exposure exercises (Codd et al., 2011; Twohig, Hayes, et al., 2010). Still, exposure exercises can be implemented in a fashion that is consistent with the ACT model, theory, and philosophy (Eifert & Forsyth, 2005). In general, if doing exposure exercises from an ACT model, the act of confronting a feared stimulus should be seen as an exercise to facilitate psychological flexibility, and what is done in the presence of the feared stimulus should be seen as the therapeutic procedure. Lastly, utilizing ACT procedures in conjunction with traditional exposure is done in the service of expanding the ability to respond to unwanted internal experiences from a value driven approach.

However, it is also important to note that ACT itself is a behavioral therapy (Hayes et al., 2012) and thus typically includes behavioral components such as exposure, goal setting, and behavioral activation as part of its protocols. Nevertheless testing ACT in an additive design with behavioral components can help in determining whether effects are accounted for by only the behavioral methods (i.e., dismantling designs), but it is important to not mistakenly assume ACT does not typically include behavioral methods as part of its model and protocols.

This review brings up considerations for future research. First, while the preliminary evidence for ACT and anxiety disorders is promising, more stringent research and methodology should be pursued. Specifically, larger randomized control trials with focuses on mediation and moderation should be conducted. Additionally, the applied work in ACT should be continuously linked to the basic science. More specifically, research on the processes of change within the ACT model should stem from laboratory settings. The results found in laboratory studies will ultimately inform the application of ACT. A host of laboratory studies exist (Arch & Craske, 2006; Levin, Hildebrandt, et al., 2012; Levitt et al., 2004); however, more are needed to better understand the processes of change within the ACT model. Future research should also focus on furthering the assessment materials for psychological flexibility. While research indicates that changes in the AAQ, and its variants, mediate clinical outcomes with ACT, behavioral measures would further the research in this area. Additional research on the incorporation of ACT into other established behavioral treatments could strengthen the field's knowledge and ability to treat anxiety disorders. Finally, in order for ACT to be considered a well-established treatment for anxiety disorders studies should include control comparison groups, larger sample sizes, and blind assessment. In addition, few studies reported assessment of treatment adherence. Therefore it cannot be fully determined whether the treatments provided in the reviewed studies are consistent with the theory, philosophy, and model of ACT.

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