Patterns of relational responding and a healthy self in older adolescents

Abstract

Evidence from Contextual Behavioral Science indicates that two patterns of relating facilitate a sense of self, namely, self-as-distinction and self-as-hierarchy. Although the latter has been associated with better mental health outcomes relative to self-as-distinction, to date these types of relating have not been examined directly at a baseline level, wherein manipulation has not occurred. The present study examined the relative contribution of self-as-distinction and self-as-hierarchy on depression, stress, and anxiety in a sample of 102 young people, while controlling for deictic ability and gender. The role of psychological flexibility was also examined using mediation analysis. While self-as-hierarchy emerged as a significant predictor of lower levels of stress and depression, psychological flexibility was not found to mediate this relationship. Self-as-distinction did not emerge as a significant predictor of any outcome variable. Suggestions for future research on the basis of these findings are discussed.

Keywords: Self; Mental Health; Deictic Relating; Contextual Behavioral Science

Introduction

Contextual Behavioral Science Account of Self

Across the psychological literature, the concept of "self" or having a sense of self has been widely regarded as playing a key role in overall mental health and psychological functioning (Dymond & Barnes, 1997; Marshall et al., 2015; Rogers, 1961). Despite the widespread attention and importance psychological research places on the self, self theories across different schools of psychology have been criticized for being imprecise and lacking in consistency (Blyth & Monroe Traeger, 1983; Stewart, Villatte, & McHugh, 2012; Yu, Norton, Harrison, & McCracken, 2015). Contextual Behavioral Science (CBS) and it's underlying scientific theory, Relational Frame Theory (RFT), offer an account of complex human behaviors, such as having a sense of self, that offers the opportunity to investigate the self in a coherent way and identifies units that are empirically testable.

According to Relational Frame Theory (Hayes, Barnes-Holmes, & Roche, 2001) humans can relate stimuli in the environment arbitrarily based on context and this relational activity can change the psychological functions of those stimuli. This relational activity can involve a number of patterns such as, same as, distinct to, more than, less than, etc. From this perspective the capacity to relate stimuli based on context underlies the formation of a sense of self. Two critical patterns of relating in this regard are deictic relational framing, which is a type of relating wherein one discriminates ones perspective interpersonally (I-YOU), spatially (HERE-THERE), and temporally (NOW-THEN) (Barnes-Holmes, Hayes, & Dymond, 2001; McHugh, Barnes-Holmes, & Barnes-Holmes, 2004) and hierarchical relational responding. Hierarchical relational responding involves responding in accordance with contextual cues such as 'contains/is an attribute of/ is a member of/ part of, or belongs to'.

Recently, investigations have taken place examining the clinical utility of targeting different patterns of relating (or relational framing) in psychological interventions (Foody, Barnes-Holmes, Barnes-Holmes, & Luciano, 2013; Foody, Barnes-Holmes, Barnes-Holmes, Rai, & Luciano, 2015; Gil-Luciano, Ruiz, Valdivia-Salas, & Suárez, 2017; Lopez-Lopez & Luciano, 2017; Luciano et al., 2011). Two types of self interventions which involve altering deictic relational responding have been examined. The first involves altering deictic relations via frames of distinction in order to facilitate noticing that oneself is HERE-NOW while psychological experiences such as thoughts and feelings, is separate to, or in a frame of distinction with oneself, THERE-THEN. This will be referred to as self-as-distinction in the present study.

The second type of self intervention involves altering deictic relations via frames of hierarchy, which teach one to notice that the self is HERE-NOW while one's psychological content is contained within the self, in a frame of hierarchy with the self, THERE-THEN. This will be referred to as self-as-hierarchy.

Over the past few years five separate empirical investigations examined the differential outcomes of brief self-as-distinction versus self-as-hierarchy interventions on distress and psychological flexibility (Foody et al., 2013; Foody et al., 2015; Gil-Luciano et al., 2017; Lopez-Lopez & Luciano, 2017; Luciano et al., 2011). Consistently across all investigations, self-as-hierarchy outperformed self-as-distinction with more desirable outcomes for the former condition in terms of distress and psychological flexibility. Gil-Luciano et al. (2017) and Lopez-Lopez and Luciano (2017) suggested that these positive outcomes for self-as-hierarchy were due to an increase in levels of psychological flexibility.

While the investigations described above have involved influence of behavior as a result of experimental manipulation, it is equally important to identify and

measure variables without manipulation, in order to produce change in meaningful ways.

Despite these studies implicating deictic relational responding in these two patterns of self-relating, none of these investigations measured or controlled for deictic ability. Therefore, it is important that the relationship between deictics and these two types of self relating is further examined, in particular whether or not deficits in deictic relational responding lead to issues around these types of relating.

One critical limitation of previous investigations in the area of self-as-hierarchy and self-as-distinction is that they did not directly measure these distinct patterns of behavior. A measure of the CBS conceptualization of the self has recently become available, which allows the measurement of these self-related processes (Yu, McCracken, & Norton, 2016).

The present study

The present study aims to examine both self-as-distinction and self-as-hierarchy in relation to distress in young people using the Self Experiences Questionnaire (SEQ). As findings by Gil-Luciano et al. (2017) and Lopez-Lopez and Luciano (2017) implied that positive outcomes associated with a self-as-hierarchy intervention were the result of increased psychological flexibility a mediation analysis will be carried out examining the relationship between any significant predictor variables and outcome variables. Outcome variables of interest in the present study include depression, anxiety, and stress. Gender and deictic ability will be controlled for.

It is predicted that self-as-hierarchy will be related to lower depression, anxiety, stress and experiential avoidance, as well as higher deictic ability. It is also predicted that while the same trend will emerge for self-as-distinction, this will be

considerably weaker than for self-as-hierarchy. Finally, it is predicted that self-as-hierarchy will be the strongest predictor of depression, anxiety, and stress, and that psychological flexibility will significantly mediate the relationship between self-as-hierarchy and distress.

Method

Ethics

Ethical approval for this study was granted by the authors' host university. Participants between the ages of 18 and 25 years were recruited anonymously using the online recruitment tool Mechanical Turk. Participants were compensated a small fee for their time. Due to the sensitive nature of measures (i.e. questions relating to mental health), participants were provided with contact details of support services, and were reminded of the voluntary nature of the research and their right to withdraw at any time.

Design & Sample

This study used a quantitative, cross-sectional design and was completed online using **www.Qualtrics.com** (Qualtrics Labs Inc., 2009). The study sample consisted of 102 older adolescents ranging in age from 18-25 years old (*M*=21.04*; SD*=2.33; 51 males). Mechanical Turk randomly recruits participants from around the world; therefore participants were asked if they spoke English as a first language. Sixteen participants reported not being native English speakers.

Measures

Predictor Variables

The Self Experiences Questionnaire (SEQ; Yu et al., 2016) is 15-item measure of a "contextual self" as defined by CBS, or self-as-context. The scale is made up of 2 subscales, one measuring Self-as-Distinction (SEQ-Dist; *"I am able to separate*

myself from my thoughts and feelings"), and the other measuring Self-as-Hierarchy (SEQ-Hier; *"I can observe experiences in my body and mind as events that come and go"*). Items are answered on a 7-point Likert ranging from *"Never True"* to *"Always True"* with higher scores indicating higher levels of each. The SEQ has only been used in populations with chronic pain to date, however it has been found to have good reliability and internal consistency (Yu et al., 2016; Yu, Norton, & McCracken, 2017). The two subscales contained in this SEQ were used separately to measure self-as-distinction and self-as-hierarchy, reliabilities for these scales were α=.835 and α=.829 , respectively,

RFT Perspective-Taking Protocol (RFT PT; McHugh et al., 2004) is a 25-item behavioral measure of deictic relating. It assesses deictic ability by measuring transformation of stimulus functions across varying types of deictic relational frame. This study uses a briefer version of the original 62-item, with simple trials removed due to the ceiling effects observed in older populations (Vilardaga, Estévez, Levin, & Hayes, 2012). The protocols contains 3 types of reversal: interpersonal, spatial, and temporal, as well as two types of double-reversal: interpersonal-spatial, and spatial-temporal. Five of each of these types of trials were used, including one foil for each to gauge participant attention levels. Higher accuracy on trials (as measured by a lower number of errors) indicates higher deictic ability. This task has been used reliably across a range of populations and age-groups (Montoya-Rodríguez, Molina, & McHugh, 2016).

Mediator Variable

Avoidance and Fusion Questionnaire for Youth (AFQ-Y8; Greco, Lambert, &

Baer, 2008) is an eight item self-report measure of experiential avoidance or psychological inflexibility, for use with young people. Higher scores indicate higher experiential avoidance and lower flexibility. The AFQ-Y8 has been found to have good reliability with both adolescent and adult samples (Greco et al., 2008; Fergus et al., 2012). Responses are measured on an 5- point Likert scale with responses ranging from *"Not at all True"* to *"Very True."* with items such as *"I am afraid of my feelings."* Cronbach's alpha for the overall scale for the present study was .886.

Outcome Variables

The Depression Anxiety and Stress Scale-21 (DASS-21; Lovibond, S.H. & Lovibond, P.F. ,1995) is a 21 item self-report measure of depression, anxiety, and stress. It is made up of three 7-item subscales measuring depression, anxiety, and stress, which can be summed for an overall measure of distress. Items for depression include "*I found it difficult to work up the initiative to do things*", Items for anxiety include "*I felt scared without any good reason.*" and items for stress include "*I felt that I was using a lot of nervous energy.*" Responses are answered on an 4 point Likert scale with responses ranging from *"Did not apply to me at all"* to *"Applied to me very much"* and higher scores are indicative of higher levels of each of the above. The DASS-21 has acceptable to excellent reliability levels with clinical and non-clinical samples (Antony, Bieling, Cox, Enns, & Swinson, 1998; Sinclair et al., 2012). Cronbach's alpha for depression, anxiety, and stress subscales for the present study were .884, .839, and .829.

Data Analysis

Pearson's Product Moment correlations were used to investigate the relationship between study variables and hierarchical multiple regressions were used

to examine the ability of each pattern of self-discrimination in predicting stress, depression, and anxiety. According to RFT, deictic relational responding is critical to self behavior with deictic relating underlying both self-as-distinction and self-as-hierarchy. On this basis, deictic ability will be examined in the present study. Although deictic ability is generally fully developed by eighteen years old (McHugh et al., 2004), it is important to control for any potential impact of deficits in deictic relational responding.

As studies with young people have shown gender differences in terms of self-relating Crocetti et al., 2016; Gestsdottir et al., 2015), perspective-taking (Eisenberg, Cumberland, Guthrie, Murphy, & Shepard, 2005; Van der Graaff et al., 2014), and distress (Aslund, Starrin, & Nilsson, 2010; Gestsdottir et al., 2015), gender will be controlled for in the present study.

Hierarchical multiple regressions examined the differential effect of each predictor after controlling for each other, thereby, evaluating the relative impact of each. In the first block of each regression model, participant gender was entered. In the second block, deictic ability was added to each of the models. Finally, in the third block of each model, either self-as-distinction, or self-as-hierarchy, was added. The ability of each of these models to predict stress, depression, and anxiety was examined, meaning six models were tested in total. A mediation analysis was carried out investigating the indirect impact of psychological flexibility on the relationship between self-as-hierarchy and mental health.

Results
Descriptive statistics

Data were entered into SPSS (Statistical Package for the Social Sciences) Version 20 file. Descriptive statistics including means, standard deviations, ranges, skewness and kurtosis values are reported in Table 1. All skewness and kurtosis values fell in the normal range (George & Mallery, 2001). Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, and homoscedasticity. All predictor variables were found to have acceptable inter-item correlation levels, ensuring no violation of multicollinearity (r=.9 or above; Pallant, 2010; tolerance= .01 or less; Brace, Kemp, & Snelgar, 2006) and no significant outliers were identified in the data based on z scores +/- 3.29 (Tabachnick & Fidell, 2007). For multiple regression, Tabachnick and Fidell (2007) suggest that the size of the sample should equal or exceed the number of predictors times 8 plus 50, which was the case for the sample in the present study (n=102).

Insert Table 1

Correlations across study variables

Insert Table 2

Correlations across study variables in full are reported in Table 2. Due to the large number of tests, the rough false discovery rate was used to control for type 1 error associated with making multiple comparisons (Benjamini & Hochberg, 1995). The *p* value is reduced by multiplying it by (n+1)/2n, where n is the number of tests being run. The rough false discovery is less conservative and has greater power than the Bonferrroni correction. Using this method, the *p* value was reduced to .0259.

Higher levels of self-as-hierarchy were related to significantly lower depression, stress and experiential avoidance. Self-as-distinction was not significantly related to any outcome variable.

Hierarchical Multiple Regressions

A series of hierarchical multiple regressions were carried out to examine the ability of self-as-hierarchy and self-as-distinction to predict depression, anxiety, and stress, while controlling for gender and deictic ability. Using the rough false discovery rate to control for type 1 error associated with making multiple comparisons, the *p* value was reduced to .0264.

Self-as-hierarchy

Insert Table 3

A full summary of hierarchical multiple regression models examining the ability of self-as-hierarchy to predict depression, anxiety and stress is presented in Table 3. Overall models were not significant for stress, $F(3, 101)= 2.640$; $p=.054$, adjusted $R^2= .046$, or depression, $F(3, 101)= 2.315$; $p= .081$, adjusted $R^2= .038$, but self-as-hierarchy emerged as a significant predictor for both accounting for 6.4% and 5.8% of variance respectively. A significant model did not emerge for anxiety, $F(3, 101)= 1.202$; $p= .313$, adjusted $R^2=.006$, with no significant predictors, and no other significant predictors or models overall.

Self-as-distinction

Insert Table 4

A full summary of hierarchical multiple regression models examining the ability of self-as-distinction to predict depression, anxiety and stress, is presented in Table 4. Self-as-distinction did not emerge as a significant predictor for depression, $F(3, 101)= 1. 597$; $p=.195$, adjusted $R^2=.017$, anxiety, $F(3, 101)= 1.087$; $p=.358$,

adjusted R^2=.003, or stress, $F(3, 101)$=1.809; p=.151, adjusted R^2=.023, with no significant predictors emerging.

Mediation Analyses

Mediation analyses were used to examine the indirect effect of experiential avoidance on the relationships between self-as-hierarchy and stress, and self-as-hierarchy and depression, respectively. Mediation analyses were conducted with the non-parametric bootstrapping procedure using the PROCESS package (Hayes, 2013). Indirect effects were deemed significant if the 95% bias-corrected bootstrap confidence intervals (CI) based on 1000 bootstrapped samples did not include zero. Results indicated that experiential avoidance did not mediate the relationship between self-as-hierarchy and stress (β= -.0842, SE= .052, 95% CI [-.2017, .0068], p >.05), or self-as-hierarchy and depression (β= -.1004, SE= .0619, 95% CI [-.2309, .0101], p >.05).

Insert Table 5

Discussion

The aims of the current study were to conduct a more fine-grained analysis into two distinct patterns of self-relating, that is, self-as-distinction and self-as-hierarchy, and to examine the relation between each of these and levels of distress at a naturally occurring baseline level in older adolescents. Correlational analysis revealed that self-as-hierarchy was significantly related to lower stress, depression, and experiential avoidance, but not anxiety. No significant relationships emerged for self-as-distinction.

Regression analyses revealed self-as-hierarchy to be a significant predictor of stress and depression but not anxiety. Self-as-distinction was not a significant predictor of any outcome variable, nor were gender or deictic ability. Finally mediation analysis revealed that psychological flexibility did not mediate the relationship between self-as-hierarchy and stress, or self-as-hierarchy and depression.

For the most part findings gave support to study predictions and results cohered with previous research. Higher self-as-context has been found to be related to lower depression (Atkins & Styles, 2016; Yu et al., 2017). Foody et al. (2013) and Foody et al. (2015) both observed reductions in stress for participants in their self-as-hierarchy condition, consistent with the results of the present study. Also consistent with the present study, little to no changes were observed on outcome measures of stress for the self-as-distinction conditions.

Moran, Almada, and McHugh (2018) found that a model of the three self discriminations identified by CBS (self-as-content, self-as-process, and self-as-context) was significantly predictive of lower levels of mental health concerns in adolescents, and Yu et al. (2017) that higher levels of self-as-context were associated with lower depression and overall improved functioning in a sample of adults with chronic pain. Similarly, Atkins and Styles (2016) found that higher occurrences of an observing self (i.e. self-as-context) is predictive of lower depression long-term in excerpts of speech in a sample of 29 adults, while Styles and Atkins (2018) found that self-as-context in conjunction with values-oriented self-rules and other-as-context (i.e. when an individual is connected to another as a conscious person) was predictive of greater well being and psychological flexibility longterm, following one to one interviews with 10 adults.

Findings for anxiety in the present study however were inconsistent with previous research. Foody et al. (2013) and Foody et al. (2015) observed reductions in

anxiety for their self-as-hierarchy and self-as-distinction conditions (larger for the former), while no relationship with anxiety was observed for either in the present study. Interestingly, while both of these studies observed reductions in anxiety following self-as-distinction and self-as-hierarchy interventions, there were marginal to no differences between conditions. Both investigations by Foody et al. (2013) and Foody et al. (2015) involved a distress induction protocol in order to elevate participant distress levels prior to completing the intervention. Therefore, the findings observed by Foody et al. (2013) and Foody et al. (2015) may be the result of regression to the mean (Barnett, van der Pols, & Dobson, 2005), after anxiety scores had been previously artificially elevated. Neither of these studies had a control condition making it difficult to draw conclusions from the results.

While correlational findings showed that higher self-as-hierarchy was related to lower experiential avoidance, findings from mediation analysis indicate that self-as-hierarchy does not lead to lower stress and depression as a result of psychological flexibility. While conclusions should be drawn tentatively due to use of observational, cross-sectional, study design, this seems to suggest self-as-hierarchy alone does not lead to increased psychology flexibility. Although previously, Luciano et al. (2011), Gil-Luciano et al. (2017), and Lopez-Lopez and Luciano (2017) observed increased psychological flexibility following self-as-hierarchy training, in each case, their protocols contained additional cues targeting emotional and behavioral regulation. Likewise, while Foody et al. (2015) did observe reductions in experiential avoidance following their self-as-hierarchy training condition, this was non-significant when length of practice session was controlled for. According to RFT, psychological flexibility involves the hierarchical framing of one's ongoing behavior with the deictic "I", thereby reducing discriminative functions of ongoing behavior and

allowing derivation of rules that specify appetitive functions and thereby allowing behavior consistent with these functions (Gil-Luciano et al., 2017; Lopez-Lopez & Luciano, 2017; Luciano, Valdivia-Salas, Cabello, & Hernández, 2009; Luciano et al., 2011). Therefore, while operating in self-as-hierarchy allows for the ongoing flexible observation of one's behavior and thereby facilitates processes such as acceptance and contacting values, which may ultimately lead to increased psychological flexibility, operating in self-as-hierarchy alone does not necessarily lead to psychological flexibility as suggested by these findings. While issues around measurement must also be kept in mind (self-report measures of psychological flexibility have been previously criticized (e.g. Vaughan-Johnston, Quickert, & MacDonald (2017)), these findings seem to indicate that self-as-hierarchy operates in conjunction with other related processes for optimal outcomes, and it is important that this is investigated more extensively.

One critical issue that has presented across investigations into patterns of self-relating in the area of CBS is inconsistent middle-level terms and definitions being used to describe the same relational processes. Specifically, while the same patterns of relating have been examined across a number of investigations, different authors have used different terminology. For example, some researchers describe deictic relations operating with frames of distinction (self-as-distinction in the present study) as self-as-process (Foody et al., 2015), while other studies refer to it as a type of self-as-context (Foody et al., 2013; Atkins & Styles, 2016), and others call it defusion (Luciano et al., 2011).

Despite its solid theoretical foundations, the abstract nature of this account of self seems to create discrepancies and lack of coherence across investigations. In particular, self-as-context is considered one of the most complex concepts in CBS (Foody, Barnes-Holmes, & Barnes-Holmes, 2012; Stewart & McHugh, 2013). This lack of consistency over definitions and descriptions of middle level terms to describe

the same functional and relational processes is arguably not surprisingly. However clear, definitive, and most importantly, consistent definitions of middle levels concepts should be employed across investigations moving forward to ensure empirical investigations are theoretically coherent and consistent. This is critical to advance scientific progress at both a basic science level and a more applied clinical level.

Use of middle level terms has been widely criticized in CBS research (Barnes-Holmes, Hussey, McEnteggart, Barnes-Holmes, & Foody, 2015; Hayes, Barnes-Holmes, & Wilson, 2012). Barnes-Holmes et al. (2015) describe middle level terms as theoretically specific, non-technical terms, which have not come about as a result of basic scientific analysis. Despite the practicality and utility of middle level terms, use of a simplified, less technical account of a process can result in decreased rigor and accuracy. Research into CBS strives for a reticulated approach, wherein applied research using midlevel terms and basic science investigations involving more specific and technical terms inform one another; allowing for development and progress on both ends (Levin, Twohig, & Smith, 2015).

This study directly measured levels of the relational units underlying a sense of self according to CBS (i.e. deictic relations) using a behavioral measure; thereby testing the theoretical assumptions underlying self-as-distinction and self-as-hierarchy However, while the SEQ addressed an important limitation of previous investigations by quantitatively measuring levels of self-as-hierarchy and self-as-distinction, it is only a proxy rather than a direct, behavioral measure of frames of distinction and frames of hierarchy. Although this measure has been found to have good reliability (Yu et al., 2016; Yu et al., 2017) and provides some useful insights, it should be remembered that this is not a substitute for more direct, behavioral measures of relational processes.

Despite the importance of deictic relating for operating in self-as-context (Foody et al., 2012; McHugh, 2015), to the best of the authors' knowledge, only one unpublished doctoral thesis has previously examined the role of deictics in relation to self-as-context. Jeffcoat (2015) examined deictic ability in relation to 2 separate measures of self-as-context, using an adapted version of the Deictic Relational Task (Vilardaga et al., 2012) in a sample of 540 adults, and observed that deictic ability did not reliably relate to either self measure (or any other study measure). Authors attributed this outcome to possible ceilings effects or issues around measurement. Interestingly, and consistent with the findings of Jeffcoat (2015), deictic relating was not found to be related to any of the measures used in the present study, including self-as-context.

The lack of a relationship between deictic relating and the two patterns of self relating is surprising given the role of deictic relational responding in self-as-context according to RFT (Barnes-Holmes et al., 2001; Foody et al., 2012; McHugh, 2015), Although issues around fatigue and engagement have been said to affect performance on deictic tasks (Weil, Hayes, & Capurro, 2011) foils were used in the present study to assess participant attention levels and possible responding at random.

As all participants were over eighteen years old deictic repertoires should be fully developed for this sample (McHugh et al., 2004). Therefore it's possible that there was not enough variability in scores within the sample for a relationship to be detected. A recent review of investigations examining deictic relational responding (Montoya-Rodríguez et al., 2016) showed that this measure has been used across a variety of different types of investigations and across a range of populations. However it's possible that this protocol may require further validation for use with a typically developing adult population and testing in relation to other measures of behaviors

related to deictic relating (e.g. self-report measures of perspective-taking, implicit measures).

The lack of a relationship observed in the study between deictic relating and these self-related processes may also be the result of measurement issues related to use of the SEQ. Issues have been reported around attempting to measure an "experiencing self" in psychological research as most measures typically involve remembered abstractions of one's ongoing experience of self, rather than direct measures of one's ongoing experience in the moment (Kahneman & Riis, 2005). Moreover, as self-as-context is a viewpoint or perspective from which experience and content is observed it is technically not possible to observe or capture in a measure. This means any measure of this experience is a proxy rather than a direct measure of self-as-context itself, making self-as-context very difficult to capture in a rigorous or systematic way. Similarly, the abstract nature of these self-related processes means participants may have experienced difficulty in reporting on their experience of them. On this basis it seems critical that further investigations using a variety of different measures and different types of analyses are carried out to better explore and understand this relationship.

Limitations

The sample for the present study were recruited using online research recruitment tool, Mechanical Turk. While Mechanical Turk has been shown to provide high quality, reliable, representative data (e.g. Chandler, Mueller, & Paolacci, 2014; Peer, Samat, Brandimarte, & Acquisti, 2017; Peer, Vosgerau, & Acquisti, 2013) use of an anonymous recruitment tool meant that beyond age, gender and language, no further demographic information was gathered. This meant cultural and socio-economic factors were not accounted for.

While these findings make an important contribution to this body of research and lay the foundation for future investigations, use of a cross sectional design means that causal relations cannot be drawn and findings should be considered tentatively.

Implications

Due to the importance of self-development for young people's mental health, and the issues identified in the psychological literature around a coherent, unified theory of self (Stewart et al., 2012; Yu et al., 2016; Blyth & Monroe Traeger, 1983), continuation of this line of research is critical. Further exploration of these ideas and revision and consolidation of theory where necessary will allow for progress that is of therapeutic value and can inform the development of self based interventions for adolescent use.

While the SEQ provided a convenient means of measuring self-as-hierarchy and self-as-distinction, it must be remembered that this is a self-report measure and therefore it would be beneficial for future studies to investigate these across multiple methods of evidence analysis, including behavioural measures. Atkins and Styles (2016) measured occurrences of these two self-related processes with their behavioral measure of self-discriminations in naturally occurring speech. This measure may be used to replicate and expand upon the present study.

A number of basic science RFT investigations into the relational frames of hierarchy and distinction have also been carried out (e.g. Gil, Luciano, Ruiz, & Valdivia-Salas, 2012; Steele & Hayes, 1991). Therefore some type of analogue study to measure frames of distinction and hierarchy along with deictic frames, may be developed.

Future studies could also expand upon this by examining these type of behaviors longitudinally and investigating self relating across the lifespan as one's sense of self develops (Erikson, 1964; Rutt & Löckenhoff, 2016). Future

investigations could also attempt to experimentally manipulate levels of self-as-hierarchy and self-as-distinction and measure outcomes using multiple levels of evidence analysis, including the SEQ.

Conclusion

This investigation addressed a number of gaps identified in previous studies into self-as-distinction and self-as-hierarchy. Each type of these two self-related processes was examined without manipulation, in order words, levels were measured at a naturally occurring baseline level; unlike previous investigations where these were experimentally induced. The relational units underlying these patterns of self relating (i.e. deictic relations) were also accounted for and the role of psychological flexibility was examined. In this way, self-as-distinction and self-as-hierarchy were examined in more depth than with previous studies; adding to this body of investigations and laying the groundwork for further research.

References

Antony, M. M., Bieling, P. J., Cox, B. J., Enns, M. W., & Swinson, R. P. (1998). Psychometric properties of the 42-item and 21-item versions of the Depression Anxiety Stress Scales (DASS) in clinical groups and a community sample. *Psychological Assessment, 10,* 176–181.

Aslund, C., Starrin, B., & Nilsson, K. W. (2010). Social capital in relation to depression, musculoskeletal pain, and psychosomatic symptoms: a cross-sectional study of a large population based cohort of Swedish adolescents. *BMC Public Health, 10,* 715–25.

Atkins, P., & Styles, R. (2016). Measuring self and rules in what people say: exploring whether self-discrimination predicts long-term wellbeing. *Journal of Contextual Behavioural Science, 5,* 71-79.

Barnes-Holmes, D., Hayes, S. C., & Dymond, S. (2001). Self and Self-Directed Rules. In S. C. Hayes., D. Barnes-Holmes, & B. Roche (Eds). *Relational frame theory: A post-skinnerian account of human language and cognition.* New York, NY: Kluwer Academic/Plenum Publishers.

Barnes-Holmes, Y., Hussey, I., McEnteggart, C., Barnes-Holmes, D., & Foody, M. (2015). Scientific Ambition: The Relationship between Relational Frame Theory and Middle-Level Terms in Acceptance and Commitment Therapy. In R. D. Zettle , S. C. Hayes & D. Barnes-Holmes (Eds), *The Wiley Handbook of Contextual Behavioural Science*. Wiley.

Barnett, A. G., van der Pols, J. C., & Dobson, A. J. (2005). Regression to the mean: what it is and how to deal with it. *International Journal of Epidemiology, 34,* 215−220. DOI:10.1093/ije/dyh299

Benjamini, Y., & Hochberg, Y. (1995). Controlling the false discovery rate: a practical and powerful approach to multiple testing. *Journal of the Royal Statistical Society. Series B (Methodological), 57(1),* 289-300.

Brace, N., Kemp, R., & Snelgar, R. (2006). SPSS for Psychologists: A Guide to Data Analysis Using SPSS for Windows (versions 12 and 13). Basingstoke: Palgrave Macmillan.

Blyth, D. A., & Monroe Traeger, C. (1983). The Self-Concept and Self-Esteem of Early Adolescents. *Theory Into Practice, 22(2),* 91-97.

Chandler, J., Mueller, P., & Paolacci, G. (2014). Nonnaïveté among Amazon Mechanical Turk workers: Consequences and solutions for behavioural researchers. *Behaviour research methods, 46(1),* 112-130.

Dymond, S., & Barnes, D. (1997). Behaviour-analytic approaches to self-awareness. *The Psychological Record, 47(2),* 181.

Eisenberg, N., Cumberland, A., Guthrie, I. K., Murphy, B. C., & Shepard, S. A. (2005). Age changes in prosocial responding and moral reasoning in adolescence and early adulthood. *Journal of Research on Adolescence, 15,* 235–260. doi:10.1111/j.1532-7795.2005.00095.x

Erikson, E. H. (1964). Childhood and society. New York, NY. Norton.

Fergus, T. A., Valentiner, D. P., Gillen, M. J., Hiraoka, R., Twohig, M. P., Abramowitz, J. S., … (2012). Assessing Psychological Inflexibility: The Psychometric Properties of the Avoidance and Fusion Questionnaire for Youth in Two Adult Samples. *Psychological Assessment, 24(2),* 402-408.

Foody, M., Barnes-Holmes, Y., & Barnes-Holmes, D. (2012). The role of self in Acceptance and Commitment Therapy (ACT). In L McHugh & I Stewart (Eds.), *The self and perspective taking: Research and applications* (pp. 126-142). Oakland, CA: Hew Harbinger.

Foody, M., Barnes-Holmes, Y., Barnes-Holmes, D., & Luciano, C. (2013). An Empirical Investigation of Hierarchical versus Distinction Relations in a Self-based ACT Exercise. *International Journal of Psychology & Psychological Therapy, 13 (3),* 373-388.

Foody, M., Barnes-Holmes, Y., Barnes-Holmes, D., Rai, L., & Luciano, C. (2015). An empirical investigation of the role of self, hierarchy, and distinction in a common ACT exercise. *The Psychological Record, 65(2),* 231-243.

George, D., & Mallery, P. (2001). SPSS for windows step by step: A simple guide and reference 10.0 update (3rd ed.). Boston: Allyn & Bacon.

Gestsdottir, S., Arnarsson, A., Magnusson, K., Arngrimsson, S. A., Sveinsson, T., & Johannsson, E. (2015). Gender differences in development of mental well-being from adolescence to young adulthood: An eight-year follow-up study. *Scandinavian Journal of Public Health, 43,* 269–275.

Gil, E., Luciano, C., Ruiz, F. J., & Valdivia-Salas, S. (2012). A Preliminary Demonstration of Transformation of Functions through Hierarchical Relations. *International Journal of Psychology and Psychological Therapy, 12*, 1, 1-19.

Gil-Luciano, B., Ruiz, F. J., Valdivia-Salas, S., & Suárez, J. C. (2017). Promoting psychological flexibility on tolerance tasks: framing behaviour through deictic/hierachical relations and specifying augmental functions. *The Psychological Record, 66,* 1-9.

Greco, L. A., Lambert, W., & Baer, R. A. (2008). Psychological inflexibility in childhood and adolescence: Development and evaluation of the Avoidance and Fusion Questionnaire for Youth. *Psychological Assessment, 20(2)*, 93-102.

Hayes, A. F. (2013). Introduction to mediation, moderation, and conditional process analysis. A regression-based approach. New York: Guilford Press.

Hayes, S. C., Barnes-Holmes, D., & Wilson, K. G. (2012). Contextual behavioural science: Creating a science more adequate to the challenge of the human condition. *Journal of Contextual Behavioural Science, 1,* 1–16.

Hayes, S. C., Barnes-Holmes, D., & Roche, B. (2001). Relational frame theory: A post- skinnerian account of human language and cognition New York, NY: Kluwer Academic/Plenum Publishers.

Jeffcoat, T. (2015). Development of the Reno Inventory of Self-Perspective (RISP): Measuring Self in the ACT Model. Unpublished Doctoral Thesis, University of Reno, Nevada.

Kahneman, D. & Riis, J. (2005). Living, and thinking about it: two perspectives on life. In F. A. Huppert, N. Baylis, & B. Keverne (eds.), *The science of well-being.* Oxford University Press, pp. 285–304.

Levin, M. E., Twohig, M. P., & Smith, B. M. (2015). Contextual Behavioural Science: An Overview. In R. D. Zettle , S. C. Hayes & D. Barnes-Holmes (Eds), *The Wiley Handbook of Contextual Behavioural Science*. Wiley.

Lopez-Lopez, J. C., & Luciano, C. (2017). An Experimental Analysis of Defusion Interactions Based on Deictic and Hierarchical Framings and Their Impact on Cognitive Performance. *The Psychological Record, 67(2).* DOI 10.1007/s40732-017-0250-3

Lovibond, S. H., & Lovibond, P. F. (1995). Manual for the depression anxiety stress scales (2nd ed.). Sydney: Psychology Foundation.

Luciano, C., Ruiz, F., Vizcaíno Torres, R., Sánchez Mar-tín, V., Gutiérrez Martínez, O., & López López, J. (2011). A Relational Frame Analysis of Defusion Interactions in Acceptance and Commitment Therapy. A Preliminary and Quasi-Experimental Study with At-Risk Adolescents. *International Journal of Psychology & Psychological Therapy, 11(2),* 165-182.

Luciano, C., Valdivia-Salas, S., Cabello, F., & Hernández, M. (2009). Developing self-directed rules. In R. A. Rehfeldt & Y. Barnes- Holmes (Eds.), Derived

relational responding: Applications for learners with autism and other developmental disabilities (pp. 335–352). Oakland: New Harbinger.

Marshall, S., Parker, P., Ciarrochi, J., Sahdra, B., Jackson, C., & Heaven, P. (2015). Self-compassion protects against the negative effects of low self-esteem: A longitudinal study in a large adolescent sample. *Personality and Individual Differences, 74,* 116-121.

McHugh, L. (2015). A contextual behavioural approach to the self and perspective-taking. *Current Opinion in Psychology, 2,* 6-10.

McHugh, L., Barnes-Holmes, Y., & Barnes-Holmes, D. (2004). Perspective-taking as relational responding: A developmental profile. *The Psychological Record, 54,* 115–144.

Montoya-Rodríguez, M. M., Molina, F. J., & McHugh, L. (2016). A Review of Relational Frame Theory Research Into Deictic Relational Responding. *The Psychological Record*, 1-11. DOI:10.1007/s40732-016-0216-x

Moran, O., Almada, P., & McHugh, L. (2018). An investigation into the relationship between the three selves (Self-as-Content, Self-as-Process and Self-as-Context) and mental health in adolescents. *Journal of Contextual Behavioural Science,7,* 55-62. doi.org/10.1016/j.jcbs.2018.01.002

Pallant, J. (2010). SPSS survival manual: A step by step guide to data analysis using SPSS. McGraw-Hill International.

Peer, E., Vosgerau, J., & Acquisti, A. (2013). Reputation as a sufficient condition for data quality on Amazon Mechanical Turk. *Behaviour Research Methods, 46(4),* 1023-1031.

Peer, E., Samat, S., Brandimarte, L., & Acquisti, A. (2017). Beyond the Turk:

Alternative platforms for crowdsourcing behavioural research. *Journal of Experimental Social Psychology*, *70*, 153-163.

Qualtrics Labs Inc. (2009). Qualtrics Research Suite (Version 12.018). Utah.

Rogers, C. R. (1961). On Becoming a Person: A Therapist's View of Psychotherapy. Boston: Houghton Mifflin Company.

Rutt, J. L., & Löckenhoff, C. E. (2016). From Past to Future: Temporal Self-Continuity Across the Life Span. *Psychology and Aging, 31(6),* 631–639.

Sinclair, S. J., Siefert, C. J., Slavin-Mulford, J. M., Stein, M. B., Renna, M., & Blais, M. A. (2012). Psychometric Evaluation and Normative Data for the Depression, Anxiety, and Stress Scales-21 (DASS-21) in a Nonclinical Sample of U.S. Adults. *Evaluation & the Health Professions, 35(3),* 259-279.

Steele, D. L., & Hayes, S. C. (1991). Stimulus equivalence and arbitrarily applicable relational responding. *Journal of the Experimental Analysis of Behaviour,* 55, 519–555.

Stewart, I., & McHugh, L. (2013) Perspective-taking. In: T Kashdan & J Ciarriochi (Eds). *Mindfulness acceptance and positive psychology: The seven foundations of well being* (pp. 108-129). Oakland, CA: New Harbinger.

Stewart, I., Villatte, J., & McHugh, L. (2012). Approaches to the Self. In L McHugh & I Stewart (Eds.), *The self and perspective taking: Research and applications* (pp. 1-42)*.* Oakland, CA: Hew Harbinger.

Styles, R., & Atkins, P. (2018). Measuring perceptions of self and others in what people say: A replication and extension of the functional self-discrimination measure. *Journal of Contextual Behavioural Science, 9.* DOI: 10.1016/j.jcbs.2018.06.005

Tabachnick, B. G., & Fidell, L. S. (2007). Using Multivariate Statistics, 5th edn. Allyn & Bacon/Pearson Education, Boston.

Van der Graaff, J., Branje, S., De Wied, M., Hawk, S., Van Lier, P., & Meeus, W. (2014). Perspective Taking and Empathic Concern in Adolescence: Gender Differences in Developmental Changes. *Developmental Psychology, 50(3),* 881-888.

Vaughan-Johnston, T. I., Quickert, R. E., & MacDonald, T. K. (2017). Psychological flexibility under fire: Testing the incremental validity of experiential avoidance. Personality and Individual Differences, 105, 335-349.

Vilardaga, R., Estévez, A., Levin, M. E., & Hayes, S. C. (2012). Deictic Relational Responding, Empathy, and Experiential Avoidance as Predictors of Social Anhedonia: Further Contributions From Relational Frame Theory. *The Psychological Record, 62,* 409–432.

Weil, T. M., Hayes, S. C., & Capurro, P. (2011). Establishing a deictic relational repertoire in young children. *The Psychological Record, 61,* 371–390.

Yu, L., Norton, S., Harrison, A., & McCracken, L. M. (2015). In search of the person in pain: A systematic review of conceptualisation, assessment methods, and evidence for self and identity in chronic pain. *Journal of Contextual Behavioural Science, 4(4),* 246-262.

Yu, L., McCracken, L. M., & Norton, S. (2016). The Self Experiences Questionnaire (SEQ): Preliminary analyses for a measure of self in people with chronic pain. *Journal of Contextual Behavioural Science, 5(3),* 127-133.

Yu, L., Norton, S., & McCracken, L. M. (2017). Change in "Self-as-Context" ("Perspective-taking") Occurs in Acceptance and Commitment Therapy for

People with Chronic Pain and is Associated with Improved Functioning.

Table 1 *Descriptive Statistics and Normality Scores for Study 4 Variables*

Variable	M (SD) Total	M (SD) Males	M (SD) Females	Min-Max	Skewness	Kurtosis
Distinction	24.94 (6.83)	24.57 (6.55)	25.38 (7.20)	7-42	.185	.174
Hierarchy	30.42 (6.85)	30.12 (6.78)	30.78 (7.02)	13-48	.255	.280
Depression	7.70 (5.10)	8.04 (4.85)	7.38 (5.24)	0-20	.155	-.849
Anxiety	7.85 (4.70)	8.59 (4.58)	7.08 (4.79)	0-21	.145	-.610
Stress	8.75 (4.33)	9.10 (4.20)	8.36 (4.51)	0-20	-.044	-.580
Psychological Inflexibility	14.56 (7.25)	16.24 (7.21)	12.82 (7.02)	0-32	.081	-.455
Deictic Ability	14.12 (3.70)	14.37 (3.60)	14.02 (3.67)	6-24	.478	.051

Note: M=Mean; SD=Standard Deviation.

Table 2 *Correlations on measures of, Self-as-Hierarchy (Hier), Self-as-Distinction (Dist), Depression (Dep), Anxiety (Anx), Stress (Str), Experiential Avoidance (Avoid), Deictic Ability (DA), and Gender (N=102)*

	Hier	Dist	Dep	Anx	Str	Avoid	DA
Dist	.730**						
Dep	-.249*	-.202					
Anx	-.107	-.089	.742**				
Str	-.262*	-.213	.803**	.821**			
Avoid	-.222*	-.104	.633**	.611**	.629**		
DA	.095	.057	-.077	-.020	-.050	.035	
Gender	.056	.069	-.052	-.161	-.090	-.231*	.017

Note: ** sig at .001, *sig at .0259.

Table 3 *Hierarchical regression analyses examining the ability of self-as-hierarchy to predict depression, anxiety, and stress while controlling for gender and deictic ability (N=102)*

Outcome Variables	Predictor Variables	*Adjusted R^2*	ΔR^2	β	95% CI
Depression					
1	Gender	-.007	.003	-.052	[-2.453, 1.426]
1	Gender	-.012	.006	-.051	[-2.445, 1.443]
2	Deictic Ability			-.076	[-.379, .169]
1	Gender	.038	.058*	-.038	[-2.271, 1.528]
2	Deictic Ability			-.053	[-.342, .195]
3	Self-as-Hierarchy			-.242*	[-.325, -.035]
Anxiety					
1	Gender	.016	.026	-.161	[-3.213, .315]
1	Gender	.006	.000	-.161	[-3.220, .327]
2	Deictic Ability			-.017	[-.272, .229]
1	Gender	.006	.009	-.155	[-3.175, .378]
2	Deictic Ability			-.008	[-.261, .242]
3	Self-as-Hierarchy			-.097	[-.203, .069]
Stress					
1	Gender	-.002	.008	-.090	[-2.388, .895]
1	Gender	-.010	.002	-.089	[-2.388, .908]
2	Deictic Ability			-.049	[-.290, .176]
1	Gender	.046	.064**	-.075	[-2.228, .981]
2	Deictic Ability			-.025	[-.256, .198]
3	Self-as-Hierarchy			-.255**	[-.284, -.039]

Note: ** sig at .01, *sig at .0264

Table 4 *Hierarchical regression analyses examining the ability of self-as-distinction to predict depression, anxiety, and stress while controlling for gender and deictic ability (N=102)*

Outcome Variables	Predictor Variables	*Adjusted R²*	Δ R²	β	95% CI
Depression					
1	Gender	-.007	.003	-.052	[-2.453, 1.426]
1	Gender	-.012	.006	-.051	[-2.445, 1.443]
2	Deictic Ability			-.076	[-.379, .169]
1	Gender	.017	.038	-.038	[-2.291, 1.550]
2	Deictic Ability			-.065	[-.361, .181]
3	Self-as-Distinction			-.196	[-.293, .000]
Anxiety					
1	Gender	.016	.026	-.161	[-3.213, .315]
1	Gender	.006	.000	-.161	[-3.220, .327]
2	Deictic Ability			-.017	[-.272, .229]
1	Gender	.003	.006	-.155	[-3.180, .382]
2	Deictic Ability			-.013	[-.267, .235]
3	Self-as-Distinction			-.078	[-.190, .083]
Stress					
1	Gender	-.002	.008	-.090	[-2.388, .895]
1	Gender	-.010	.002	-.089	[-2.388, .908]
2	Deictic Ability			-.049	[-.290, .176]
1	Gender	.023	.042	-.075	[-2.249, 1.002]
2	Deictic Ability			-.037	[-.273, .186]
3	Self-as-Distinction			-.206	[-.255, -.006]

*Note: ** sig at .01, *sig at .0264*

Table 5 *The unstandardized and standardized regression coefficients for significant predictor variables (N=102)*

Predictor Variable	Outcome Variable	B	SE B	β	*p*
Self-as-Hierarchy	Depression	-.180	.073	-.242	.016
Self-as-Hierarchy	Stress	-.161	.062	-.255	.010

Note: **B= standardized beta; SE= Standard Error.**