The Relationship Between Continuous Identity Disturbances, Negative Mood, and Suicidal Ideation

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ABSTRACT

Objective: To examine the relationship between continuous identity and a measure of depression, anxiety, and stress as well as suicidal ideation using 2 validated measures of continuous identity.

Method: A total of 246 subjects recruited from the Amazon Mechanical Turk subject pool who completed a full survey in November 2014 were included in the analyses. Stress, anxiety, and depression severity were measured using the Depression, Anxiety, and Stress Scale. Continuous identity was measured with the Venn continuous identity task and the me/not me continuous identity task.

Results: Multiple regression analyses revealed continuous identity disturbances were significantly associated with depressed mood ($R^2 = 0.37$, $P < .01$). Continuous identity also predicted suicide severity, even after controlling for demographic factors, negative life events, and depressed mood. Additionally, predictive discriminant analysis revealed continuous identity, depression severity, and negative life events correctly classified 74.1% of participants into high and low suicide risk groups.

Conclusion: Lack of continuous identity predicted both depression and suicidality severity. Integration of perceived identities may be a worthwhile goal for behavioral interventions aimed at reducing depressed mood and suicidality.

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A hallmark characteristic of psychopathology is a disturbance in identity.[1,2] Self-identity deficits are seen not only as antecedents to mental illness, but also as a contributing factor to a variety of psychiatric disorders.[3] For example, feelings of worthlessness, low self-esteem, and unstable self-image are key diagnostic criteria for defining several *DSM-5* psychiatric disorders including major depressive disorder, dysthymia, and borderline personality disorder.[4]

Theorists have proposed that people do not have a static notion of self-identity but rather a changing identity consisting of many overlapping selves over time.[5,6] A sense of personal persistence of identity over time has been referred to as *diachronicity* or *continuous identity*[5–7] and can be measured as the degree a person feels like the same person when looking into his or her past or future. Lack of continuous identity or diachronic disunity is characterized by a sense of alienation from one's future or past self.

Several studies[8–13] revealed that people who were diachronically disunified between their present and future self were less likely to behave in ways benefiting a future self and more likely to make delinquent decisions benefiting their current self at the expense of their future self-interests. The greater the perceived distance between a person's present and future self, the more self-disadvantageous behavior subjects displayed.[14–16]

In terms of neurobiological correlates, individuals making present self versus future self judgments[10] as well as present self versus past self judgments[17] elicit decreased activation in the same brain areas as self versus other judgments (ie, the rostral anterior cingulate and the mesial prefrontal cortex) as opposed to self-referential judgements, which elicit increased activation decreased in the mesial prefrontal cortex.[18] These findings indicate that present-tense self-referential processing is functionally dissociable from other forms of self-referential processing involving the future or past self, suggesting that the future self may be considered by the brain as distinct or alien from the present self.

In addition to the relationship between continuous identity and delinquent behavior, researchers have found disunity between past to present self-identity to be associated with psychopathology. Past to present diachronically disunified individuals, for example, have been shown to experience increased negative affect, anxiety, alienation, and risk for suicidal behavior compared with individuals with a unified continuous self-identity from past to present.[19–23] No study to date, however, has examined continuous identity from the past to present self and the present to future self as it relates to psychopathology. Additionally, past studies examining the relationship between psychological maladjustment and continuous self-identity are complex and suffer from a variety of methodological limitations. These limitations include the use of unstructured interviews to assess continuous identity as well as limited and selected sample sizes that may have been influenced by experimental demand characteristics.

We examined the relationship between continuous identity and a measure of depression, anxiety, and stress as well as suicidal ideation using 2 validated measures of continuous identity.[10] We expected that diachronic disunity would be highly associated with depression, anxiety, and stress. We also hypothesized that varying levels of continuous identity would predict

Clinical Points

- Diachronic disunity is an overlooked psychiatric symptom prevalent in depression and suicidal thinking.
- Physicians can readily assess patients for severity of diachronic disunity.
- Clinical interventions aimed at increasing present to future self-identity stability may be a worthwhile goal for mood-disordered patients.

suicidality, even taking into account several previously established predictors of suicidality such as depression severity, negative life events, age, and gender.

METHOD

Participants

Initially, 254 adult subjects were recruited from the Amazon Mechanical Turk subject pool. Of these subjects, 250 completed the full survey in November 2014. An additional 4 subjects were ruled out for selecting an option stating that there was a reason that their survey should not be used for academic research. A total of 246 subjects were included in the analyses. In terms of demographics, subjects ranged in age from 18 to 68 years with a mean age of 38.2 (SD = 13.1), 63% were female, and their primary language was English (99%). The subjects' mean years of education was 15.76 (SD = 3.4); 38% were single, 50% were married or in a domestic partnership, 1% were widowed, and 11% were divorced (single) or separated; 78% were white, 7% were Hispanic or Latino, 8% were black or African American, 1% were Native American, and 2% identified as other. Also, 65% of the participants were employed, 11% were out of work, 5% were retired, 7% were homemakers, 8% were students, and 3% identified as other. Subjects were compensated $0.25 for completion of test items.

Amazon Mechanical Turk has been shown to be a highly reliable and valid method of collecting data for psychological experiments.[24,25] There has been a recent increase toward utilizing the Amazon Mechanical Turk subject pool for research in many areas of clinical psychology including well-being, obsessive-compulsive behavior, and general psychopathology.[26,27] Additionally, Shapiro et al[28] demonstrated that the Amazon Mechanical Turk subject pool has a similar prevalence of clinical variables such as depression and anxiety as subject pools obtained though more traditional methods. In addition, due to the diverse range of participants available in the pool studies, using the Amazon Mechanical Turk subject pool allows for a more representative selection of ages, socioeconomic levels, race, and gender than sampling from a college campus, thus increasing external validity of clinical findings.[28] Additionally, the online format allows for greater confidentially and anonymity such as in the present study wherein even the researchers do not have access to any information beyond the demographic information explicitly given by the subject.[28]

Inclusion criteria for participation included individuals aged ≥ 18 years living in the United States who had previously filled out over 100 HITS (human intelligence tasks; a HIT represents a single, self-contained task that an Amazon Mechanical Turk user can work on, submit an answer for, and collect a reward for completing) and had an approval rate of over 98% on Amazon Mechanical Turk.[29]

In terms of demographic data for the continuous identity tasks, analyses of variance revealed no significant differences for subjects' gender, ethnicity, and language on any continuous identity task scores (all $P > .05$). Pearson correlations were then computed between age, years of education, and all continuous identity measures. Neither age nor years of education were significantly correlated with measures of continuous identity.

Measures

All means and standard deviations of clinical measures are reported in Table 1.

Venn continuous identity task. To measure self-continuity, we used a modified version of the Venn continuous identity task featuring a question on a 7-point scale marked at each point by 2 circles that ranged from depicting no overlap to depicting almost complete overlap (Figures 1A and 1B). Participants selected the circle pair that best described how similar and how connected they currently felt to either their past or their future self 10 years from now and 10 years ago. The task has demonstrated adequate test-retest reliability for this measure ($r = 0.66$, $P < .01$) wherein time to complete each version was separated by a minimum of 1 week.[10] In addition, this study demonstrated significant prediction of a future-oriented financial task using the temporal discounting task (described previously). The Venn continuous identity task scores range from 1 to 7, with higher scores indicating increased self-continuity.

Me/not me continuous identity task. To measure the subjects' view of their change over time as a secondary measure for continuous identity, we used a modified version of the me/not me task.[10] In this task, subjects are shown a list of 20 words including 10 positive words (calm, casual, untiring, moral, hopeful, confident, easygoing, informal, outgoing, and positive) and 10 negative words (fearful, demanding, worrying, tense, impractical, stubborn, clumsy, unhappy, withdrawn, and nervous). Subjects then rate their present, past, and future self for each word along a 1- to 6-point Likert rating scale anchored with "1" meaning the word did not describe them at all, "3" meaning the word is somewhat descriptive, and "6" meaning that the word perfectly described them.[10] We calculated the absolute value of the change in rating between the 2 temporal points to create a single value for the total change in each word, then computed the mean absolute change for each subject based on all 20 words. Subjects rated the words from their past, present, and future selfs separately. Our dependent variables on the basis of this task included past/present continuous identity based on change in words from past to present (me/not me continuous identity past to present) and present/future continuous identity–based change

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Table 1. Means and Standard Deviations of Clinical Variables and Total Depression, Anxiety, and Stress Scale Score Predicted by Measures of Continuous Identity and the List of Threatening Experiences

	Zero-Order *r*									
Variable	Continuous Identity Venn Past to Present	Continuous Identity Venn Present to Future	Me/Not Me Continuous Identity Past to Present	Me/Not Me Continuous Identity Present to Future	List of Threatening Experiences	Depression, Anxiety, and Stress Scale	*B*	SE *B*	SE r^2	β
Continuous identity Venn past to present	…	0.41[a]	−0.42[a]	−0.30[a]	−0.27[a]	−0.30[a]	0.03	0.56	0.00	−0.00
Continuous identity Venn present to future		…	−0.27[a]	−0.36[a]	−0.18[a]	−0.47[a]	−2.87[a]	0.52	0.08	−0.32
Me/not me continuous identity past to present			…	0.52[a]	0.35[a]	0.37[a]	1.97	1.68	0.00	0.08
Me/not me continuous identity present to future				…	0.33[a]	0.48[a]	7.75[a]	2.00	0.04	0.25
List of Threatening Experiences					…	0.40[a]	1.56[a]	0.36	0.05	0.24
Mean (SD)	3.46 (1.54)	4.64 (1.63)	1.00 (0.55)	0.82 (0.46)	2.33 (2.22)	15.38 (14.61)				
$R^2 = 0.389$										
Adjusted $R^2 = 0.376$										
F for change in $R^2 = 030.67^*$										

$^*P < .01$.
Abbreviation: SE = standard error.

in words from present to future (me/not me continuous identity present to future). These values can range from 0 to 6, with 0 indicating no change and 6 indicating very high levels of perceived change in identity over time (lack of self-continuity or diachronic disunity).

Depression, Anxiety, and Stress Scale. The Depression, Anxiety, and Stress Scale (DASS)[30] was used to measure the subjects' stress, anxiety, and depression severity. Past studies have found the DASS to be reliable and valid, with its subscales for depression, anxiety, and stress correlating highly to the Beck Depression Inventory II, the Beck Anxiety Inventory, and the State-Trait Anxiety Inventory.[31,32] The range of each subscale (depression, anxiety, and stress) is 0–21. The range of the DASS total score is 0–63.

We computed coefficients for our DASS total score and each subscale and found the Cronbach α for the total DASS score was 0.95; the Cronbach α for the DASS subscale of depression was 0.93, for anxiety was 0.87, and for stress was 0.89. Each of the subscales correlated very highly with each other and to total DASS scores (total DASS correlations to depression, anxiety, and stress were $r = 0.90$, $r = 0.87$, and $r = 0.91$, respectively; all $P < .001$). As a result, we used the total DASS score as a measure of negative mood.

The List of Threatening Experiences (LTE)[33] was used to assess the number of negative life events. The LTE is a validated and widely used scale that measures life events that may affect mental illness.[33,34] The LTE has been shown to have satisfactory levels of test-retest validity over a period of 2 years for lifetime scores, as well as high levels of predictive validity for mental health problems in a large epidemiologic study,[35] and also has been shown to be significantly predictive of depression and anxiety.[36] The LTE measure was included to determine the relationship between negative life events, continuous identity, depression, and suicidality. The range of LTE total score is 0–12, with increasing score indicating increased number of negative life events.

The Suicidal Behaviors Questionnaire–Revised (SBQ-R)[37] was used to assess suicidal ideation and risk of suicide. The SBQ-R is a 4-item self-report suicidal ideation and behavior measure. The first item ("Have you ever thought about or attempted to kill yourself?") evaluates past suicidal ideation and suicide attempts. The second item ("How often have you thought about killing yourself in the past year?") assesses frequency of past suicidal ideation. The third item ("Have you ever told someone that you are going to commit suicide or that you might do it?") assesses threat of suicidal behavior. The fourth item ("How likely is it that you will commit suicide someday?") evaluates self-reported suicide likelihood. The SBQ-R has been validated and used in past studies to predict suicidality.[37] The SBQ-R yields an overall suicide severity score ranging from 3–18, with increasing scores indicating increased risk for suicidality. The overall severity score of the SBQ-R score has demonstrated adequate concurrent and predictive validity.[38]

Procedure

After selecting the HIT on Amazon Turk and agreeing to the online consent form for our study, subjects were told to read 20 words and choose from a Likert scale of 1–6 rating how well the word described them. Then, they were instructed to spend 10–20 seconds thinking about what they were like 10 years ago. After 10 seconds, they were able to press a button to go to the next screen where the same 20 words were shown again. The instructions asked the subjects to choose how well each word described them 10 years ago. Following completion of this section, similar instructions were given for subjects to think about what they expect to be like in 10 years and then to fill out how well they expect the 20 words to apply to them in 10 years.

After completion of the me/not me task, subjects completed a digital version of the DASS-21 as well as the Venn continuous identity tasks. Subjects next completed the SBQ-R and the LTE.

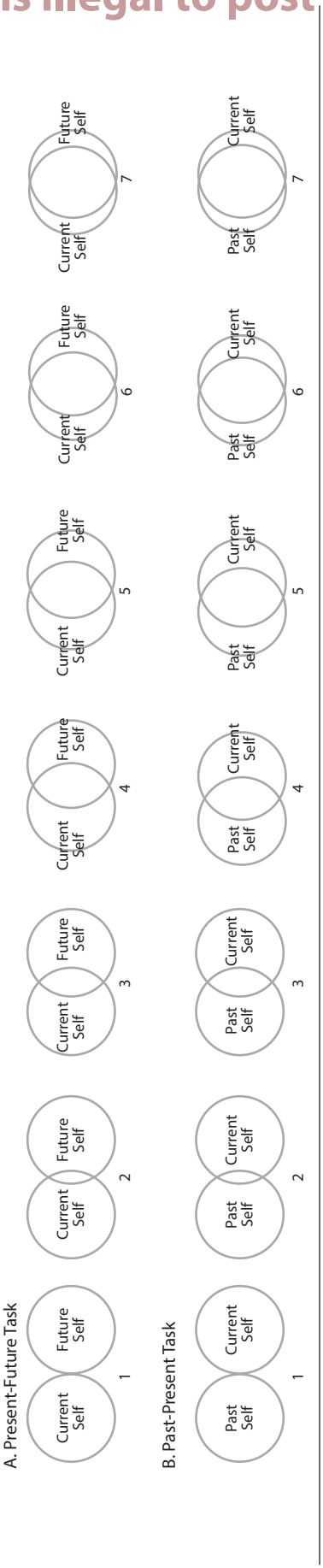

Figure 1. Venn Continuous Identity Tasks

RESULTS

Relationship Between DASS and Continuous Identity

Identity measures. To assess the relationship between continuous identity and negative mood severity, a simultaneous regression analysis was conducted using subjects' total DASS score as the predicted or dependent variable and past Venn continuous identity, future Venn continuous identity, me/not me continuous identity present to future, me/not me continuous identity past to present, and LTE as predictor or independent variables. The raw and standardized regression coefficients of the predictors together with their correlations with the DASS (their squared semipartial correlations) are shown in Table 1. All predictors were entered into the model. The highest variance inflation factor score for the included predictor variables was 1.59, indicating no collinearity.

The overall model and 3 of the individual predictors (future Venn continuous identity, LTE, and me/not me continuous identity present to future) were significant, with the overall model accounting for 37% of the variance (adjusted $R^2 = 0.37$, $P < .01$). Unique variance accounted for by future continuous identity Venn was 5%, while me/not me continuous identity present to future accounted for an additional 4% and LTE scores added an incremental 5% of unique variance (all $P < .01$).

Relationship Between Suicidality and Continuous Identity Measures

To assess the relationship between continuous identity and suicidality, a simultaneous regression analysis was conducted using subjects' total SBQ-R score as the predicted or dependent variable and past Venn continuous identity, future Venn continuous identity, me/not me continuous identity present to future, me/not me continuous identity past to present, LTE, and total DASS score as predictor or independent variables. The raw and standardized regression coefficients of the predictors together with their correlations with the SBQ-R (their squared semipartial correlations) are shown in Table 2. All predictors were entered into the model. The highest variance inflation factor score for the included predictor variables was 1.63, indicating no collinearity issues. The overall model and 3 of the individual predictors (future continuous identity Venn, LTE, and total DASS score) were significant, with the overall model accounting for almost 25% of the variance (adjusted $R^2 = 0.248$, $P < .01$). Unique variance accounted for by the DASS was 5%, while LTE and future Venn continuous identity accounted for 3% unique variance each (all $P < .01$).

To further examine the predictive relationship between continuous identity and suicidality, the sample was divided into low and high suicide risk groups on the basis of their SBQ-R total score. The nonrisk group (n = 105) consisted of subjects scoring 3 on the SBQ-R (the lowest possible score on the SBQ-R) and an at-risk group (n = 53), which consisted of subjects who scored above 7 (the SBQ-R clinical cutoff score for significant risk).[37] Predictive discriminant analysis was performed to ascertain how well the significant predictors, future continuous identity Venn, LTE, and total DASS scores could classify participants into the low-risk and at-risk groups. For the 2 groups, the cross-validated correct classification was 74.1%. The separate group hit rates were statistically significant using the Dunn-Bonferroni correction (with $P < .01$) for nonrisk (74.3% correctly classified) and at-risk (73.6% correctly classified) groups. The standardized canonical discriminant function coefficients were DASS = 0.58, future continuous identity Venn = –0.43, and LTE = 0.40, indicating that the severity of diachronic disunity adds incremental variance to suicide prediction beyond negative mood severity (depression, anxiety, and stress) and negative life events.

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Table 2. Suicidal Behaviors Questionnaire–Revised Score Predicted by Measures of Continuous Identity, List of Threatening Experiences, and Depression, Anxiety, and Stress Scale

Variable	Suicidal Behaviors Questionnaire–Revised Zero-Order *r*	*B*	SE *B*	β	SE r^2
Continuous identity Venn past to present	–0.22[a]	0.05	0.17	–0.02	0.00
Continuous identity Venn present to future	–0.36[a]	–0.50[a]	0.16	–0.20	0.03
Me/not me continuous identity past to present	0.27[a]	0.61	0.50	0.09	0.00
Me/not me continuous identity present to future	0.24[a]	–0.57	0.60	0.07	0.00
List of Threatening Experiences	0.34[a]	0.32[a]	0.11	0.18	0.03
Depression, Anxiety, and Stress Scale	0.45[a]	0.08[a]	0.02	0.29	0.05
Mean (SD)	5.70 (3.95)				
$R^2 = 0.267$					
Adjusted $R^2 = 0.248$					
F for change in $R^2 = 14.54^*$					

$^*P < .01$.
Abbreviation: SE = standard error.

CONCLUSION

The study results support the notion that continuous identity disturbances are associated with depression and suicidal behavior endorsement. Past studies have found that lack of past to present continuous identity is associated with increased alienation and psychological maladjustment.[19] Additionally, a failure to consider future self-identity as an extension of current self-identity was associated with making deviant life choices.[17]

If past findings can be generalized to the present results, it may be the case that diachronic disunity between the present and future self increases risk for making deviant life choices and sacrificing future self-interests, which ultimately raises the risk for depression and suicidality. That is, abnormal decision making has been hypothesized to be a core etiologic feature of depressive and other psychiatric disorders.[39,40] Past studies have found that deviant life choices result in stress and negative mood and in turn cause or perpetuate depression suicidality.[41] Additionally, deviant decision making itself has been linked to acting out on suicidal ideation,[42] leading to a further explanatory link between continuous identity disturbances and suicidality.

Conversely, the debate over whether cognitive deficits cause mood disturbance or mood disturbance causes cognitive impairment can be extended to the above discussion. That is, it may be the case that depressed mood causes diachronic disunity. Depression has been associated with impairment in executive functioning ability as well as cognitive rigidity.[41,43] It may be the case that depressed individuals' cognitive inflexibility leads to difficulties in synthesizing and finding similarity or continuity between their past self-identity and their current and imagined future selves. It also may be the case that self-disunity is both a cause and consequence of depression. Lastly, if diachronic disunity is a causal factor in developing or maintaining depression, it may be possible to develop intervention strategies to strengthen a unified sense of self progressing through time to ameliorate expression of depression or anxiety mediated by a lack of continuous identity.

While past studies used past to present diachronic disunity to predict mood disturbance, the current study included both past to present and present to future discontinuity to determine the constructs' relation to each other and their potentially disparate implications in mood disturbance/suicidality. Our results indicated that there was a relationship between past to present and present to future continuity, which depending on the measure used, accounted for between 17% and 27% of each other's variance. In addition, there was evidence that the more important variable to consider for both mood disturbance and suicidality was present to future diachronic disunity. It was only present to future unity/disunity that added significant predictive strength to the regression models predicting mood disturbance and suicide risk. This finding fits with the earlier explanation linking present to future diachronic disunity to problematic decision making, which itself leads to depression and increased suicide risk. An important study limitation concerns the use of Amazon Turk to recruit subjects. While the methodology has gained increased support over the years,[28–29] use of online data collection remains relatively new to the field. Future studies may wish to validate our conceptualization of continuous identity using more traditional methods of data collection.

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