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Measurement of Defusion: Further Validation of the Drexel Defusion Scale

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MEASUREMENT OF DEFUSION: FURTHER VALIDATION OF THE DREXEL DEFUSION SCALE

by

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Christopher A. Briggs

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Christopher A. Briggs, Ph.D.

Western Michigan University, 2019

Acceptance and Commitment Therapy (ACT) seeks to develop psychological flexibility through the engagement of the six interrelated processes. Four processes employ mindfulness and acceptance strategies and consist of acceptance, defusion, present moment awareness, and the contextualized self. Two other processes, values and committed action, are grouped with present moment awareness and the contextualized self and are termed behavior change strategies. One issue encountered by contemporary behavioral approaches in general, and ACT in particular, is the measurement of the proposed processes. Measurement is complicated by the functional nature of some of the repertoires described making the development of instruments for assessment challenging. The present study focuses on defusion, the ability to disentangle from language and its byproducts. The development of reliable and valid instruments is essential for research and clinical application. Forman, Herbert, Juarascio, Yeomans, Zebell, Goetter, and Moitra (2012) presented initial psychometric data on the Drexel Defusion Scale (DDS), a measure of defusion. In the present study data were collected from a large undergraduate population across three phases (N = 306, 325, 256, respectively) to explore the psychometric properties of the DDS. Results were consistent with the ACT model and Forman et al. in that the DDS correlated moderately with the Acceptance and Action Questionnaire-II ($r = -.30$, $p < .001$)

and quality of life ($r = -.30$, $p < .001$), but with the latter two correlating more strongly with each other. A questionable test-retest reliability statistic ($r = .62$, $p < .001$) was found suggesting some potentially temporal variability in responding. The two-factor structure found by Forman et al. (2012) was generally replicated across samples, genders, and ordering of the questions; however, one item appeared somewhat inconsistent. Both the DDS and AAQ-2 items were entered simultaneously into an exploratory factor analysis. The items of the AAQ-2 consolidated into their own factor; but the DDS now sorted into 3 factors. The implications for the ACT Hexaflex model are explored as is the need for future research to explore the interaction of the DDS with other related-ACT measures. An important need is to study the measure with diverse populations.

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INTRODUCTION

Contemporary behavior therapy involves the integration of principles of acceptance, mindfulness, and non-judgmental awareness with traditional cognitive and behavioral therapeutic approaches (Thoma, Pilecki, & McKay, 2015; Hayes, 2004). Mindfulness skills are used in these therapies to help create a shift from the world of verbally-based judgment and evaluation to one of experientially-based observation and willingness. The origins of mindfulness are largely from Buddhist traditions involving meditative practices designed to alter states of awareness, but have been linked to contemplative spiritual practices more generally (Hayes, 2002). In recent decades the scientific examination of mindfulness has proliferated (Goleman & Davidson, 2017).

Acceptance and Commitment Therapy

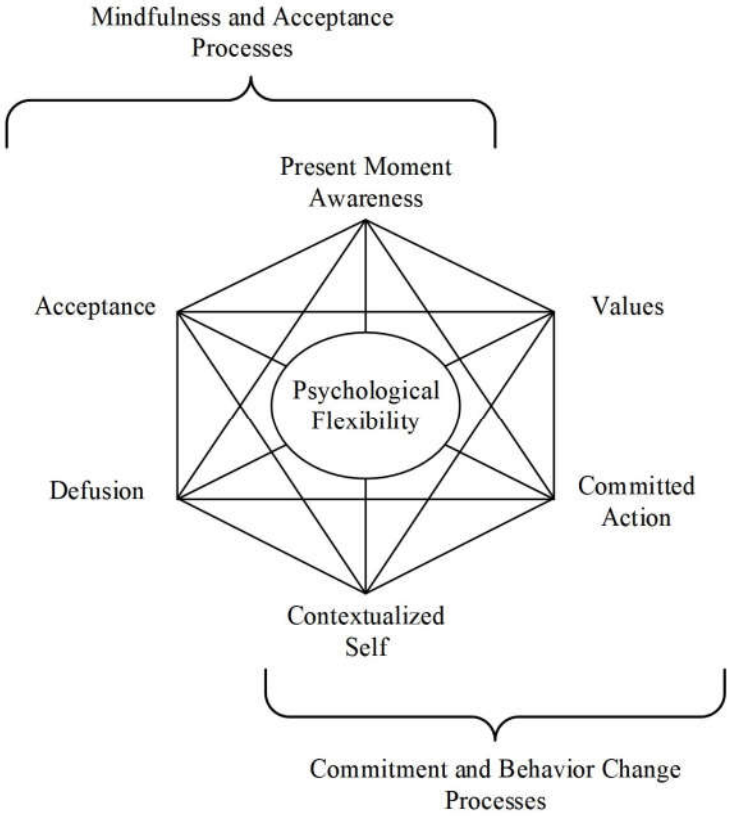
A contemporary behavior therapy that has extensively incorporated mindfulness is Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 2011). ACT is based on relational frame theory, a behavioral account of human language and cognition (Hayes, et al., 2011). ACT hypothesizes that the foundation of language is the ability to relate stimuli, especially stimuli that have no formal physical correspondence (i.e. arbitrarily applicable relational responding). Words are a clear example as the word "lemon" and a physical lemon have no physical correspondence but are related by verbal convention. Once related, some of the functions of an actual lemon may be inherent in the word (e.g., sour taste, bright yellow color) in some contexts (e.g., in a discussion of fruit vs. a discussion of cars). The ability for words to "stand in" for objects/events/experiences is often useful but, in some contexts, can be problematic. One context in which language can become problematic is in the realm of thoughts and feelings, particularly because the relation of words to things in so many areas of life invites

us to treat the words as though they literally represent the things. For instance, consider someone having the thought "Things will never get better" and experiencing it as a literal statement of truth rather than verbal behavior that may or may not be helpful in the present context. Thus, words become problematic in the realm of mental events in which entanglement with rules leads to avoidance of difficult thoughts, feelings, and sensations reducing the likelihood of engaging in valued and vital life experiences.

ACT posits that psychopathology arises from a reduction in psychological flexibility, a repertoire that emerges when one is able to willingly contact difficult thoughts, feelings, and emotions, from a nonjudgmental and non-controlling stance, and choose to engage life in accordance with personally held values (Hayes, et al., 2011). For example, someone struggling with the symptoms of depression (e.g., anhedonia, low mood) chooses to watch TV all day until the emotions pass. This person is avoiding the feelings of sadness and worthlessness to the detriment of attending work and taking care of his family (assuming these are values for the afflicted person). The treatment for this patient would use mindfulness and acceptance strategies to develop willingness to experience the uncomfortable inner experiences (e.g., anhedonia, low mood), while encouraging willingness to engage in value-oriented directions (e.g., being financially responsible and providing for his or her family).

The development of psychological flexibility consists of addressing six interrelated, mutually dependent core processes. No one process is more important than any other and all processes contribute to the generation of the main construct. Due to the multi-faceted, interrelated nature of ACT, the ACT model is typically depicted graphically via the "hexaflex" (Figure 1). One can observe from the hexaflex that four processes (left side of the hexaflex) employ mindfulness and acceptance strategies and consist of acceptance, defusion, present

moment awareness, and the contextualized self. These four processes are developed to increase awareness of avoidance and are effective for disentangling language and its by-products. The right side of the hexaflex is represented by behavior change strategies. The right side consists of two overlapping processes with the mindfulness strategies, present moment awareness and the contextualized self, combined with two behavioral action components: values identification and committed action. All six processes are essential in producing behavior change in a person's life in the presence of uncomfortable inner experiences. The development of psychological flexibility involves the contribution of all constructs, but not necessarily equally (see Figure 1).



Note. © Steven C. Hayes. Used with Permission.

Figure 1. The ACT Hexaflex (Hayes, Strosahl, & Wilson, 1999; 2011)

Evidence in Support of ACT

Acceptance and commitment therapy (ACT) is developing a significant evidence base. In addition to being listed as an evidenced-based therapy for SAMHSA and the Society of Clinical Psychology, Division 12 of the APA, to date there are over 300 RCTs testing ACT's efficacy with a variety clinical diagnoses, somatic health concerns, and work place stress. A search of the literature reveals at least six meta-analyses with positive outcomes. Three of the earlier reviews (Hayes, Luoma, Bond, Masuda, & Lillis, 2006; Öst, 2008; Powers, Vording, & Emmelkamp, 2009) utilized small sample sizes, but still managed to demonstrate medium effects sizes (hedges g =.42 to .66). In a more recent study, Öst (2014) conducted a reanalysis of his original review (2008) that included 8 years of additional research. The new analysis increased the RCTs from 13 to 60 and the sample size to 4234 participants. Öst found a small overall effect size of .42 when compared to control conditions (WL, TAU, etc.); however, no significant effect was observed when ACT was compared to active treatments (e.g. CBT). In a 2015 study by A-Tjak and colleagues, 39 ACT RCTs were analyzed with N=1821 and found an overall effect size (Hedge's g) of .57 against control conditions and .56 when considering process variables. This study also did not find a significant effect when compared to active treatments. While evidence is light in support of ACT versus active treatments, Ruiz (2012) considered only studies examining ACT versus CBT or other active treatments. Sixteen studies were selected with a sample size of 954. Ruiz found an overall effect size of .40; however, there was no benefit for anxiety and only a trend for depression (ES = .27). Overall, ACT is proving an efficacious treatment when compared to treatment as usual, and it appears to be at least as efficacious as other active treatments, such as CBT.

ACT Processes

Acceptance and Commitment Therapy seeks to develop psychological flexibility through the engagement of the six interrelated processes of the hexaflex. Early iterations of ACT, conceptualized the development of psychopathology as the result of experiential avoidance, or avoiding value-oriented experiences to reduce contact with uncomfortable thoughts, emotions, and/or sensations. Although ACT's conceptualization of psychopathology expanded, experiential avoidance is still anathema to the process of acceptance. Acceptance involves active awareness of private events and a willingness to embrace difficult thoughts and feelings without unnecessary attempts to change their form or frequency (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). For example, anxious patients are taught to experience their stress, worry, and rumination fully and without defense. Acceptance is developed through mindfulness skills practiced in-session while promoting generalization to the natural environment. The body scan meditation and progressive muscle relaxation are two examples of brief mindfulness skills that have been shown to increase tolerance to pain and, while not a target of acceptance, decrease subjective stress (Vowles et al., 2005; Levitt, Brown, Orsillo, & Barlow, 2004)

At the heart of ACT is the concept that humans have the unique capacity for language. That capacity allows us to accomplish great things through planning and problem solving; however, it has a dark side in that language can also cause psychological suffering when a person over-identifies with evaluations and descriptions that are not an accurate representation of reality. For example, consider a person who is fused with the thought of being a "loser". That is, the self ("I") is framed relationally with "loser", as seen in the client's repeated cognitive products (self-statements like "I'm a loser"). To the extent that "loser" has negative psychological functions those now become relevant to the person as a whole. This may impact

how the person views his/her life prospects (e.g., losers are socially rejected; losers fail at school, losers will never amount to anything). This association may result in feelings of failure, inadequacy, and rejection being present even when corresponding environmental evidence is not or even contraindicating such claims. Furthermore, a person entangled with the thought "I am a loser" may be less likely to pursue important values such as studying hard for exam or asking a potential mate out on a date. Finally, to the extent that the person has been socialized in a culture that suggests negative self-thoughts are a sign of disorder or low self-esteem, the very presence of the thought becomes problematic. In short, fusion (treating the thought literally, as a true statement representing reality) can have a range of untoward effects.

ACT uses defusion techniques to address over-identification of thoughts, or cognitive fusion. Defusion attempts to alter the undesirable functions of thoughts and other private events while not trying to alter the form or frequency. More specifically, defusion is the process of deliteralizing thoughts so that a person can respond to what thoughts really are, verbal events that do not have to have control over overt behavior. Defusion is typically addressed in a therapy session through exercises that change the relationship with the words that compose the thoughts. One common exercise is Titchener's repetition in which a word is vocally repeated in rapid succession for 30 seconds. The goal is for the individual to experience the change from the derived features of the word to the actual stimulus properties of the word itself, the sounds. For example, when you hear the word "lemon", derived properties such as a bright yellow fruit, rough dimpled skin, and strong tart taste may be contacted. If you repeat the word in rapid succession, what remains is simply the nonsensical sound consisting of the word "lemon" and the strange feel of your tongue going in and out. The result of the exercise is differentiation between the word (auditory direct stimulus functions) and that for which it stands (derived

relations and stimulus functions). Titchener's repetition has been shown to be effective with negative self-referential thoughts, such as "fat", "ugly", or "loser" (Masuda, Hayes, Sackett, & Twohig, 2004; Masuda et al., 2010). Other exercises, such as the contents-on-cards exercise, facilitate defusion by having thoughts physically present yet demonstrating no psychological control over behavior (e.g., participants carry his or her thoughts written on cards as he or she goes about their day.) The purpose of the exercise is to demonstrate that thoughts do not have to control his or her behavior. The content-on-cards exercise has been shown to be efficacious in reducing the believability and tolerance of pain (Gutiérrez, Luciano, Rodríguez, & Fink, 2004).

Promoting contact with direct experience over derived verbal experiences is also emphasized in the importance ACT places on present moment awareness. Worries of future events or rumination over past occurrences, reduce contact with the current moment and can inhibit engagement of valued pursuits in the here-and-now. To address this, ACT attempts to develop present moment awareness with the intent of increasing contact with environmental and psychological events as they occur (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). A nonjudgmental, defused, aware approach to private events is hypothesized to contribute to the production of psychological flexibility. The loss of present moment awareness disconnects a person from what is happening in the now, whether that is the pleasure of interaction with loved ones or the pride taken in being productive. It can also disconnect us from the internal experiences as they are occurring and make it difficult to concentrate or identify emotions or emotional reactions. Skills used to develop present moment awareness are similar to defusion and acceptance and use variations of mindfulness exercises. Examples are noticing what is occurring in the external world, observing a child playing, truly experiencing a routine task as if it is first encounter, savoring a chocolate or a mint, or appreciating a sunset (Broderick, 2005).

The purpose of these exercises is to use language as a tool to promote noticing and describing direct experiences rather than predicting, judging, and evaluating (deriving) based on experiences.

As individuals describe, evaluate, and judge their experiences in the world, a verbally-based self-concept is developed. In ACT this verbally derived sense of self is called the *conceptualized* self. Conversely, the *contextualized* self is a sense of self contacted by consciously observing the perspective from which one interacts with the present moment. That is, it is the "I/here/now" of conscious experience (Hayes, Levin, Plumb-Vilardaga, Villatte, & Pistorello, 2013). For example, I am here now (observing) my behavior of writing. ACT interventions that attempt to develop self-in-context help clients see inner experiences as distinct from consciousness and not a potential assault on who the client is. The idea is to undermine excessive fusion with the verbally derived "story of self" and increase direct contact with the self in interaction with the environment, creating a distinction between a self that notices all things and a self that is a verbal product. The stability produced by enhancing the experience of an "I/here/now" perspective is hypothesized to help one engage the present moment, willingly, and non-defensively, thereby promoting psychological flexibility. Contacting the contextualized self is similar to increasing present moment awareness in that techniques such as mindfulness exercises, metaphors, and experiential processes are employed to develop a sense that there is a constant self, a self that notices and observes all things, and a self that is unchanging across all time (Harris, 2009).

Given the pragmatic nature of ACT, values, or what the client most deeply wants out of life, provide the direction for clinical work (Hayes, et al., 2013). More formally, values are verbally described globally desired life consequences (Hayes et al., 1999). They contact what is

most important to the client (e.g., family, career) and how the client wants to be in those domains (e.g., love, productive). Excessive fusion with evaluations and judgments and avoidance of uncomfortable inner experiences can result in a reduction of important, vital, personally relevant, pursuits. Values establish a direction, but not an endpoint, serving to enhance motivation to engage in difficult, strenuous, or self-sacrificing behaviors in the presence of trying thoughts, feelings, or sensations (Schmeichel & Vohs, 2009). ACT employs exercises that help clients identify vital life directions while engaging in awareness, defusion, and mindfulness strategies. Techniques used to increase value identification involve discussing the importance a client places on various life domains, how active he/she has been in those domains, and how she/he would like to be.

If values are the direction, then establishing values-based goals is the destination, and committed action is the process. Committed action in ACT is relatively straightforward behavior therapy using graded activation, problem-solving, and goal planning to encourage larger and larger patterns of effective behavior associated with the client's valued directions. As acceptance is developed, defusion and contact with the present moment from a perspective of the observer self heightened, the ultimate goal of ACT is pursued: committed action in line with the client's values. ACT protocols consistently involve assignments, in session and at home, linked to short, medium and long-term behavioral goals (Hayes, Luoma, Bond, Masuda, and Lillis, 2006). In summary, the development of psychological flexibility is the interplay of processes weakening maladaptive verbal control, promoting contact with experience, and maximizing verbal influence in the area where it can be most effective: specification of values and goals.

Measurement of Defusion

One issue encountered by contemporary behavioral approaches in general, and ACT in particular, is the measurement of these proposed maladaptive verbal processes. Measurement is problematic due to the functional nature of some of the repertoires described by the construct labels making the development of instruments for assessment challenging. The present study is going to focus on defusion. Given the importance of defusion to Acceptance and Commitment Therapy, the development of valid and reliable instruments is essential for research and clinical application.

One instrument that has frequently been employed to measure defusion is the Automatic Thoughts Questionnaire (ATQ; Zettle & Hayes, 1986). The ATQ presents 30 items designed to assess the frequency and believability of thoughts. The ATQ was originally developed to measure frequency of negative self-thoughts but was later adapted for fused thinking by adding a believability scale (1986). The ATQ is one of the most frequently used measures for defusion; however, it may be wanting in some respects. For example, while frequency and believability of thoughts may be a component of fused thinking it fails to capture whether reactivity is problematic in relation to the thoughts. A person could have the thought of being "loser", and the thought does not prevent him or her from engaging personally or professionally; therefore, this would not be fused thinking even though it is frequent and possibly believable.

The Acceptance and Action Questionnaire-2 (AAQ-2; Bond et al., 2011) assesses psychological inflexibility, which, as reviewed earlier, is behavior that emerges when one has difficulty accepting internal events and engages in experiential avoidance to the detriment of living a vital life. As such, we would expect to see a correlation between this measure of psychological flexibility as a whole and defusion, as defusion is one of the constructs of

psychological flexibility. Thus, the AAQ-2 should correlate with measures of defusion, but measures of defusion should correlate more strongly among themselves.

Other defusion instruments focus on distinct populations or examine specific disorders. The Believability of Anxious Feelings and Thoughts Scale (BAFT: Herzberg et al., 2012) assesses the subjective validity of thoughts and feelings related to anxious experiences. The authors report this as a valid tool for measuring fusion with anxious thoughts; however, the applicability to non-anxious populations has yet to be evaluated. The Psychological Inflexibility in Pain Scale (PIPS; Trompetter et al., 2014) contains a fusion subscale in relation to the believability of pain, but not necessarily depression, anxiety or other problem areas. The PIPS narrow focus limits the applicability to a subset of potentially fused people. The Avoidance and Fusion Questionnaire for Youth (AFQ-Y; Greco, Lambert, & Baer, 2008) was developed to measure both avoidance and fusion in children and adolescents. This instrument has demonstrated satisfactory psychometric properties in adult populations as well (Fergus et al., 2012). As a measure of both fusion and avoidance behavior the AFQ should correlate more highly with overall psychological inflexibility than isolated defusion measures.

Two recent instruments attempt to measure fusion/defusion specifically, the Drexel Defusion Scale (DDS; Appendix D; Forman, Herbert, Juarascio, Yeomans, Zebell, Goetter, Moitra, 2012) and the Cognitive Fusion Questionnaire (CFQ; Gillanders et al., 2014).

The CFQ conceptualizes fusion as "the tendency for behavior to be overly regulated and influenced by cognition" (Gillanders et al., 2014, p. 84; e.g. "I struggle with my thoughts"; "My thoughts cause me distress or emotional pain"). In a combined student and community sample, the CFQ demonstrated strong internal consistency (Cronbach's alpha = .90), good test-retest reliability (r = .80; N=82), and a factor structure that was interpreted as a single factor

(Gillanders et al., 2014). The CFQ also demonstrated a strong correlation with psychological flexibility (AAQ-2; r=.72) and a medium to strong correlation with quality of life (World Health Organization Quality of Life Measure; r=-.45), as the ACT model would predict. Gillanders and colleagues (2014) also describe the conclusions from unpublished exploratory factor analyses using the AAQ-2 and CFQ items. In their young adult and community sample the result was two factors corresponding to the respective scales, suggesting that while defusion and psychological flexibility are related, they are distinct. Such an interpretation is consistent with the ACT model where in psychological flexibility is the cumulative product of six processes, one of which is defusion.

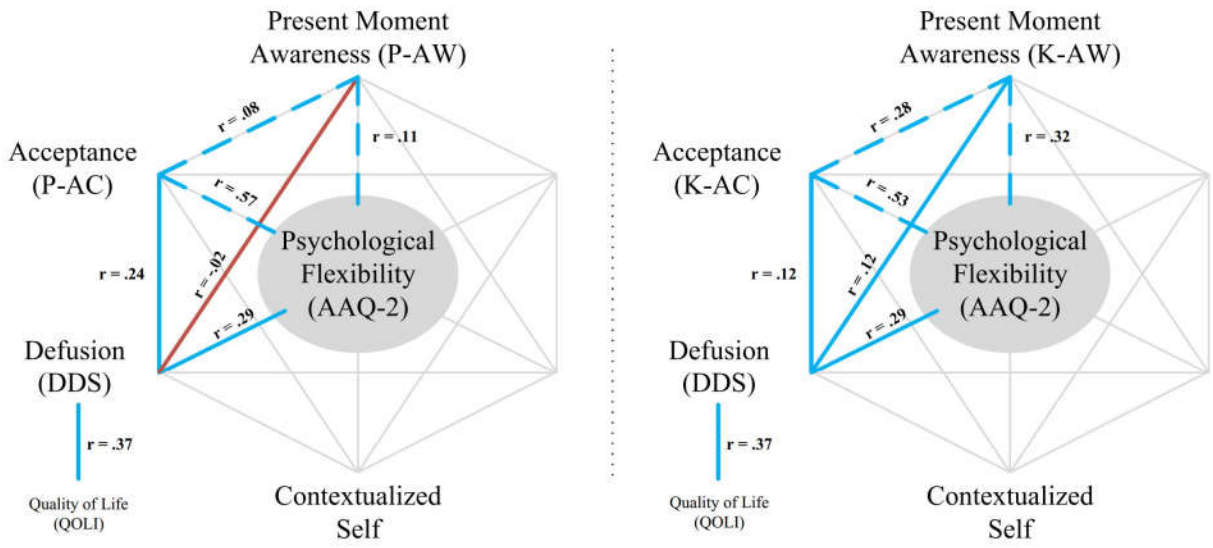
A second measure of defusion, the Drexel Defusion Scale (Forman et al., 2012), has good psychometric properties and a coherent pattern of convergent and divergent validity in both clinical and non-clinical samples. The DDS consists of 10 items that evaluate the extent to which individuals can defuse from difficult internal experiences. The measure begins with an explanation of defusion, followed by brief vignettes of situations that would elicit negative internal experiences (e.g., "You become angry when someone takes your place in a long line. To what extent would you normally be able to defuse from feelings of anger?"). The DDS demonstrates good internal consistency (Cronbach's alpha = .82) and is interpreted as having a single factor structure. The DDS is modestly more complicated given the inclusion of a lengthy description of defusion and the presentation of 10 vignettes across multiple situations. However, the complexity of the measure is also a strength as it assesses internal sensations and emotions in addition to thoughts alone as addressed with the CFQ. Questions remain about the DDS given the relative recent development of the measure and lack of research with diverse populations.

The ACT model includes defusion as one of the mindfulness and acceptance processes on the left side of the hexaflex (See Figure 1). As such, defusion should be related to but not redundant with present moment awareness, the contextualized self, and acceptance as there is a common thread with the mindfulness and acceptance processes. At the same time, general awareness is the common thread that runs through all of the mindfulness and acceptance processes of ACT. Thus, according to the model, there should be associations between the mindfulness and acceptance processes but they should also contribute uniquely to psychological flexibility.

Forman, Herbert, Juarascio, Yeomans, Zebell, Goetter, and Moitra (2012) present data from their research on the validation of the DDS that provides some indication of the relationship between defusion and other ACT processes. The authors analyzed two samples, an undergraduate sample (N=135; Figure 2) and a sample of clinical patients (N=144; Figure 3). Two measures of mindfulness and acceptance were used to assess the ACT constructs of present moment awareness and acceptance, respectively. The two measures of awareness were the Philadelphia Mindfulness Scale – Awareness Subscale (P-AW; Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008) and the Kentucky Inventory of Mindfulness Skills – Act with Awareness Subscale (K-AW; Baer, Smith, & Allen, 2004). The two measures of acceptance were the Philadelphia Mindfulness Scale – Acceptance Subscale (P-AC; Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008) and the Kentucky Inventory of Mindfulness Skills – Accept with Nonjudgment Subscale (K-AC; Baer, Smith, & Allen, 2004).

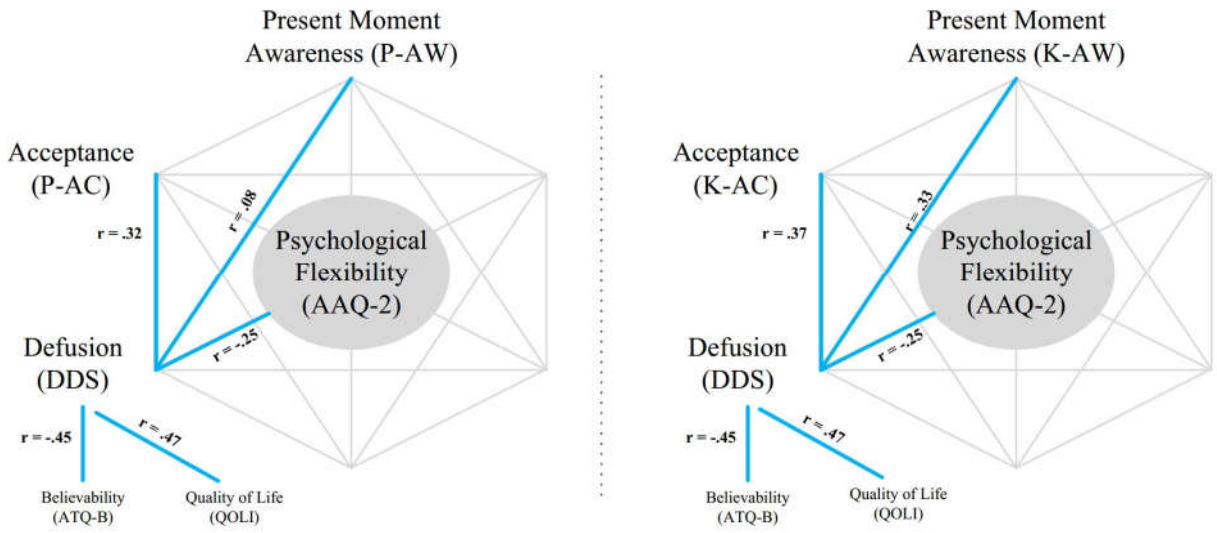
Based on the ACT hexaflex model, the expected correlations should show a moderate degree of association. (Interpretations of correlation coefficients are based on the widely used Cohen's (1998) conventions where the strength of association is considered small (.10), medium

(.30) or large (.50).) For the acceptance measures with the undergraduate sample (Figure 2), the data demonstrate a moderate relationship between the DDS and P-AC (r=.24) and a small relationship with the (K-AC; r=.12). For the clinical sample (Figure 3) medium relationships (r= .32 to .37) were found for both measures of acceptance, as would be predicted by the model. The awareness measures show less association. For the undergraduate sample no to a small relationship was reported for either instrument (r= -.02 to .12) while the clinical sample demonstrated a moderate relationship on the K-AW (r=.33) and a small relationship for the P-AW (r=.08). Thus, the data clearly suggest that the measure of defusion was not redundant with the measures of acceptance and present moment awareness. Furthermore, several moderate correlations with measures of awareness and acceptance are consistent with what the model would predict, although there were inconsistencies across measures. It should be also noted that the relationships appear to be stronger with the clinical sample, perhaps indicating the model solidifies as psychopathology increases. This would not be an incompatible conclusion given the model theorizes the prominence of these processes in understanding human suffering. Consistent with this interpretation, the DDS demonstrated a moderate relationship with psychological flexibility (r=-.25 to -.29) for both undergraduate and clinical samples as the ACT model would predict.



Note. Reported correlations for an undergraduate sample (N=135; Forman et al., 2012).
DDS = Drexel Defusion Scale; AAQ-2 = Acceptance and Action Questionnaire-2; P-AC = Philadelphia mindfulness scale awareness subscale score; P-AW = Philadelphia mindfulness Scale acceptance subscale score; K-AC = Kentucky Inventory of Mindfulness Skills accept with non-judgment subscale score; K-AW = Kentucky Inventory of Mindfulness Skills act with awareness subscale score. A single administration of the DDS, ATQ-B, and QOLI were conducted simultaneously with all measures of awareness and acceptance. Hexaflex graphic © Steven C. Hayes. *Used with Permission.*

Figure 2. Non-clinical correlations for the DDS applied to the ACT Hexaflex



Note. Reported correlations for a clinical sample (N=144; Forman et al., 2012).
DDS = Drexel Defusion Scale; AAQ-2 = Acceptance and Action Questionnaire-2; P-AC = Philadelphia mindfulness scale awareness subscale score; P-AW = Philadelphia mindfulness Scale acceptance subscale score; K-AC = Kentucky Inventory of Mindfulness Skills accept with non-judgment subscale score; K-AW = Kentucky Inventory of Mindfulness Skills act with awareness subscale score; ATQ-B = Automatic Thoughts Questionnaire – Believability Scale; QOLI = Quality of Life Inventory. A single administration of the DDS, ATQ-B, and QOLI were conducted simultaneously with all measures of awareness and acceptance. Hexaflex graphic © Steven C. Hayes. *Used with Permission.*

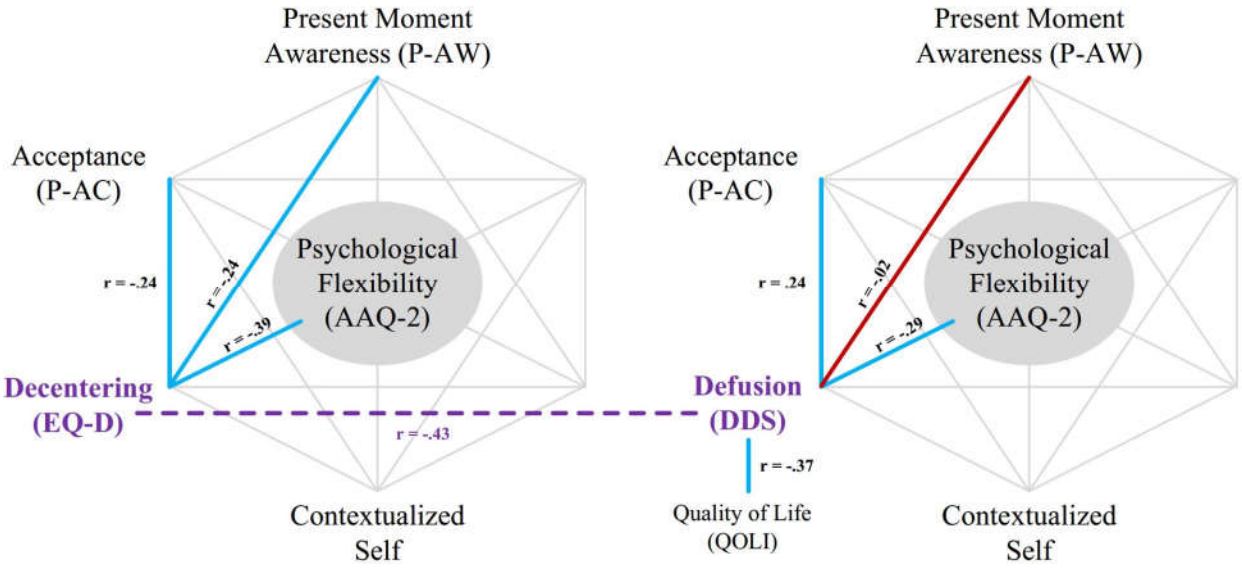
Figure 3. Clinical correlations for the DDS applied to the ACT Hexaflex

The Forman et al., (2012) data also show relationships between defusion and improvements with quality of life. As measured by the DDS, defusion was strongly correlated (r=.37 to .47) with the Quality of Life Inventory (QOLI; Figures 2 and 3). This is as expected given that with the ACT model theorizes that reductions in reactivity to thought content should be linked to increased psychological flexibility and therefore increased engagement and enjoyment in life. Thus, we would expect this measure to be positively correlated with quality of life and associated with psychological flexibility.

The clinical sample from the dataset also included a convergent measure of defusion, specifically the Automatic Thoughts Questionnaire – Believability subscale (ATQ-B; Figure 3). The ATQ-B, along with the QOLI, demonstrated strong correlations with the DDS and the strongest relationships between any measures assessed by Forman et al. The medium to strong

ATQ-B and DDS correlations suggest they may be measuring a similar process; namely that which is described as defusion. Moreover, Forman et al. ran a series of correlations to examine the predictive power of the DDS on measures of psychopathology, happiness, and quality of life after controlling for effects due to another measure. The predictive power of the DDS was most reduced when examined after controlling for effects due to the ATQ-B. As an example, the BDI=II and DDS were correlated -.27 after controlling for the ATQ-B but -.44 after controlling for acceptance on the P-AC. Again, these data suggest the DDS and ATQ-B are tapping a similar process that while related can be seen as contributing unique variance to the ACT hexaflex model.

Forman and colleagues also administered a measure associated with defusion from Mindfulness-based Cognitive Therapy (MBCT), the Experiences Questionnaire - Decentering Subscale (EQ-D; Figure 4). Using the undergraduate sample, correlations were calculated between the ACT processes and defusion for the construct of decentering. Comparing the results of the DDS with the EQ-D (Figure 4), demonstrated a similar association as with the ATQ-B in the clinical sample (Figure 3). That is, the EQ-D and DDS showed a relatively strong -.43 correlation with each other that was higher than the moderate correlations (r=.24) between the ED-Q and the two measure of acceptance (P-AC and K-AC). Additionally, there was a moderate relationship between decentering and present moment awareness as measured by the P-AW (r=-.24). Thus, again, defusion measures correlated most highly with one another, had medium effect size associations with psychological flexibility, that were higher than the relationships with other measures related to the left side of the hexaflex.



Note. Reported correlations for an undergraduate sample (N=135; Forman et al., 2012).
DDS = Drexel Defusion Scale; AAQ-2 = Acceptance and Action Questionnaire-2; P-AC = Philadelphia mindfulness scale awareness subscale score; P-AW = Philadelphia mindfulness Scale acceptance subscale score; K-AC = Kentucky Inventory of Mindfulness Skills accept with non-judgment subscale score; K-AW = Kentucky Inventory of Mindfulness Skills act with awareness subscale score; EQ-D = Experiences Questionnaire decentering subscale; QOLI = Quality of Life Inventory. Hexaflex graphic © Steven C. Hayes. *Used with Permission.*

Figure 4. Additional non-clinical correlations for the DDS applied to the ACT Hexaflex

One of the interesting observations from the Forman et al., (2012) data is on the factor structure of the DDS. The factor structure reported consisted of two factors with eigenvalues greater than 1. Given the primary factor accounted for a significant portion of the total variance (41.0% vs. 11.2%) and both factors were correlated (r=.46), the authors interpreted the result as a single factor rather than independent factors. Given the standard rule of thumb in factor analysis (Tabachnick & Fidell, 2013) for interpreting eigenvalues greater than 1, these results beg the question of whether the DDS is actually measuring an overall propensity toward defusion that can be interpreted as a solitary construct. Additionally, an examination of the item factor loadings suggests the potential for an order effect (See Table 1). If the DDS data are interpreted based on eigenvalues, and therefore having two factors, it was the items "feelings of anger", "cravings for food", and "physical pain" that loaded onto a separate factor. This was the case

with both the clinical and non-clinical samples. Moreover, these are the first three questions on the DDS (Appendix D). This pattern of results could represent an order effect. No other data is provided to rule out the possibility. The factor analysis data on the DDS suggest this possibility is worth examining.

A substantial body of survey research has shown that the order in which questions are asked can have an impact how participants respond. That is, rather than each question being treated as unique, prior questions, especially the directly preceding question, potentially may influence subsequent responding. Two primary types of order effects have been described as most applicable to questionnaire data: (1) contrast effects, where prior questions produce greater differences in responses, and (2) consistency effects, where responses become more alike due to their order (Moore, 2002; Strack, 1992). In the present study, order effects were examined by using two versions of the DDS. The first used exactly the 1-10 question order as published by Forman et al. (2012): feelings of anger, cravings for food, physical pain, anxious thoughts, thoughts of self, thoughts of hopelessness, thoughts about motivation or ability, thoughts about your future, sensations of fear, and feelings of sadness. In the second version of the DDS, the sequencing of the questions was completely reversed (i.e., item 10 became item 1; item 9 became item 2; etc.). The reordering ensured the immediately preceding item was completely different for all 10 items between the two versions, as was the sequence of all preceding items. As a result, we will be able to examine of whether the item means and item-to-item correlations. systematically differ between the two versions, as well as whether they result in different internal consistency estimates and factor structures.

Table 1

Summary of DDS factor loadings from initial EFA sample (Phase 2 and 3)

	Student Sample		Clinical Sample	
Item	Factor 1	Factor 2	Factor 1	Factor 2
1. Feelings of anger	.465	**.615**	.268	**.568**
2. Cravings for food	.249	**.643**	.108	**.606**
3. Physical pain	.316	**.852**	.173	**.721**
4. Anxious thoughts	**.648**	.299	**.712**	.370
5. Thoughts about self	**.769**	.274	**.791**	.175
6. Thoughts of hopelessness	**.864**	.309	**.817**	.073
7. Thoughts about motivation	**.704**	.447	**.711**	.368
8. Thoughts about future	**.738**	.296	**.793**	.365
9. Sensations of fear	**.469**	.409	.398	**.532**
10. Feelings of sadness	**.702**	.517	**.713**	.318

Note. Factors loadings for undergraduate (Phase 2; N=135) and clinical (Phase 3; N=144) samples (Forman et al., 2012)

One final note about the validation of the DDS, concerns the demographic composition of both samples. Of particular note, is the undergraduate sample consisted of 76% females and the clinical sample consisted of 85% females. The question remains as to whether the conclusions are equally relevant to both men and women. While there are many other non-western, educated, industrialized, rich and democratic (WEIRD) demographic variables to consider, a baseline should be examined for the applicability between men and women.

Overall, the data show relatively strong relationships between the DDS and other measures of defusion, with weaker relationships between the DDS and measures of acceptance, and awareness. The DDS is moderately related with psychological flexibility, the cumulative measure of hexaflex processes, and quality of life. This study proposes to collect additional data from a large undergraduate population to further examine the psychometric properties of the

DDS. Based on the existing literature, and the ACT hexaflex model, we would predict the DDS will correlate moderately with the AAQ-2 and quality of life, but with the latter two correlating more strongly with each other (although a medium correlation with the DDS is predicted.) Also examined will be the possibility that the factor structure of the DDS is influenced by order effects. The DDS will be administered in both its standard form and with the items reversed. The results of both will be subjected to independent exploratory factor analyses. The pattern of relationships between the DDS, AAQ-2 and quality of life, and the factor structure of the DDS, will be examined across genders as the moderating effect of gender has not been explored. Finally, both the DDS and AAQ-2 items will be entered simultaneously into an exploratory factor analysis to test the prediction generated from Gillanders et al., (2014) that the result will be independent factors that correspond to each measure.

METHOD

Demographic information and measurement data were collected from undergraduate students on the DDS, AAQ-2, and quality of life question 4 (QOL-4). The measures were administered during instructor-approved class time. The study was conducted in three phases. During Phase 1 research assistants administered all of the measures in their original, unaltered format and repeated the process, including seeking instructor permission, 30 days later. For Phase 2, the same procedure was followed (2 administrations over 30 days), with the single change of reordering the DDS items for both administrations. There is a substantial body of survey research showing that the sequence in which items are presented can influence participant responding (Moore, 2002; Strack, 1992).

Subject Recruitment

University students (N=891) were recruited from classes at Western Michigan University. Students were required to be between 18 and 75 years of age and have the ability to read at the 8th grade level.

Research Procedure

A research investigator identified on the research protocol requested permission from instructors of undergraduate courses to administer a demographic questionnaire (Appendix B), question 4 from the Health Related Quality of Life (QOL-4; Appendix C), the Acceptance and Action Questionnaire-II (AAQ-2; Appendix E) and the Drexel Defusion Scale (DDS; Appendix D). (See Figure 5 for a graphical representation of the research procedure.) Once permission had been obtained from the instructor, a researcher identified on the HSIRB protocol attended the scheduled class session at the scheduled time. Sealed research packets were distributed to all students regardless of participation in the study. The sealed packet had the consent document

(Appendix A) affixed to the outside. The packets contained: an anonymity code sheet (Appendix F), a demographic questionnaire (Appendix B), question 4 from the Health Related Quality of Life (QOL-4; Appendix C), the Acceptance and Action Questionnaire-II (AAQ-2; Appendix E), the Drexel Defusion Scale (DDS; Appendix D), and an extra credit slip (Appendix G).

The investigator or research assistant read the consent document (Appendix A) out loud and addressed any questions regarding the study before issuing the directive to begin. It was explained that each participant needed to self-generate a unique code and the instructions for generating the code were included in the packet (Appendix F). Direction was provided to the participants to write the self-generated code at the top of each assessment measure. Furthermore, it was stated that researchers only have access to the generated code and no other identifying information. Multiple verbal reminders were provided that by opening the packet, completing the measures, and submitting the completed packet, the participant was indicating consent for participation in the study, but that all students have the option not to participate.

After the instructions were read, the consent process explained, and any questions answered, the students were directed to open the packets if they wished to consent and participate. All forms contained no personally identifiable information. The participants labeled all forms, with his or her self-generated code from the aforementioned algorithm (Appendix F). Students who elected not to participate were provided the options of either completing a puzzle on the back of the consent document (Appendix I) or sitting quietly while the study was conducted. At completion time, students submitted their packet at the designated receipt location in the classroom in exchange for an extra credit slip (Appendix G). After all packets had been submitted, completed or not, a researcher or assistant identified on the HSIRB protocol immediately transported the packets to the Behavior Research and Therapy Lab, 1524 Wood

Hall, Western Michigan University. The information was locked in the Behavior Research and Therapy Lab where it will be maintained for a period of at least 5 years.

The same research procedure was repeated, including instructor consent, approximately 30 days after the initial assessment session. The replication allowed for the collection of test-retest data as well as data for individuals who may have missed the first administration.

For Phase 2, the entire two-session procedure was repeated again with different class sections in a different semester. The single change to Phase 2 was an item-order reversal of the on the DDS as discussed above. (See Figure 5 for a flow chart of the research procedure.)

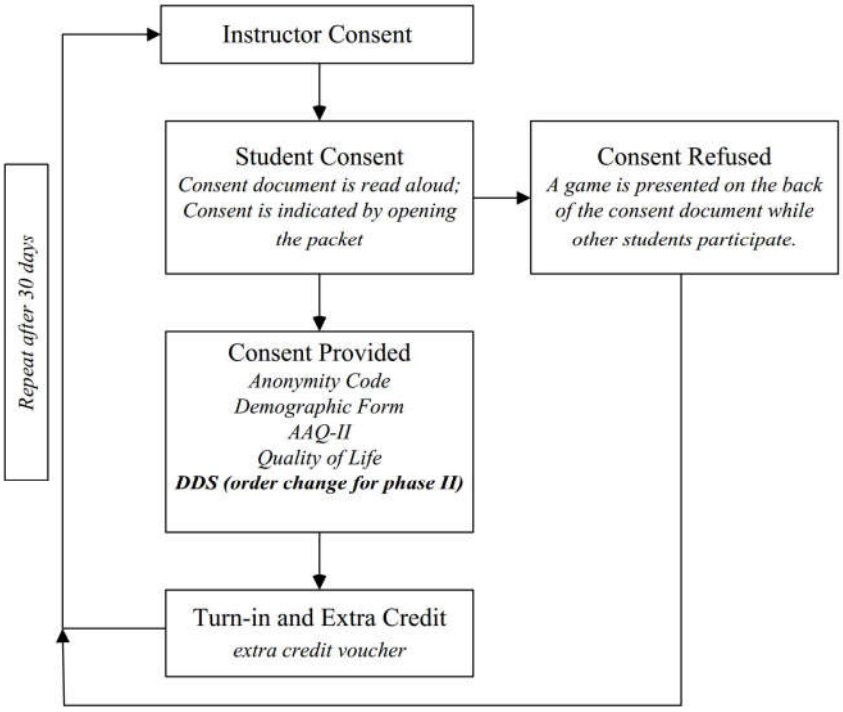


Figure 5. Research Procedure

Phase 3 was added after the study began to collect additional data some of which is relevant to the current study and some that pertains to related work. For Phase 3, the Phase 1

procedure was repeated again with different class sections in a different semester. One change to Phase 3 was the second administration of measures for test-retest data was not conducted. (See Figure 5 for a flow chart of the research procedure.)

Extra Credit Procedure

Students earned extra credit for participation in this study. Extra credit slips (Appendix G) were included inside the sealed assessment packet. After the consent document was read aloud, the participating student broke the seal of the packet, completed the survey, and retrieved the extra credit slip. The extra credit slip was exchanged for an extra credit voucher (Appendix H) that was redeemable with any instructor offering extra credit for research participation. Extra credit for non-participation was not policed; some students may have obtained extra credit vouchers without actually completing the measures.

Confidentiality of Data

To maintain anonymity in responses, participants were asked to write a five-digit alphanumeric code (Appendix F) on the packet of measures. Participants were provided with the following algorithm to develop their participant identification code: 1) last letter of your current last name; 2) first letter of your mother's maiden name; 3) first letter of the month you were born; 4) "M" if male; "F" if female; 5) first number of your current address. The generated code has an extremely small chance of anyone (including the researchers) of being able to identify the participant. The use of the code allowed for 1) anonymity with respect to any personal information 2) pairing the results of the measures (DDS, QOL-4, AAQ-2, and the demographic questionnaire) to each other, and 3) measures to be associated when the process was repeated approximately 30 days later for test-retest data.

After completion of the research session, all measures were taken immediately to the Behavior Research and Therapy Lab for storage and subsequent scoring, data entry and analysis. After data entry and analysis was completed, the original documents were stored in a locked file cabinet, inside the Behavior Research and Therapy Lab.

Risks and Costs

The risks associated with this study were minimal. The study was designed to maintain anonymity. The questions being asked are informational in nature and, in the case of the DDS, are inquiring about the rigidity or flexibility of a person's thought process. The single cost of the study was the 15-20 minutes of course time associated with completing the measures. However, this cost was offset by the benefit of education for participating in research. There were no direct travel costs associated with this study.

Benefits

Extra credit was available for study participation. Extra credit was the single direct benefit of participation. Indirect benefits of the study include providing data that may contribute to the evaluation of the Drexel Defusion Scale. The development of the DDS may lead to improved identification of dysfunctional thought patterns and improved targeting of therapeutic interventions.

Instrumentation

Commonly used clinical self-report measures were employed. The measures were consistent with those used in prior studies examining the efficacy of the Drexel Defusion Scale (Forman, Herbert, Juarascio, Yeomans, Zebell, Goetter, and Moitra, 2012). A description of each assessment measure is listed below.

Acceptance and Action Questionnaire-II (AAQ-2; Appendix E; Bond et al., 2011) is a 7-item scale measuring the ability to take action despite uncomfortable thoughts/feelings. Each item is scored on a 1-7 point Likert scale. Interpretation of scores varies with the application objectives. Higher scores indicate greater psychological inflexibility. Psychometric findings indicate a normative mean score of 20.72 (*SD* = 8.18) for college students. Test-retest reliability was calculated r = .81. Gillanders et al. (2014) reported Cronbach's alpha = .93 while Bond et al. (2011) published data verifying a single factor structure.

Demographic Questionnaire (Appendix B) is a measure developed by the Behavior Research and Therapy Lab to collect basic background information on each participant. The information was used to validate existing norms and develop new population standards based on the demographic characteristics of the Midwestern undergraduate samples collected in the study. The measure does not include personal identifying information.

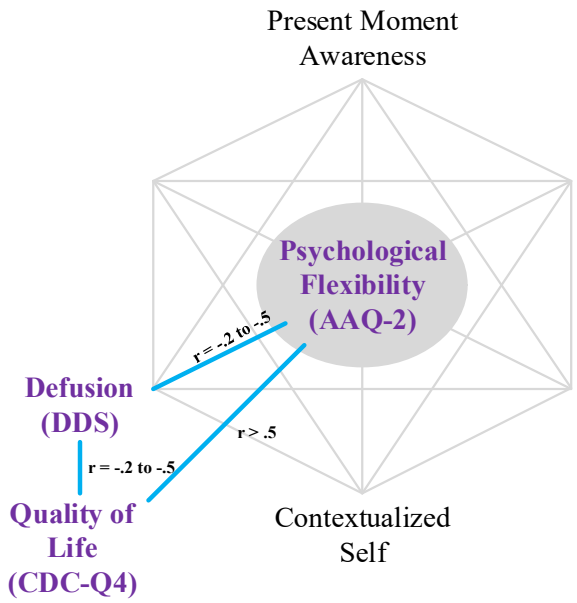
Drexel Defusion Scale (DDS; Appendix D; Forman, et al., 2012) is a 10-item self-report questionnaire assessing the extent to which a person is able to distance him/herself from negative thoughts, feelings, and physiological reactions. Each item was scored on a 0-5 Likert scale. Higher scores indicate greater levels of defused thinking. Participants rate their ability to defuse in various situations on a scale from 0 (not at all) to 5 (very much). Good ($\alpha = .85$) internal consistency has been previously reported (Forman et al. 2012).

Health Related Quality of Life – Question 4 (QOL-4; Appendix C) is the fourth question from the CDC Health Related Quality of Life (HRQOL) inventory that assesses global health by the number of days in the past month where the participant struggled with poor physical health, poor mental health, and activity limitations. The HRQOL is a valid and reliable

instrument whose profile reflects sensitivity to treatment effects associated with cognitive behavior therapy. HRQOL is related to but not redundant with psychological distress.

Hypotheses

This study collected data from a large undergraduate population to further examine the psychometric properties of the DDS. Based on the existing literature and the ACT hexaflex model we predicted moderate correlations between the DDS and the AAQ-2 and QOL-4, but with the latter two correlating more strongly with each other (although a medium correlation with the DDS was predicted.). See Figure 6.



Hexaflex graphic © Steven C. Hayes. *Used with Permission.*

Figure 6. Hypothetical results applied to the ACT Hexaflex

Also examined was the possibility that the factor structure of the DDS is influenced by order effects. This was assessed by DDS administration in both its standard form (Phase 1) and with the items reversed (Phase 2). The results of both were subjected to principal component

factor analyses with the prediction of a similar pattern of two correlated factors for the original and reversed orderings. See Table 2 and Table 3, respectively.

Table 2

Predicted DDS Factor Loadings

	Student Sample	
Item	Factor 1	Factor 2
1. Feelings of anger	.5	**.6**
2. Cravings for food	.2	**.6**
3. Physical pain	.3	**.9**
4. Anxious thoughts	**.6**	.3
5. Thoughts about self	**.8**	.3
6. Thoughts of hopelessness	**.9**	.3
7. Thoughts about motivation	**.7**	.4
8. Thoughts about future	**.7**	.3
9. Sensations of fear	**.5**	.4
10. Feelings of sadness	**.7**	.5

Table 3

Predicted DDS Factor Loadings (after item reversal)

	Student Sample	
Item	Factor 1	Factor 2
10. Feelings of sadness	**.7**	.5
9. Sensations of fear	**.5**	.4
8. Thoughts about future	**.7**	.3
7. Thoughts about motivation	**.7**	.4
6. Thoughts of hopelessness	**.9**	.3
5. Thoughts of self	**.8**	.3
4. Anxious thoughts	**.6**	.3
3. Physical pain	.3	**.9**
2. Cravings for food	.2	**.6**
1. Feelings of anger	.5	**.6**

The pattern of relationships between the DDS, AAQ-2 and QOL-4, and the factor structure of the DDS, was examined across genders as the moderating effect of gender has not been explored. If the model holds, we would expect to see a similar pattern of relationships (Figure 6) and factor structure (Table 4).

Table 4

Predicted DDS Factor loadings by gender

	Male		Female	
Item	Factor 1	Factor 2	Factor 1	Factor 2
1. Feelings of anger	.5	**.6**	.5	**.6**
2. Cravings for food	.2	**.6**	.2	**.6**
3. Physical pain	.3	**.9**	.3	**.9**
4. Anxious thoughts	**.6**	.3	**.6**	.3
5. Thoughts about self	**.8**	.3	**.8**	.3
6. Thoughts of hopelessness	**.9**	.3	**.9**	.3
7. Thoughts about motivation	**.7**	.4	**.7**	.4
8. Thoughts about future	**.7**	.3	**.7**	.3
9. Sensations of fear	**.5**	.4	**.5**	.4
10. Feelings of sadness	**.7**	.5	**.7**	.5

Finally, both the DDS and AAQ-2 items were entered simultaneously into an exploratory factor analysis to test the prediction generated from Gillanders et al., (2014) that the result will be independent factors that correspond to each measure. We expected a similar factor loading for the DDS items consisting of two moderately correlated factors with an additional third factor consisting of the AAQ-2 items (See Table 5).

Table 5

Predicted DDS and AAQ Combined Item Factor Loadings

	Student Sample		
Item	Factor 1	Factor 2	Factor 3
DDS 1. Feelings of anger	.5	**.6**	.3
DDS 2. Cravings for food	.2	**.6**	.1
DDS 3. Physical pain	.3	**.9**	.2
DDS 4. Anxious thoughts	**.6**	.3	.2
DDS 5. Thoughts about self	**.8**	.3	.2
DDS 6. Thoughts of hopelessness	**.9**	.3	.3
DDS 7. Thoughts about motivation	**.7**	.4	.3
DDS 8. Thoughts about future	**.7**	.3	.2
DDS 9. Sensations of fear	**.5**	.4	.2
DDS 10. Feelings of sadness	**.7**	.5	.4
AAQ 1. Painful experiences	.3	.4	**.7**
AAQ 2. Afraid of feelings	.2	.2	**.8**
AAQ 3. Worry of controlling feelings	.3	.3	**.9**
AAQ 4. Painful memories	.5	.5	**.6**
AAQ 5. Problematic emotions	.2	.2	**.7**
AAQ 6. Living by comparison	.3	.3	**.8**
AAQ 7. Worrying is a barrier	.5	.4	**.7**

RESULTS

Samples and Associated Statistics

Phase 1 sample

Three hundred six undergraduate students (133 males, 173 females) in psychology or alcohol and drug abuse courses were recruited for Phase 1 in exchange for extra course credit according to the research procedure described above. Participant ages ranged from 16 to 42 years old, with a mean age of 19.9 years (SD=2.59). Participants' self-identified as follows: 68.8% White/Caucasian/European, 13.7% Black/African American, 6.9% multi-racial, 4.9% Asian, 1.6% Native American, and 5.3% ''other.'' Of the sample, 5.9% ethnically identified as Hispanic or Latinx. The DDS, AAQ-2, and the QOL-4 were re-administered approximately 30 days after the initial administration. One hundred seven undergraduate students (38 males, 69 females) completed the 30-day re-administration. From the second administration, participant ages ranged from 18 to 42 years old, with a mean age of 19.9 years (SD=3.10). Participants self-identified as follows: 75.0% White/Caucasian/European, 15.9% Black/African American, 6.9% multi-racial, 6.5% Asian, 0% Native American, and .9% ''other.'' Of the sample, 4.6% ethnically identified as Hispanic or Latinx. Demographic data is presented in Table 6.

Phase 2 sample

Three hundred twenty-five undergraduate students (128 males, 197 females) in psychology or alcohol and drug abuse courses were recruited for Phase 2 of this project in exchange for extra course credit according to the research procedure described above. Participant ages ranged from 18 to 43 years old, with a mean age of 20.2 years (SD=3.00). Participants' self-identified as follows: 69.0% White/Caucasian/European, 16.7% Black/African American, 4.9% multi-racial, 4.3% Asian, 1.5% Native American, and 3.6% ''other.'' Of the sample, 8.5%

ethnically identified as Hispanic or Latinx. The DDS (items reversed), AAQ-2, and the QOL-4 were administered to the full sample.

Phase 3 sample

An additional third administration was added to collect additional data. Phase 3 used the same methodology as Phase 1 without the second administration for test-retest data.

Two hundred fifty-six undergraduate students (132 males, 124 females) in psychology or alcohol or drug abuse related courses were recruited for Phase 3 in exchange for extra course credit. Participant ages ranged from 17 to 69 years old, with a mean age of 20.6 years (SD=4.40). Participants self-identified as follows: 67.4% White/Caucasian/European, 13.6% Black/African American, 5.8% multi-racial, 9.7% Asian, 0.8% Native American, and 2.7% ‘‘other.’’ Of the sample, 8.5% ethnically identified as Hispanic or Latinx.

Table 6

Demographic Data

	Phase 1		**Phase 2**		**Phase 3**	
	n	%	n	%	n	%
Sample	306	100.0	325	100.0	256	100.0
Gender (Female)	173	56.4	197	59.9	124	48.1
White/Caucasian/European	208	68.8	227	69.0	174	67.4
Black/African American	42	13.7	55	16.7	35	13.6
Multi-racial	21	6.9	16	4.9	15	5.8
Asian	15	4.9	14	4.3	25	9.7
Native American	5	1.6	5	1.5	2	0.8
"other"	16	5.3	12	3.6	7	2.7
Hispanic or Latinx	18	5.9	28	8.5	22	8.5
	M	SD	M	SD	M	SD
Age	19.9	2.6	20.2	3.0	20.6	4.4
College Year	1.96	.94	1.98	1.05	2.12	1.10

Internal Consistency of the DDS

Phase 1 and 3 combined sample

The mean and standard deviation for the DDS from the Phase 1 and 3 combined sample was M = 27.55 and SD = 8.91 (N = 471). Reliability analysis suggested good internal consistency for the DDS with Cronbach's alpha = .83 (N = 471). Results were in line with the mean, standard deviation, and Cronbach's alpha reported by Forman and colleagues (2012) of 27.30, 7.28, and .83, respectively (See Table 7). All inter-item correlations for Phase 1 and 3 were significant and ranged from .11 to .65. All items were positively correlated with the total on the DDS with item 2 ("cravings for food") being the weakest (r= .38; N = 472) and item 6 ("sensations of fear") being strongest (r = .76; N = 471) of the correlations. The histogram of the data was reviewed for kurtosis and skew of the distribution. The data had a slight negative skew and did not appear overly kurtotic. The assumption of normality was largely met and therefore did not warrant transformation. (The histogram from Phases 1 and 3 is presented in Appendix J.) The box-and-whiskers plot was also examined for outliers. One extreme score was in the range of the measure toward the low-end. (The box-and-whisker-plot is included in Appendix J).

Phase 2 sample

The mean and standard deviation for the DDS from the Phase 2 (items reversed) sample was M = 27.59 and SD = 8.82 (N = 328). For Phase 2, reliability analysis suggested good internal consistency for the DDS with Cronbach's alpha = .79 (N = 328). Results were again in line with the mean, standard deviation, and Cronbach's alpha reported by Forman et al. (2012). All inter-item correlations for Phase 2 were statistically significant and ranged from .10 to .61. All items were significantly correlated with the total on the DDS with item 2 ("cravings for food") being the weakest (r=.39; N=325) and item 6 ("sensations of fear") being the strongest (r

= .76; N = 325). See Appendix L for a table of item-total correlations. The data again presented skewed slightly to the left and did not appear overly kurtotic and thus not warranting a correction for normality. (The histogram from Phase 2 is presented in Appendix K.) The box-and-whiskers plot was also examined for outliers. Four extreme scores out of 328 were noted in the range of the measure, but toward the low-end. (The box-and-whisker-plot for Phase 2 is included in appendix K).

Table 7

Internal Consistency

	DDS				AAQ-2	
	Published*	**Phase 1&3**	**Phase 2**		**Published***	**Phase 1-3**
M	27.3	27.59	27.59	**M**	20.26	21.03
SD	7.28	8.84	8.82	**SD**	8.80	8.86
N	176	471	328	**N**	231	677
α	.83	.83	.79	**α**	.88	.88
** Published (Forman et al., 2012)*				** Published (Bond et al., 2011)*		

Internal Consistency of the AAQ-2

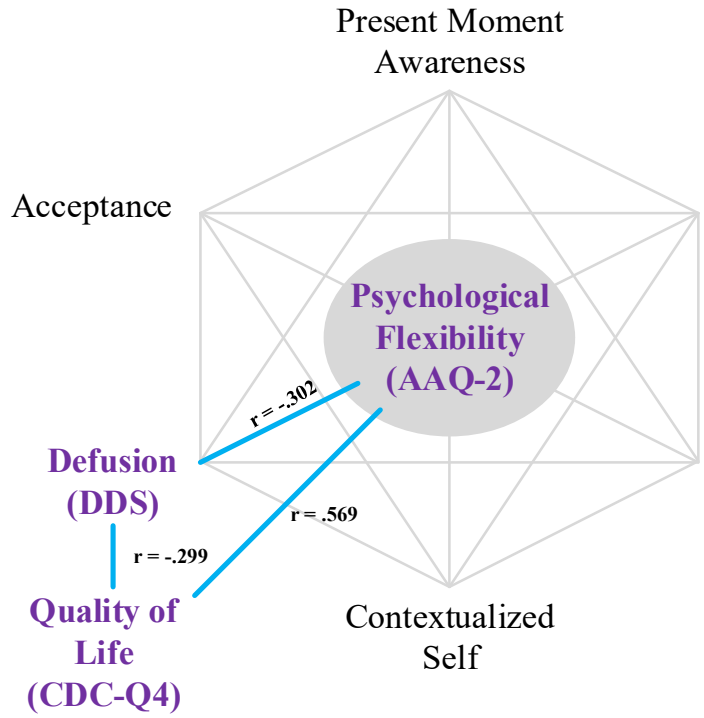
The mean and standard deviation for the AAQ-2 from all phases of the study were M = 21.03 and SD = 8.86 (N = 685). Reliability analysis suggested good internal consistency for the AAQ-2 with Cronbach's alpha=.88 (N = 677). Statistics were comparable to M = 20.26, SD = 8.80, and α = .93 reported by Gillanders et al. (2014) for an undergraduate sample.

Quality of Life- Question 4 Descriptive Statistics

The mean results from the QOL-4 measure indicate participants struggle with mental health about 8 days per month (M = 7.8 days, SD = 8.09, N = 760).

Correlational Analysis

Bivariate correlations were calculated by combining the samples of Phases 1-3 of the study. The pattern of correlations was consistent with predictions. The DDS was moderately correlated with the AAQ-2 (r = -.30; N = 678) and quality of life (r = -.30; N = 687). The direction of the correlations was also as predicted, as defusion increased, psychological inflexibility and the number of days of poor mental health decreased. Psychological inflexibility and poor quality of life correlated more strongly with each other (r = .57; N = 633) than with defusion. Table 8 presents the correlations from the analysis of Phase 1, 2, and 3. Figure 7 presents the results as applied to the hexaflex model.



Note. Hexaflex graphic © Steven C. Hayes. *Used with Permission.*

Figure 7. Results of Correlational Analysis Applied to the ACT Hexaflex

Table 8

Means, (standard deviations), and Zero-order Correlations between Defusion, Psychological Flexibility, and Quality of Life for All Undergraduates.

Measure	1	2	3
1. Defusion (DDS)		-.302 **	-.299 **
2. Psychological Inflexibility (AAQ-2)			.569 **
3. Quality of Life (QOL-4)			
Mean	27.49	21.03	7.79
(Standard Deviation)	(8.94)	(8.87)	(8.09)

** p < .01 (two-tailed).

Test-retest reliability was calculated from the combined samples from Phase 1 and Phase 2 of the study. The DDS items were reordered for Phase 2 of the study; however, this change

does not affect the total score. The DDS means for Phase 1 and Phase 2 were 27.59 (SD = 8.84) and 27.59 (SD = 8.82), respectively. The mean and standard deviation for the combined sample at the initial administration was 27.86 (SD = 8.83) and at the 30-day re-administration was 28.99 (SD=8.48). Test-retest reliability was r = .62 (N = 275; p < .01). See Table 9.

Table 9

Test-Retest Reliability

DDS				AAQ-2			
	Published*	**Phases 1-3**	**Retest**		**Published***	**Phase 1-3**	**Retest**
M	27.3	27.49	28.99	**M**	20.26	21.03	28.99
SD	7.28	8.94	8.49	**SD**	8.80	8.86	8.49
N	176	800	275	**N**	231	677	275
T/R	N/A	.62**	N=275	**T/R**	.81	.82**	N=276

** Published (Forman et al., 2012)* ***p<.01*

** Published (Bond et al., 2011)* ***p<.01*

Regression Analysis of Quality of Life, Psychological Flexibility, and Defusion

Given this study reassessed participants after 30 days, it allowed for an additional analysis exploring the best predictor of our variables for quality of life 30 days into the future. The DDS was a bivariate predictor of QOL 30 days later, r = -.28, p < .001, N = 258, as was the AAQ-2, r = .43, p <. 001, N = 258. A standard multiple linear regression was run with defusion (DDS), psychological flexibility (AAQ-2), and quality of life (QOL-4) as predictors of quality of life 30 days later (QOL430) on the combined retest data (Phases 1 and 2; N = 249). The full model was found to be significant, F (3, 245) = 73.93, p = .00, and accounted for roughly 47% of the variability (R^2 = .475, Adjusted R^2 = .469). Of the three factors included, two were found to be significant predictors: quality of life (t = 10.50, p = .000) and psychological flexibility (t =

2.44, p = .02; see Table 10). See Table 8 for the bivariate correlations between defusion, quality of life, and psychological flexibility.

Table 10

Measures that Predict Quality of Life at Day 30

	β (SE)	t	*p*
Defusion	.003 (.049)	0.071	.944
Psychological Flexibility	.132 (.054)	2.441	.015
Quality of Life (Day 1)	.668 (.064)	10.502	.000

Principal Components Analysis of the DDS

The factor structure of the DDS was analyzed by combining data from Phase 1 and Phase 3. Data from Phase 2 was excluded due to the reordering of the DDS items, the effect of which was explored in a subsequent analysis. All analyses were conducted using the Dimension Reduction → Factor Analysis platform in IBM SPSS statistics 25. Shared variance was examined with the Kaiser-Meyer-Olkin (KMO) test for sampling adequacy to confirm the proportion of common variance among items. The sampling adequacy was deemed sufficient as the resulting value of .89 is greater than the generally accepted minimum of .60 (Tabachnick & Fidell, 2013). Bartlett's test of sphericity was also performed to confirm the inter-item correlation matrix of the DDS has a non-zero covariance in the analyzed sample. The test was significant at the $p < .000$ level; therefore, the sample is suitable for factor analysis. Two unrestricted factor analyses were conducted using principal component analysis extraction methods and both a ProMax rotation (as conducted by the original development authors (Forman et al., 2012) and a Varimax rotation, the most common method for PCA recommended by

Tabachnick & Fidell (2013) were utilized. Due to similar findings, only the Varimax rotation results are presented here. The ten items from the DDS were entered as variables to examine their factor structure. Results produced two factors with eigenvalues greater than one- i.e., a two-factor solution. As recommended by Tabachnick & Fidell (2013), the scree plot was also examined to further identify how many factors to retain as solely relying on eigenvalues greater than 1.0 can lead to an overestimation of the number of meaningful factors. Of the two factors, one accounted for 40.7% of the total variance, whereas the second factor contributed 11.0%. Both of the identified factors were moderately correlated (r = .43). (see Table 11 for a summary of factor loadings). Results indicated that the first 3 items of the DDS ("feelings of anger", "cravings for food", "physical pain") loaded onto a separate factor from the other 7 items.

Table 11

Summary of DDS Factor Loadings (Phases 1 and 3)

	Phases 1 and 3 combined	
Item	Factor 1	Factor 2
1. Feelings of anger	.215	**.590**
2. Cravings for food	.067	**.597**
3. Physical pain	.116	**.774**
4. Anxious thoughts	**.663**	.098
5. Thoughts about self	**.809**	.094
6. Thoughts of hopelessness	**.802**	.141
7. Thoughts about motivation	**.736**	.245
8. Thoughts about future	**.716**	.141
9. Sensations of fear	**.460**	.401
10. Feelings of sadness	**.674**	.254

Note: Phase 1 and 3 combined, N=563

To test the DDS for the presence of an order effect, during Phase 2 the measure was administered to undergraduate students (N = 328) with the items reversed. The KMO test for sampling adequacy was deemed sufficient with a resulting value of .86. Bartlett's test of sphericity was significant at the $p < .000$ level; therefore, the sample was suitable for factor analysis. An unrestricted factor analyses was conducted again using principal component analysis extraction methods and a varimax rotation. The analysis again produced a two-factor solution- two eigenvalues greater than one. The first factor that accounted for a significant portion of the total variance (35.7%), whereas the second factor contributed significantly less (10.9%). Both of the identified factors were moderately correlated ($r = .44$). Results indicated the order of items did not affect the factor structure of the measure with the first 3 items (of the original ordering) loading onto a separate factor. (see Table 12 for summary of factor loading).

Table 12

Summary of DDS Factor Loadings (Phase 2)

	Phase 2 (Reversal)	
Item	Factor 1	Factor 2
10. Feelings of sadness	**.601**	.287
9. Sensations of fear	**.475**	.141
8. Thoughts about future	**.628**	.074
7. Thoughts about motivation	**.620**	.233
6. Thoughts of hopelessness	**.765**	.165
5. Thoughts about self	**.671**	.171
4. Anxious thoughts	**.739**	.010
3. Physical pain	.216	**.619**
2. Cravings for food	-.030	**.763**
1. Feelings of anger	.300	**.620**

Note: Phase 2 (item reversal), N=328

The Correlational Effects of Gender

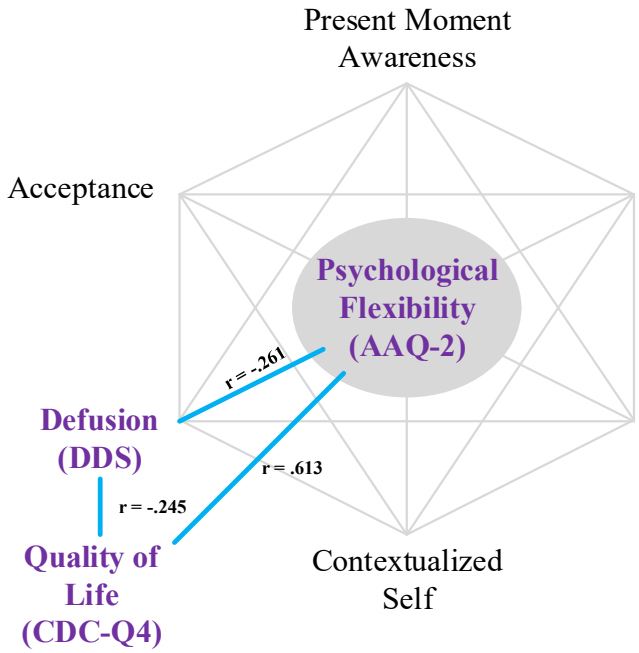
Bivariate correlations were examined with respect to gender using the combined sample from all phases of the study. Results for males demonstrate the DDS was moderately correlated with the AAQ-2 (r = -.26; N = 284) and QOL-4 (r = -.25; N = 292). The direction of the correlations was as predicted, as defusion increased, psychological inflexibility and the number of poor mental health days decreased. Psychological inflexibility and quality of life correlated more strongly with each other (r = .61; N = 261) than with defusion. Table 13 presents the correlations from the analysis of Phase 1, 2, and 3 considering males in the calculation. Figure 8 presents the results as applied to the hexaflex model.

Table 13

Means, (standard deviations), and Zero-order Correlations between Defusion, Psychological Flexibility, and Quality of Life for Male Undergraduates.

Measure	1	2		3	
1. Defusion (DDS)		-.261	**	-.245	**
2. Psychological Inflexibility (AAQ-2)				.613	**
3. Quality of Life (QOL-4)					
Mean	28.44	19.25		5.88	
(Standard Deviation)	(9.46)	(8.60)		(7.15)	

** p < .01 (two-tailed).



Note. Hexaflex graphic © Steven C. Hayes. *Used with Permission.*

Figure 8. Results of the Correlational Analysis for Males applied to the ACT Hexaflex

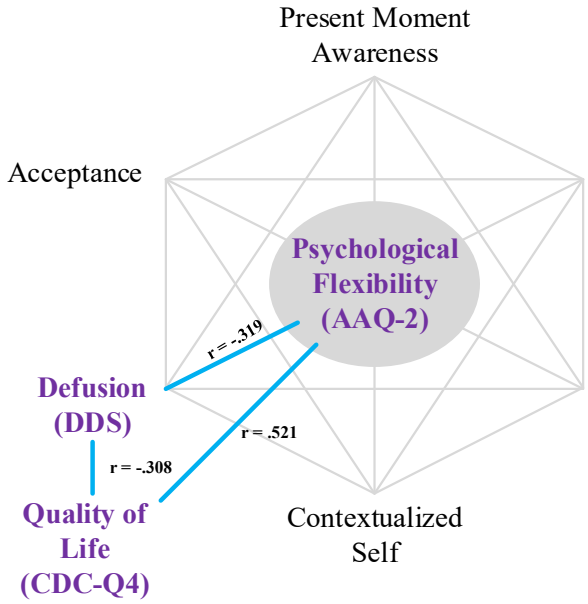
Calculating the bivariate correlations for females resulted in the DDS moderately correlated with the AAQ-2 (r = -.32; N = 388) and quality of life (r= -.31; N = 392). The direction of the correlations was as predicted, as defusion increased, psychological inflexibility and the number of poor mental health days decreased. Psychological inflexibility and quality of life correlated more strongly with each other (r = .521; N = 369) than with either measure with defusion. Table 14 presents the correlations from the analysis of Phase 1, 2, and 3 considering only females in the calculation. Figure 9 presents the results as applied to the hexaflex model.

Table 14

Means, (standard deviations), and Zero-order Correlations between Defusion, Psychological Flexibility, and Quality of Life for Female Undergraduates.

Measure	1	2	3
1. Defusion (DDS)		-.319 **	-.308 **
2. Psychological Inflexibility (AAQ-2)			-.521 **
3. Quality of Life (QOL-4)			
Mean	26.74	22.39	9.33
(Standard Deviation)	(8.49)	(8.77)	(8.48)

** p < .01 (two-tailed).



Note. Hexaflex graphic © Steven C. Hayes. *Used with Permission.*

Figure 9. Results of the correlational analysis for females applied to the ACT Hexaflex.

Factor Analysis: Considering Gender

The factor structure of the DDS was analyzed with consideration to gender differences. Analysis was performed again while examining only the male subjects (N=263) from the combined data from Phase 1 and Phase 3. The sampling adequacy was deemed sufficient as the resulting KMO value of .856. Bartlett's test of sphericity was significant at the $p < .000$ level; therefore, the sample was suitable for factor analysis. An unrestricted factor analyses was conducted using principal component analysis extraction methods and a Varimax rotation. The analysis produced a two-factor solution with two eigenvalues greater than one. One factor that accounted for a significant portion of the total variance (41.2%), whereas the second factor contributed significantly less (12.0%). Both of the identified factors were moderately correlated ($r = .46$). In this analysis, unlike the prior principal component analysis, the first 3 items of the DDS ("feelings of anger", "cravings for food", "physical pain") along with item 9 ("sensation of fear") loaded onto a separate factor. The other 6 items remained on the factor that accounted for the greatest amount of variance. (see Table 15 for summary of factor loadings).

The factor analysis was repeated to examine only the female subjects (N=494) from the combined data from Phase 1 and Phase 3. The sampling adequacy was deemed sufficient as the resulting KMO value of .876. Bartlett's test of sphericity was significant at the $p < .000$ level; therefore, the sample was suitable for factor analysis. An unrestricted factor analyses was conducted using principal component analysis extraction methods and a varimax rotation. The analysis produced a two-factor solution with eigenvalues greater than one. One factor accounted for a significant portion of the total variance (39.4%), whereas the second factor contributed significantly less (11.3%). Both of the identified factors were moderately correlated ($r = .40$). Results reveal a similar pattern of the first 3 items of the DDS (e.g. "feelings of anger", "cravings

for food", "physical pain") loading onto a separate factor from the other 7 items of the DDS, with the latter accounting for the greatest amount of variance. (see Table 15 for summary of factor loading).

Table 15

Summary of DDS Factor Loadings by Gender

	males (n=263)		females (n=494)	
Item	Factor 1	Factor 2	Factor 1	Factor 2
1. Feelings of anger	.368	**.437**	.129	**.736**
2. Cravings for food	-.052	**.725**	.178	**.423**
3. Physical pain	.180	**.692**	.073	**.771**
4. Anxious thoughts	**.662**	.117	**.683**	-.025
5. Thoughts about self	**.832**	.069	**.770**	.133
6. Thoughts of hopelessness	**.816**	.156	**.786**	.120
7. Thoughts about motivation	**.728**	.245	**.732**	.268
8. Thoughts about future	**.707**	.149	**.708**	.205
9. Sensations of fear	.333	**.637**	**.537**	.183
10. Feelings of sadness	**.630**	.297	**.669**	.264

Note. Phases 1 and 3 combined (n=563)

Principal Components Analysis with the Combined DDS and AAQ-2 Items

Gillanders et al. (2014) predicted a combined factor analysis of DDS items and AAQ-2 items would result in three separate factors with the AAQ-2 items loading onto their own factor. An exploratory factor analysis was conducted with the combined ten items of the DDS and seven items of the AAQ-2 items. The analysis was performed with the combined Phase 1 and 2 sample (N=332). The sampling adequacy was deemed sufficient with a resulting KMO value of .883. Bartlett's test of sphericity was significant at the $p < .000$ level. An unrestricted factor analyses was conducted using principal component analysis extraction methods and a varimax rotation.

The analysis produced four eigenvalues greater than one; that is, a four-factor solution. One factor that accounted for a significant portion of the total variance (33.8%), and the second, third, and fourth factors accounting for considerably less (16.2%, 6.6%, and 6.0%). Results indicated all 10 AAQ items loaded onto their own factor as predicted, the factor accounting for the greatest proportion of variance. The DDS loaded onto three other factors. Factor 2 contained DDS items 4-8 and 10, factor 3 contained DDS items 1 and 3, and factor 4 contained DDS items 2 and 9. (see Table 16 for summary of factor loading).

Table 16

Summary of Combined DDS/AAQ Factor Loadings

	Phases 1 and 3 combined			
Item	Factor 1	Factor 2	Factor 3	Factor 4
DDS 1. Feelings of anger	.029	.242	**.787**	-.123
DDS 2. Cravings for food	-.010	.102	.027	**.699**
DDS 3. Physical pain	-.056	.130	**.730**	.358
DDS 4. Anxious thoughts	-.084	**.605**	-.123	.370
DDS 5. Thoughts about self	-.165	**.773**	.019	.139
DDS 6. Thoughts of hopelessness	-.215	**.800**	.160	.018
DDS 7. Thoughts about motivation	-.142	**.747**	.209	.069
DDS 8. Thoughts about future	-.153	**.732**	.101	.032
DDS 9. Sensations of fear	-.010	.395	.191	**.508**
DDS 10. Feelings of sadness	-.179	**.683**	.147	.068
AAQ 1. Painful experiences	**.740**	-.178	-.104	.287
AAQ 2. Afraid of feelings	**.735**	-.145	.129	.022
AAQ 3. Worry of controlling feelings	**.813**	-.181	.099	-.083
AAQ 4. Painful memories	**.784**	-.164	-.141	.230
AAQ 5. Problematic emotions	**.824**	-.087	-.034	-.066
AAQ 6. Living by comparison	**.785**	-.154	.026	-.179
AAQ 7. Worrying is a barrier	**.764**	-.141	-.126	-.202

Note. Phase 1 and 3 combined, n=332

DISCUSSION

Results from this study add some further evidence in support of the DDS as a potential measure of one of the core processes of ACT. As predicted, the DDS is modestly associated with quality of life and psychological flexibility, while psychological flexibility was more strongly associated with quality of life. This is further supported by the results of a regression analysis revealing that defusion did not serve as a unique predictor of quality of life 30 days later when the impact of initial quality of life and psychological flexibility were also included in the model. Psychological flexibility did uniquely predict quality of life although not as strongly as initial quality of life today predicted quality of life in the future. Considering the theory behind ACT as a whole, increased psychological flexibility is the antithesis of psychopathology and change occurs through moving the six interrelated processes of the hexaflex, of which defusion is one. It would be expected that any variation attributed to defusion on its own would be subsumed by a measure of psychological flexibility. As such, it is not a surprise to observe that defusion on its own did not predict quality of life, as it is just one component of the larger construct that is argued to predict change in quality of life.

The verbal reports of the participants about how they would respond to the circumstances described in the DDS were not particularly stable by psychometric standards. These findings have implications for the use of the DDS as a repeated measure in research or clinical work. If a significant amount of change occurs with the passage of time it becomes more challenging in group designs to find effects as error terms may be larger. Similarly, in single case designs it becomes hard to attribute change to treatment in the face of potentially unstable baseline data. Consider the difference in calculating the reliable change index if one uses test-retest correlations as the measure of reliability versus Cronbach's alpha. In the former, the RCI is 15.09 (based on

a SD = 8.85) compared to 10.09 if Cronbach's alpha was used. The interpretation of clinical effects could, obviously, vary greatly.

Evidence from the factor analysis replicated and extended the original work by Forman and colleagues (2012) by exploring not just the overall sample, but also the effects of item-order and gender. The resulting structure of the DDS items is consistent with the initial analysis by Forman et al. with the DDS possessing two moderately correlated factors with items one through three loading onto a separate factor from the remainder of the items. Changing the item-order did not appear to produce order effects as results reflected a change consistent with the original order. Specifically, the first 3 items of the original order clustered into their own factor and the remainder grouped together as they did originally, but in the order reflected by the change.

While the factor structures found in the current study generally align with predictions from Forman et al. (2012) one area of inconsistency did occur when examining the effect of gender. Among men the outcome resulted in item 9 ("Sensations of fear") moved to the opposing factor with items one through three. Interestingly, item 9 had the weakest item-total correlation suggesting this item might have less insight into the process of defusion at least as measured by the DDS. The contribution of item 9 to the DDS would be an area in need of further investigation.

One of the extensions of this study examined the hypothesis by Gillanders et al. (2014) that entering the items of the DDS along with the AAQ-2 into an exploratory factor analysis would result in a three-factor solution with all of the items of the AAQ-2 loading onto their own factor. While evidence from this study confirms the prediction- the AAQ-2 did in fact sort onto its own factor, but the result was not three factors, but four. The fourth factor was made up of item 9 ("Sensations of fear") along with item 2 ("Cravings for food"). Evidence suggests there is

something unique about item 9. Interestingly, Forman et al., (2012) had similar findings with item 9, specifically, when a clinical sample was employed item 9 changed factors, a result that was not discussed in the publication. In considering the movement of item 9 across factors, it is interesting to examine the characteristics of the items that tended to factor together in general (i.e., items 1-3 and 4-8 and 10). What is interesting about the wording of questions 1-3 and 9 is that they ask about the ability to defuse in a very specific situation provided in the question (e.g., someone takes your place in a long line, you see your favorite food, you bang your knee on a table, you are about to present to a large group). Questions 4-8 and 10 on the other hand are much more general, there is less situation-specificity in the item. For instance, being stuck in a difficulty situation, having a thought such as "no one likes me", "I can't do this", and "I'll never make it". Thus, it is possible that the observed factor structure is a result of the wording of the question. Questions about one's capacity to defuse in general, especially to thoughts (see items 4-8), appeared to factor uniquely from queries requiring context specific responding.

The data examining the stability of the DDS suggests a tenuous conclusion. That is, the test-retest result was modest (r = .62), suggesting the measure is variable over time, in this case across 30 days.

Another issue for further investigation involves the nature of the DDS. While in comparison to other measures of fusion/defusion, one candidate measure is the Cognitive Fusion Questionnaire (CFQ). Recent research by Naragon-Gainey and DeMarree (2017) showed a relatively small correlation between the DDS and the CFQ (r = .20; N = 351) in a normative sample with a moderate correlation when administered to a clinical population (r = .48; N = 211). These measures while putatively looking at the same response tendencies were only weakly linked. The authors conducted an exploratory factor analysis that demonstrated the DDS

as factoring differently from the CFQ and the CFQ factoring separately from the AAQ-2. If both of these instruments are argued to measure defusion while the factor structure diverges, then the question remains as to what is being measured. One explanation offered by Naragon-Gainey and DeMarre is the CFQ asks about the struggle and emotional response to thoughts while the DDS inquires about the ability to take a more distanced perspective. It does appear as though the CFQ asks more about global difficulties struggling with thoughts and the DDS more domain specific responding, which may account for lower correlations. Future research should be geared toward exploring the nature of the DDS along with gathering additional convergent and divergent evidence for the ACT processes to determine boundaries of the constructs being measured.

The limitations of this study include the absence of additional measures of related ACT processes. Defusion is one of six processes and future replications should continue to explore the boundaries and overlap of this particular process with the other five as well as the overall construct of psychological flexibility. A second limitation is the lack of a clinical sample to discern the effects of pathology, especially the effects of fear and eating concerns. The DDS may behave differently at varying levels of dysfunction and knowing where the sensitives are may improve our understanding of the process. The generalizability of the measure should also be explored. While this sample captured enough demographic data to conduct analysis based on gender, there were insufficient numbers to be able to examine differences amongst racial, ethnic, and socioeconomic backgrounds. Furthermore, the sample used undergraduate students primarily around the age of 20 and consideration of the effects across the lifespan requires further examination.

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APPENDIX A

Consent Document

Western Michigan University
Department of Psychology
Consent Document
Further Validation of the Drexel Defusion Scale

Principal Investigator: Scott Gaynor, Ph.D.
Student Investigator: Christopher A. Briggs, M.A.
Student Investigator: Taylor Weststrate, B.S.

Anonymous Survey Consent

You are invited to participate in a research project entitled "***Further Validation of the Drexel Defusion Scale".*** The purpose of this study is to collect data in support of modern psychological assessment tools. Scott Gaynor, Christopher A. Briggs, and Taylor Weststrate from the Department of Psychology at Western Michigan University are conducting the study as part of Christopher A. Briggs' dissertation research project.

This study involves answering 30 questions and will take approximately 15 minutes to complete. Your replies will be anonymous, so **do not put your name anywhere on the form**. You will be asked to provide an anonymous code for keeping your documents together. Directions for this code are included in the packet and will have almost no chance of anyone (including the researchers) being able to associate your answers with you. The purpose of the code is to maintain confidentiality and to allow the researchers to associate your answers together. You may choose not to answer any question and simply leave it blank. **If you choose not to participate in this study, please return the blank unopened packet**. *Returning the completed packet indicates your consent for use of the answers you supply.*

One of your course instructors may offer extra credit for participation in research. To receive extra credit, there will be a slip included inside the packet indicating participation. This slip can be exchanged for an extra credit voucher from a research assistant when the packets are collected. You must turn your extra credit voucher into your professor to receive the extra-credit. *Note: The extra credit may be used for a different instructor offering extra credit.*

If you choose not to participate in the study. **Do not open the packet!** On the reverse side of this document is a challenging puzzle for you to complete, or you may sit quietly for the 15 minutes while the study is being conducted. *There will be no extra credit offered for crossword puzzle completion.*

If you have any questions, you may contact Dr. Scott Gaynor at (269) 387-4482 or scott.gaynor@wmich.edu or the student investigator, Christopher A. Briggs at (269) 358-8772 or christopher.a.briggs@wmich.edu, the Chair, Human Subjects Institutional Review Board at (269) 387-8293 or the Vice President for Research at (269) 387-8298.

This consent document has been approved for use for one year by the Human Subjects Institutional Review Board as indicated by the stamped date and signature of the board chair in the upper right corner. You should not participate in this project if the stamped date is more than one year old.

APPENDIX B

Demographic Questionnaire

Participant #_____ Session: _____

Demographic Questionnaire

1. What is your age? _____

2. What is your gender? Male Female

3. What is your race?

   _____ White, Euro-American _____ Asian

   _____ African American _____ American Indian or Alaska Native

   _____ Native Hawaiian or Other Pacific Islander _____ Multi-Racial

4. What is your ethnicity? _____ Hispanic or Latino _____ Not Hispanic or Latino

5. Are you a student? Yes No

   If yes, what is your current year in school? Fresh Soph Junior Senior Graduate
   Are you a full-time student? Yes No

   What is your current major? _____

   What is your cumulative GPA? _____

   What was your semester GPA in your most recently completed semester? _____

6. Are you employed? Yes : Full Time _____ Part Time _____ No _____

7. Are you *currently* in treatment for emotional/behavioral/mental health concerns? Yes No
   If yes, what is the focus of treatment? _____

8. Do you have a *history* of mental health treatment? Yes No
   If yes, what is the focus of treatment? _____

9. Are you *currently* taking medication for emotional/behavioral/mental health concerns? Yes No

   If yes, please indicate the medication, does, and length of use for each medication:

   Med: _____ Dose: _____ Length of use: _____

10. Do you have a *history* of taking medication for emotional/behavioral/mental health concerns? Yes No

    If yes, please indicate the medication, dose, and length of use for each medication:

    Med: _____ Dose: _____ Length of use: _____

11. Do you use alcohol? Yes (No. of drinks per week? _____) No

12. Do you have a history of treatment for alcohol/substance abuse? Yes No

APPENDIX C

Health Related Quality of Life - Question 4

Health Related Quality of Life

Thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?

_____

Health-Related Quality of Life (HRQOL-4)

The standard 4-item set of Healthy Days core questions (CDC HRQOL– 4) has been in the State-based Behavioral Risk Factor Surveillance System (BRFSS) since 1993 (see BRFSS Website). Since 2000, the CDC HRQOL– 4 has been in the National Health and Nutrition Examination Survey (NHANES) for persons aged 12 and older. Since 2003, the CDC HRQOL– 4 has been in the Medicare Health Outcome Survey (HOS)—a NCQA HEDIS measure. Standard Activity Limitation and Healthy Days Symptoms modules have also been available since January 1995. When used together, these measures comprise the full CDC HRQOL–14 Measure. See the Health Related Quality of Life Measures in Spanish.

APPENDIX D

Drexel Defusion Scale

Drexel defusion scale (DDS)

Defusion is a term used by psychologists to describe a state of achieving distance from internal experiences such as thoughts and feelings. Suppose you put your hands over your face and someone asks you, "What do hands look like?" You might answer, "They are all dark." If you held your hands out a few inches away, you might add, "they have fingers and lines in them." In a similar way, getting some distance from your thoughts allows you to see them for what they are. The point is to notice the process of thinking as it happens rather than only noticing the results of that process, in other words, your thoughts. When you think a thought, it "colors" your world. When you see a thought from a distance, you can still see how it "colors" your world (you understand what it means), but you also see that you are doing the "coloring." It would be as if you always wore yellow sunglasses and forgot you were wearing them. Defusion is like taking off your glasses and holding them several inches away from your face; then you can see how they make the world appear to be yellow instead of only seeing the yellow world.

Similarly, when you are defused from an emotion you can see yourself having the emotion, rather than simply being in it. When you are defused from a craving or a sensation of pain, you do not just experience the craving or pain, you see yourself having them. Defusion allows you to see thoughts, feelings, cravings, and pain as simply processes taking place in your brain. The more defused you are from thoughts or feelings, the less automatically you act on them.

For example, you may do something embarrassing and have the thought "I'm such an idiot." If you are able to defuse from this thought, you will be able to see it as just a thought. In other words you can see that the thought is something in your mind that may or may not be true. If you are not able to defuse, you would take the thought as literally true, and your feelings and actions would automatically be impacted by the thoughts.

	Based on the definition of *defusion* above, please rate each scenario according to the extent to which you would normally be in a state of *defusion* in the specified situation. You may want to read through all the examples before beginning to respond to the questions. (Important: you are not being asked about the degree to which you would think certain thoughts or feel a certain way, but the degree to which you would *defuse* if you did.)	(0) Not at all	(1) A little	(2) Somewhat	(3) Moderately	(4) Quite a lot	(5) Very much
1	**Feelings of anger.** You become angry when someone takes your place in a long line. To what extent would you normally be able to *defuse* from feelings of anger?	☐	☐	☐	☐	☐	☐
2	**Cravings for food.** You see your favorite food and have the urge to eat it. To what extent would you normally be able to *defuse* from cravings for food?	☐	☐	☐	☐	☐	☐
3	**Physical pain.** Imagine that you bang your knee on a table leg. To what extent would you normally be able to *defuse* from physical pain?	☐	☐	☐	☐	☐	☐
4	**Anxious thoughts.** Things have not been going well at school or at your job, and work just keeps piling up. To what extent would you normally be able to *defuse* from anxious thoughts like "I'll never get this done."?	☐	☐	☐	☐	☐	☐
5	**Thoughts of self.** Imagine you are having a thought such as "no one likes me." To what extent would you normally be able to *defuse* from negative thoughts about yourself?	☐	☐	☐	☐	☐	☐
6	**Thoughts of hopelessness.** You are feeling sad and stuck in a difficult situation that has no obvious end in sight. You experience thoughts such as "Things will never get any better." To what extent would you normally be able to *defuse* from thoughts of hopelessness?	☐	☐	☐	☐	☐	☐
7	**Thoughts about motivation or ability.** Imagine you are having a thought such as "I can't do this" or "I just can't get started." To what extent would you normally be able to *defuse* from thoughts about motivation or ability?	☐	☐	☐	☐	☐	☐
8	**Thoughts about your future.** Imagine you are having thoughts like, "I'll never make it" or "I have no future." To what extent would you normally be able to *defuse* from thoughts about your future?	☐	☐	☐	☐	☐	☐
9	**Sensations of fear.** You are about to give a presentation to a large group. As you sit waiting your turn, you start to notice your heart racing, butterflies in your stomach, and your hands trembling. To what extent would you normally be able to *defuse* from sensations of fear?	☐	☐	☐	☐	☐	☐
10	**Feelings of sadness.** Imagine that you lose out on something you really wanted. You have feelings of sadness. To what extent would you normally be able to *defuse* from feelings of sadness?	☐	☐	☐	☐	☐	☐

APPENDIX E

Acceptance and Action Questionnaire - II

AAQ-II

Below you will find a list of statements. Please rate how true each statement is for you by circling a number next to it. Use the scale below to make your choice.

1	2	3	4	5	6	7
never true	**very seldom true**	**seldom true**	**sometimes true**	**frequently true**	**almost always true**	**always true**

1. My painful experiences and memories make it difficult for me to live a life that I would value.	1	2	3	4	5	6	7
2. I'm afraid of my feelings.	1	2	3	4	5	6	7
3. I worry about not being able to control my worries and feelings.	1	2	3	4	5	6	7
4. My painful memories prevent me from having a fulfilling life.	1	2	3	4	5	6	7
5. Emotions cause problems in my life.	1	2	3	4	5	6	7
6. It seems like most people are handling their lives better than I am.	1	2	3	4	5	6	7
7. Worries get in the way of my success.	1	2	3	4	5	6	7

This is a one-factor measure of psychological inflexibility, or experiential avoidance. Score the scale by summing the seven items. Higher scores equal greater levels of psychological inflexibility.

APPENDIX F

Anonymity Code Sheet

Anonymity Code Sheet

All of your response to the study related questionnaires will be anonymous. Your data will only be identified by a 5-digit alphanumeric code that you create by answering the 5 questions below. Please put the answer to each question in the column to the right of the question and then on the last line of the grid sequence the responses from top to bottom (1-5) to establish your code. The top grid provides an example and the bottom grid is to be used by you to determine your code.

Here is an example code for John Smith, son of Mary Jones, who was born Dec 10th and lives at 1903 W. Michigan Ave.

Question	**Code**
1) Last letter of your current last name?	H
2) First letter of your mother's maiden name?	J
3) First letter of the month you were born?	D
4) "M" if male; "F" if female	M
5) First number of your current address?	1
FINAL CODE =	**HJDM1**

Here is a grid for you to determine your code

Question	**Code**
1) Last letter of your current last name?	
2) First letter of your mother's maiden name?	
3) First letter of the month you were born?	
4) "M" if male; "F" if female	
5) First number of your current address?	
FINAL CODE =	

Please use this 5-digit alphanumeric code on all of your questionnaire forms.

APPENDIX G

Extra Credit Slip

Extra Credit Slip

I broke the seal and completed the DDS study!

Thank you for your participation!

APPENDIX H

Extra Credit Voucher

Record of Research Participation
Further Validation of the Drexel Defusion Scale

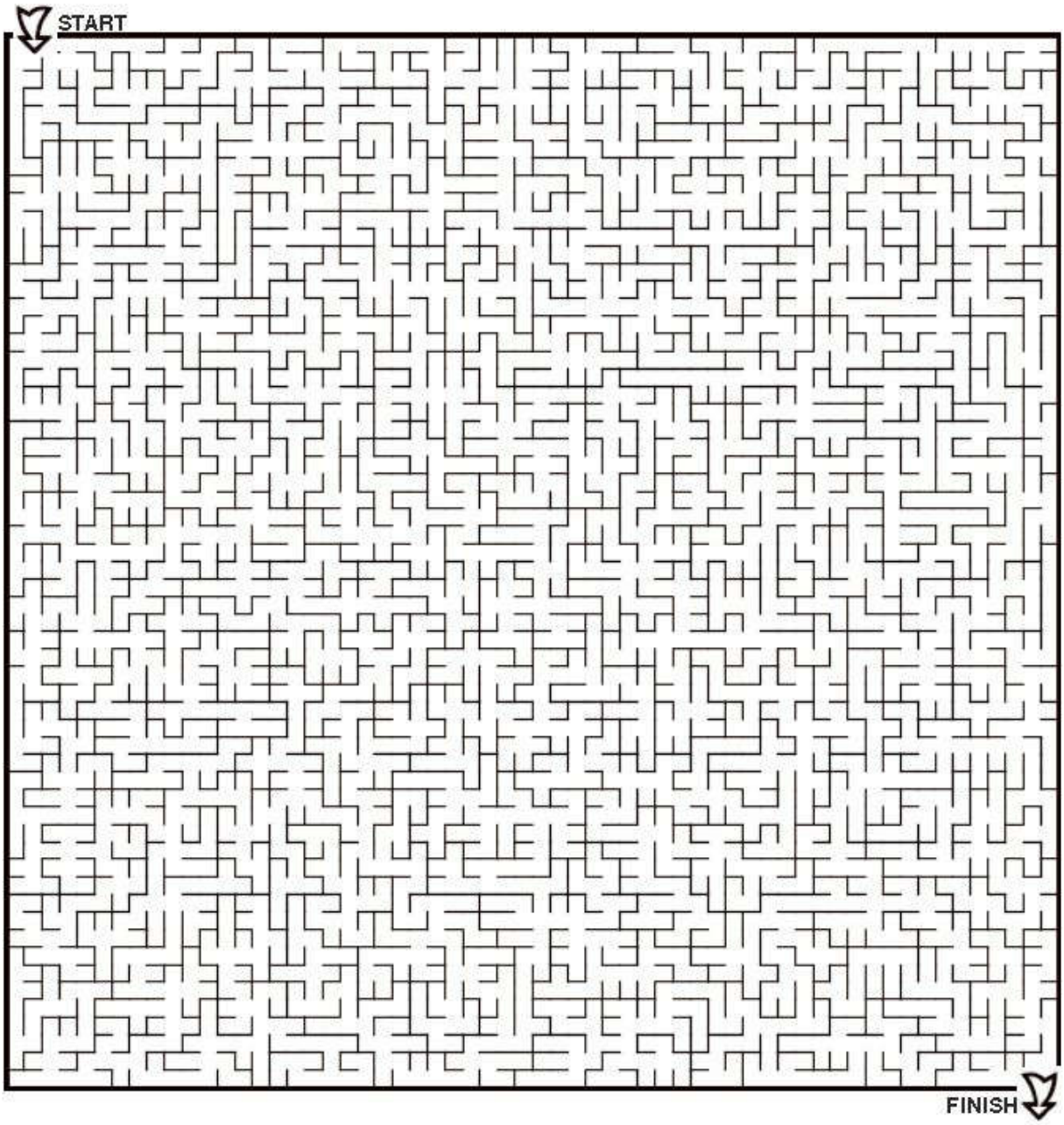
_____ has completed 30 minute of research participation on _____
(Print Name)

_____ _____
Research Investigator Date

To earn extra credit in participating classes, please submit this form to the instructor for that course.

APPENDIX I

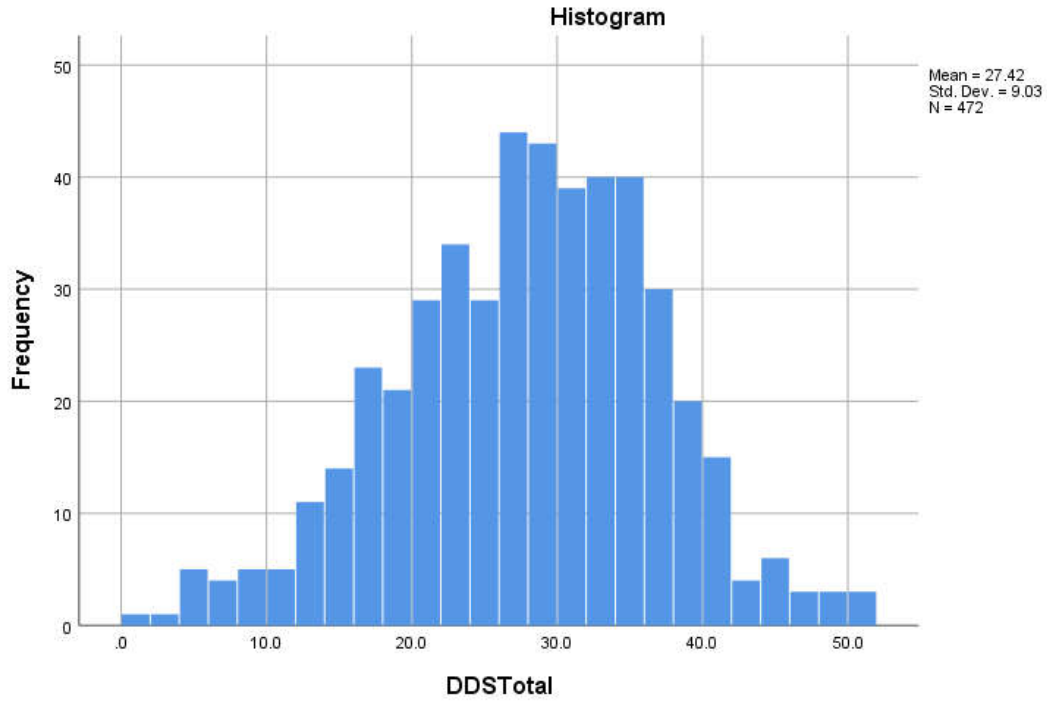
Puzzle


START
FINISH

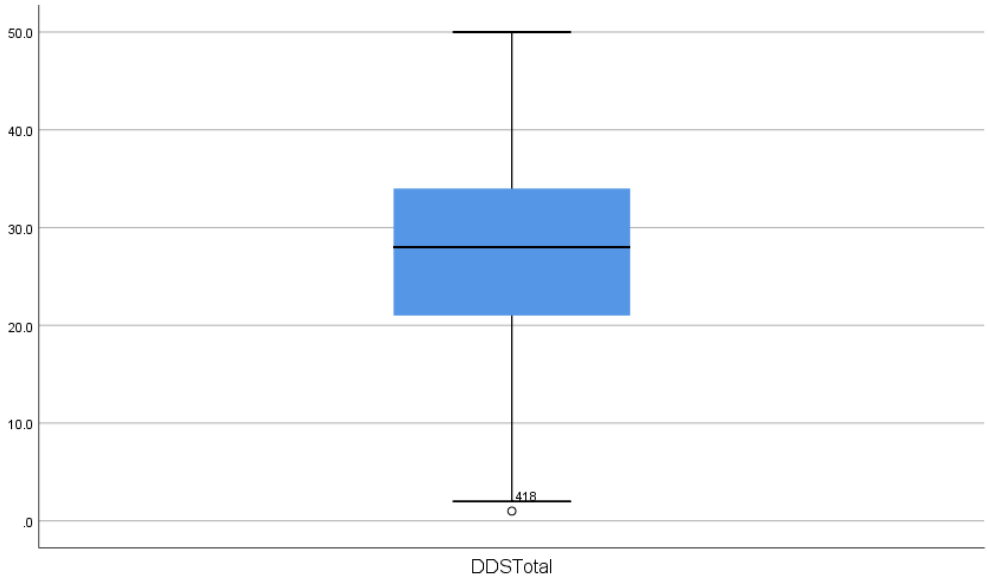
APPENDIX J

Histogram and Box-and-Whisker Plot for Phase 1 and 3

Histogram of DDS data (Phase 1 and 3)



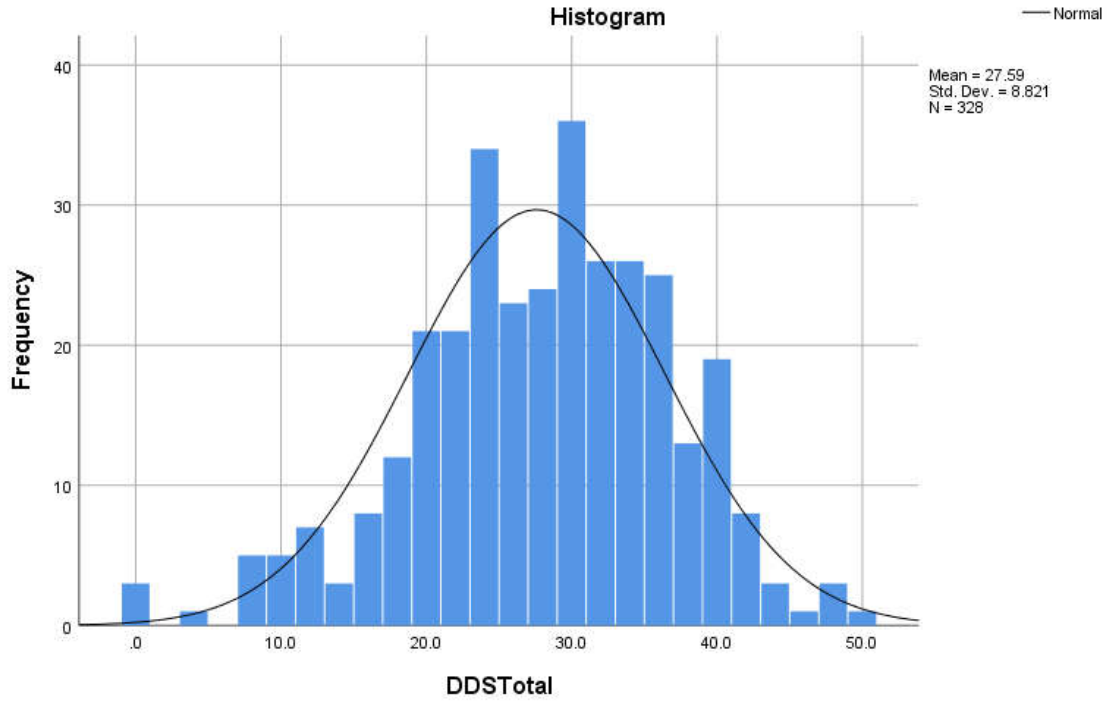
Box-and-whisker Plot of DDS data (Phase 1 and 3)



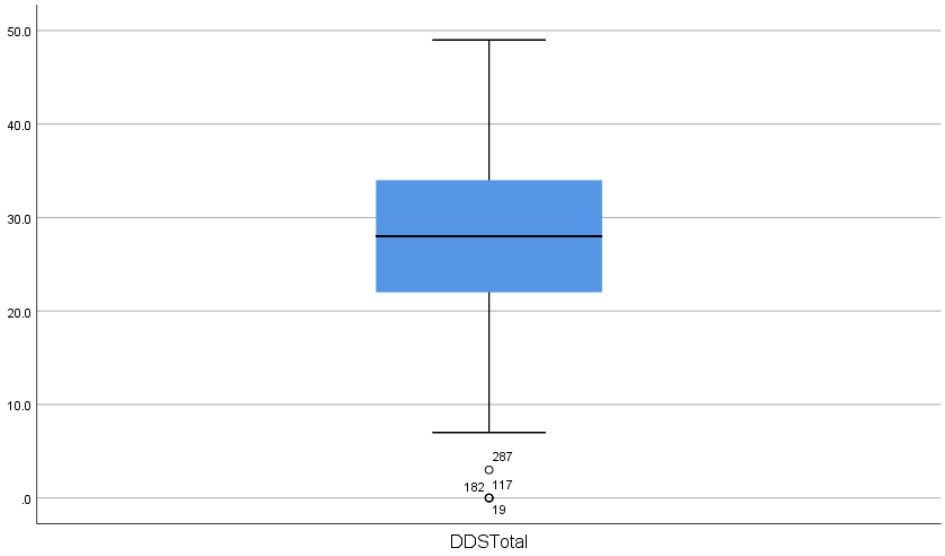
APPENDIX K

Histogram and Box-and-Whisker Plot for Phase 2

Histogram of DDS data (Phase 2)



Box-and-whisker Plot of DDS data (Phase 2)



APPENDIX L

DDS Item-total Correlations

DDS Item-Total Correlations

Item	DDS Total
1. Feelings of anger	.493**
2. Cravings for food	.378**
3. Physical pain	.491**
4. Anxious thoughts	.633**
5. Thoughts about self	.726**
6. Thoughts of hopelessness	.749**
7. Thoughts about motivation	.729**
8. Thoughts about future	.673**
9. Sensations of fear	.601**
10. Feelings of sadness	.683**

Note. N= 471 - 472

APPENDIX M

HSIRB Approval Letter

WESTERN MICHIGAN UNIVERSITY
Human Subjects Institutional Review Board

Date: October 26, 2015

To: Scott Gaynor, Principal Investigator
Christopher Briggs, Student Investigator
Taylor Weststrate, Student Investigator

From: Amy Naugle, Ph.D., Chair

Re: HSIRB Project Number 15-09-25

This letter will serve as confirmation that your research project titled "Further Validation of the Drexel Defusion Scale" has been **approved** under the **exempt** category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note: This research may **only** be conducted exactly in the form it was approved. You must seek specific board approval for any changes in this project (e.g., ***you must request a post approval change to enroll subjects beyond the number stated in your application under "Number of subjects you want to complete the study***)." Failure to obtain approval for changes will result in a protocol deviation. In addition, if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

Reapproval of the project is required if it extends beyond the termination date stated below.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: **October 25, 2016**

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