An Examination of Factors Associated with Diachronic Disunity

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By

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Table of Contents

List of Tables

Abstract

Diachronic disunity is the phenomenon of feeling the lack of a continuous sense of self over time. It is understood to occur in the general population, but is more prevalent in those with psychiatric illnesses. However, it is not currently well understood in the psychological literature. This study aimed to explore factors that may contribute to a sense of diachronic disunity including dissociation, autobiographical reasoning, autobiographical memory functioning, wellbeing, sense of self and self-concept clarity in a sample of 251 individuals from the general population. Higher levels of trait dissociation and reduced self-concept clarity were significantly associated with higher levels of diachronic disunity. Furthermore, problems with autobiographical reasoning, autobiographical memory functioning, and sense of self were found to be weak, yet significant, predictors of diachronic disunity on some, but not all, measures of diachronicity. In contrast to expected results, state dissociation, and subjective wellbeing did not predict diachronic disunity. These findings suggest that trait dissociation and self-concept clarity in particular, play a role in the extent to which an individual may experience diachronic disunity. Findings have implications for clinical practice.

Introduction

It is inherent in the human experience that as life progresses, both small and large changes occur in how a person views themselves and the trajectory their life takes. For most people these changes do not impact on their ability to see themselves as the same person over time. However, for some individuals, their identity is deeply disconnected by these life changes. This study explores factors that may contribute to a sense of a discontinuous self over time, including dissociation, autobiographical reasoning, autobiographical memory functioning, wellbeing, sense of self and self-concept clarity.

Sense of Self

Defining *the self* has challenged philosophical thinking for centuries (Thiel, 2011). This challenge remains pertinent, as philosophers and psychologists continue to explore how to define *the self* (Flury & Ickes, 2007; Klein, 2012a; Klein, 2012c). However, perhaps more importantly, and of particular interest in the current study, remains the question of how one defines *themselves.* An individual's sense of self may be defined in a number of ways. Some argue that it should be defined at different levels, namely individual, relational and social (Zacarés & Iborra, 2015). Others take a more general approach, describing the self as "one's sense of *who I am and what I am*" (Hammell, 2006, p.190). From a psychological perspective, one's sense of self may play an important role in their mental health, and can be related to a number of mental health issues (Flury & Ickes, 2007).

Prebble, Addis and Tippett, (2013) define sense of self as "the mental processes that provide one with the feelings of singularity, coherence, individuality, and unity that define one as a unique and particular human being" (p. 816). Prebble et al. (2013) propose a novel framework for self, using a dimensional approach. The first dimension describes the *subjective* versus *objective* sense of self. This depicts the experience of self as a process (*subjective* or *I-self*) and the mental representation of the self as a product (*objective* or *me-*

self), the latter sometimes referred to as self-concept. The second dimension of the framework involves time. On one end of the spectrum is the present self, relating to a sense of self in the present moment. Unifying many aspects of self in a particular moment is known as *synchronic unity* (Prebble et al., 2013). At the other end is the *temporally extended self* which includes a sense of self extended over time. Viewing one's self as the same over time, despite changes is known as *diachronic unity* (Radden, 1999). Diachronic unity has also been labelled *personal persistence* or *continuous identity*. Though distinct constructs, sense of self shares a somewhat overlapping definition with *self-concept clarity*; how clearly, well defined and stable an individual's self-concept is (Campbell et al., 1996). Given this conceptual overlap, self-concept clarity is also examined in the current study.

Most individuals achieve a sense of diachronic unity throughout their lives (Lampinen, Odegard & Leding, 2004). Though parts of their bodies, thoughts, and lives may have changed, most individuals still view themselves as the same person they have always been. They feel that the life events they experienced, both recently and long ago, happened to them. This is assisted through a narrative memory of one's life, alongside a subjective experience of those memories (i.e. first person perspective) (Lampinen et al., 2004).

However, not all individuals experience diachronic unity (Lampinen et al., 2004). In contrast to those that experience such unity, some individuals report feeling that they are a different person from who they were at another time in their life, and that the experiences they had, happened to a person different to how they see themselves now. Individuals who have not incorporated into their sense of self experiences and changes in themselves over time, view themselves as a different person now than then. These individuals would be considered to have *diachronic disunity* (Lampinen et al., 2004). This may be related to a weak sense of self, characterised by one not knowing "who they are, what they think, what their opinions are, or what religion they should adopt" (Flury & Ickes, 2007, p. 281).

Given different conceptualisations of the self have different perspectives on how a sense of self over time is achieved (Klein, 2012b), diachronic disunity has been measured in a number of ways. A range of scales have been developed that directly ask participants how much they feel they are the same person (Lampinen et al., 2004), how much a certain set of words relate to their past, present and future selves (Sokol & Serper, 2017), and how much their past, present and future self overlap using visual (i.e., Venn diagrams) depictions (Sokol & Eisenheim, 2016; Sokol & Serper, 2017). With such a breadth of measurement instruments it is clear diachronic disunity is a complex concept to assess, and it may be the case that these scales capture slightly different aspects of diachronic disunity. Current research shows a paucity of possible factors associated with diachronic disunity.

Dissociation

Dissociation frequently arises following serious life trauma (Dalenberg et al., 2011). From a cognitive perspective, dissociation can result in an individual experiencing disruption in their memory for both autobiographical and non-autobiographical experience, creating difficulties accessing information from the memory (Kennedy et al., 2004). This poor retrieval of ones memories may therefore lead to a sense of memory fragmentation (Bedard-Gilligan & Zoellner, 2012).

Some theories suggest dissociation occurs along a continuum from normal to pathological manifestations (Bernstein & Putnam, 1986; Waller & Ross, 1997). On the severe end of the continuum, one may experience identity alterations as evident in dissociative identity disorder (DID). DID is characterised by two or more distinct identity states and recurrent episodes of amnesia (APA, 2013). Dissociation can be measured as a trait variable, associated with an individual's general tendency to dissociate, or a state variable, associated with the degree an individual has dissociative experience during a specific time period, like the present moment (Bremner, 2010).

Dissociative symptoms can be conceptualised as "(a) a loss of continuity in subjective experience with accompanying involuntary and unwanted intrusions into awareness and behavior (so-called positive dissociation); and/or (b) an inability to access information or control mental functions, manifested as symptoms such as gaps in awareness, memory, or self-identification, that are normally amenable to such access/control (so called negative dissociation); and/or (c) a sense of experiential disconnectedness that may include perceptual distortions about the self or the environment" (Cardeña & Carlson, 2011, p. 251-252). Positive (intrusive) symptoms (e.g., flashback, passive influence experience) have a puncturing impact on conscious awareness and ego-alien perception while negative symptoms (e.g., amnesia) fragment conscious awareness and autobiographical memory representations. Both can have significant impacts on continuity in sense of self. Thus, dissociation maybe associated with diachronic disunity.

Lampinen et al. (2004) found that university students who scored higher on trait dissociation, also scored higher on diachronic disunity. This effect was reduced for individuals who experienced a lot of change in their life, such that they may have become more able to integrate differing experiences into their sense of self due to greater exposure to change. Individuals who were more diachronically disunified were also more prone to dissociation and had at least a 70% chance of falling into the pathologically dissociative taxon, which is an index of dissociative symptoms. Lampinen et al. (2004) suggested that a non-continuous sense of self could be related to dissociation, and should be explored when dissociation was actually occurring, as assessed in state dissociation.

Chiu, Chang and Ming Hui (2017) investigated the link between self-concept organisation and dissociation. They found individuals with high proneness to dissociation had lower levels of self-concept clarity and were more polarized in their evaluations of themselves. Dorahy et al. (2021) examined the link between diachronic disunity, dissociation

and self-concept clarity. They found that diachronic disunity occurred in individuals from the general population. Their results suggested that individuals who experience an extreme form of dissociation (i.e., DID) report a greater a sense of diachronic disunity. However, studies exploring the link between disunity and trait dissociation in the general population are rare. In addition, no studies have investigated the link between diachronic disunity and state dissociation, to explore if state dissociation impacts diachronic disunity more than trait dissociation. State dissociation during the time of testing may have a greater impact on perceptions of self-continuity than a propensity to dissociate. Examining and controlling for other factors that may impact on diachronic disunity is important for empirical advancements.

Autobiographical Memory and Reasoning

Memory plays an important role in ones sense of self (Hyman & Faries, 1992; Conway, 2005; Prebble et al., 2013). Constructing a life narrative, intimately connected with a sense of self across time, that finds meaning in suffering and adversity, and includes a sense of personal agency and exploration, can lead to better mental health outcomes (McAdams, 2013; but see Strawson, 2004, for alternative view where self is not reliant on narrative recall). In part, one's identity can be seen as a function of their autobiographical memory (Neimeyer & Rareshide, 1991). Conway (2005) proposes a framework known as the Self-Memory System (SMS), that highlights the relationship between self and memory, viewing memory as "the data base of the self" (p. 594). This relationship may depend on one's age, as older adults tend to have current self-images formed longer ago and future self-images that are closer to the present (Chessell, Rathbone, Souchay, Charlesworth & Moulin, 2014). An individual's sense of diachronic unity is related to their autobiographical memory or their memory of their own life from a first-person perspective (Lampinen et al., 2004). Diachronic unity is assisted by accessing autobiographical memories (Sokol, Conroy & Weingartner, 2017). Higher levels of past-to-present and present-to-future diachronic unity is associated

with a better ability to remember autobiographical information when given a cue (Sokol et al., 2017). Diachronic unity is also associated with lower levels of heuristic usage (Sokol et al., 2017), suggesting that more unified individuals do not rely on the use of certain mental rules and shortcuts to retrieve certain memories. Those with better psychological health may be more flexible in their cognitive capacity, and therefore, do not need to rely on heuristics.

Habermas and Köber (2015) explored the role of autobiographical reasoning in one's sense of diachronic unity. Autobiographical reasoning is defined as "a process of thinking or speaking that links distant elements of one's life to each other and to the self in an attempt to relate the present self to one's personal past and future" (Habermas & Köber, 2015, p. 666). Habermas and Köber (2015) found that autobiographical reasoning was positively correlated with a sense of diachronic unity, if a biographical disruption (i.e., rapid change of the body such as puberty, or job loss) had occurred in the past four years. Thus, those who could reason through changes maintained a more continuous sense of self. The importance of this study is the connections established between diachronic unity and autobiographical reasoning, which by definition involves the remembering of autobiographical information.

In exploring the link between memory quality and diachronicity, Lampinen et al. (2004) found that for recent memories, disunified and unified individuals did not differ in their memory quality. This suggests that individuals who experience diachronic disunity do not have "globally impoverished memories" (p. 242), yet individuals who experience diachronic disunity remember their past differently from those who were more unified (Lampinen et al., 2004). Lampinen et al. (2004) posited two possible explanations. Firstly, that "people infer the extent to which their past self is related to their current self by examining the qualities of their memories" (p. 243). Alternatively, it may be possible that experiencing diachronic disunity results in "impoverished memories" (p. 243). Regardless, the link between memory and diachronic disunity remains to be fully explored.

Wellbeing

Greater diachronic disunity has been linked to certain psychiatric conditions and symptoms, including depression and suicidal behaviour (Sokol & Serper, 2019). A lack of continuous identity may possibly increase risk of decision making that does not consider future self-interests (Sokol & Eisenheim, 2016). However, the research associated with this interpretation has been mixed. For example, Sokol and Serper (2017) found that individuals with a depressed mood experienced a perceived decrease in their positive attributions from past-to-present, but perceived an increase in positive attributions for their present-to-future self, which somewhat counterintuitively suggested a hope for the future. Despite this, higher levels of depression were associated with less continuous identity (Sokol & Serper, 2017). This disparity highlights an area requiring further exploration, including the direction of this relationship, namely whether a sense of disunity causes psychological distress or such distress results in a sense of disunity.

The current study

It is clear that a discontinuous sense of self can occur in a range of individuals with various levels of pathology. Factors such as dissociation, autobiographical reasoning, autobiographical memory functioning, wellbeing, sense of self and self-concept clarity, may predict whether or not an individual will experience a sense of diachronic unity, despite life changes, some of which may be significant. The studies outlined above show that a sense of continuous identity is linked to an individual's sense of self, their reasoning and memory of their own life, their mental health and wellbeing (including symptoms such as dissociation). To our knowledge, no study has examined these factors collectively nor used a representative adult general population sample. However, such exploration may help predict the central factors associated with diachronic disunity. Findings could be particularly relevant for a psychiatric population of individuals experiencing major difficulties (e.g., dissociative

identity disorder, psychotic spectrum disorders), and/or who experience significant disruptions in sense of self (Dorahy et al., 2021; Nijenhuis, 2015).

This study examines the impact of state and trait dissociation, autobiographical reasoning, autobiographical memory functioning, subjective wellbeing, sense of self and self-concept clarity on diachronic disunity (present to past; present to future). However, measuring diachronicity is complex, with existing scales measuring the construct variously and therefore leading to possibly different outcomes. As a result, this study takes an exploratory approach, using three separate scales to assess self-continuity over time. Using multiple scales has the potential to enhance robustness of the findings, and establish diachronic disunity as a solid outcome of any of the predictor variables, should there be significant results.

The diachronicity scales used in this study are as follows. The Diachronic Disunity Scale (DDS; Lampinen et al., 2004) simply asks participants if they feel they are the same person or not despite any changes in their perception of self. The Me/Not Me (MNM) task (Ersner-Hershfield et al., 2009) more subtly analyses disunity by asking participants to rate how much a word applies to their past, present and future selves. The Venn Continuous Identity task (VCI; Sokol & Eisenheim, 2016) requires participants to rate how closely their past and present, and present and future selves are connected. The latter two scales measure an individual's diachronicity from the past to present *and* present to future.

It is hypothesised that individuals who experience higher levels of diachronic disunity report high levels of state and trait dissociation, less autobiographical reasoning ability, poor autobiographical memory functioning, low subjective wellbeing, poorer sense of self and less self-concept clarity. Beyond the contribution of other variables, and following Lampinen et al. (2004), dissociation is expected to be the most powerful predictor of diachronic disunity.

Method

Participants

This study assessed a sample of New Zealand adults, representative of the general population on gender and age. They were recruited via Qualtrics. A total of 322 participants opened the survey. Of these, seven did not complete any items, 12 completed all items but did not submit their final response, 32 completed part but not all of the survey, and 20 failed both validity questions on the Detachment and Compartmentalization Inventory (DCI; Butler, Dorahy & Middleton, 2019) (see Appendix A for individual items of all scales). The remaining 251 participants completed the full survey, passed all four validity questions and were included in the final analysis.

With respect to the recruited sample, 118 identified as male (47%), 131 identified as female (52.2%) and two identified as other (0.8%). The average age of participants was 45.9 years (*SD* = 17.9). Participants identified their ethnicity as follows: New Zealand European (*n* = 151, 60.2%), Māori (*n* = 28, 11.2%), Asian (*n* = 36, 14.3%), European (*n* = 17, 6.8%), Pacific Peoples (*n* = 10, 4%), Middle Eastern (*n* = 1, 0.4%), African (*n* = 1, 0.4%), Latin American (*n* = 1, 0.4%), North American (*n* = 1, 0.4%) and other (*n* = 5, 2%). Regarding relationship status, 109 participants identifying as “single” (43.4%) and 142 identifying as being “in a relationship” (56.6%).

A total of 70 participants reported having mental health difficulties (27.9%), 175 reported having no mental health difficulties (69.7%), and six preferred not to say (2.4%). Of the 70 participants with mental health difficulties, 40 did not have a formal diagnosis (57.1%), 29 did have a formal diagnosis (41.4%), and one respondent preferred not to say (1.4%). Of the formal diagnoses, a combination of depression and anxiety was the most common (n = 6, 20.7%), followed by depression alone (n = 5, 17.2%), personality disorders (n = 5, 17.2%), Posttraumatic Stress Disorder (PTSD) (n = 4, 13.8%), and then eating

disorders (n = 2, 6.9%). The following diagnoses were endorsed by one participant each (n = 1, 3.4%): Attention Deficit/Hyperactivity Disorder (ADHD), Obsessive Compulsive Disorder (OCD), DID, Schizophrenia, Bipolar, Psychosis, and one was not stated (the option to specify other was included after their response had been gathered).

Measures

In addition to demographic questions regarding age, gender, ethnicity, relationship status, and mental health diagnoses, the survey also included scales measuring diachronic disunity, autobiographical reasoning, autobiographical memory, state and trait dissociation, subjective wellbeing, self-concept clarity and sense of self. These questions were randomly assigned, to avoid any priming effects of certain topics. Four validity questions were included in this study and were dispersed throughout the survey (two in the initial section and two in the DCI, which are already embedded into this measure). The two validity questions from the DCI were “I cross the street where there is no pedestrian crossing or crosswalk (i.e., jaywalk)” and “I tell a small lie to stop someone being disappointed or cross with me” (invalid responses include “never” or “once or twice in my life”). The other two validity questions were “Please select the response that fits best for you to this statement: In the past fortnight I have slept less than 2 hours a night” (valid if participant responds “not at all true” or “not very true”) and “If you are reading this question please select 2” (valid if participant selects 2).

The Diachronic Disunity Scale (DDS; Lampinen et al., 2004) assesses diachronicity on a 9-point scale that ranges from high (i.e., diachronic unity), “I am the same person” (4) to low (i.e., diachronic disunity), “I am not the same person” (-4). It also assesses the degree to which participants believe they have changed, “I have changed a great deal” (4) versus have not changed, “I haven’t changed at all” (-4), over the past 5 years. Due to limitations of Qualtrics software, this format had to be slightly adjusted such that participants dragged a

slider on a scale from 0-100 (as opposed to the -4 to 4 scale) to indicate their diachronicity and change ratings at the time of completing the scale compared to 5 years ago. Because of the focus of this study, only the diachronicity score was used. Original scores from 0-100 were converted to a range from 0-8, where 0 indicated the person felt they were the same, and 8 indicated the person felt they were not the same. Whilst existing psychometric data is limited on this measure, it has been used in several studies (e.g., Dorahy et al., 2021, Lampinen et al., 2004).

The Me/Not Me (MNM) task (Ersner-Hershfield et al., 2009) measures an individual's temporal self-continuity, and for the purpose of this study was also included as a second measure of diachronicity. Participants are shown a list of 20 words including 10 negative words (fearful, demanding, worrying, tense, impractical, stubborn, clumsy, unhappy, withdrawn, and nervous) and 10 positive words (calm, casual, untiring, moral, hopeful, confident, easy-going, informal, outgoing, and positive). In three separate phases participants rate their present, past (10 years ago), and future (10 years from now) self with respect to each word, along a 6-point scale from "the word does not describe me at all" (1), to "the word perfectly describes me" (6). An absolute value was calculated for the change in rating between current and past and current and future for each word and then these were summed to create two temporal diachronicity ratings: past-present (PP); present-future (PF). These ranged from 0 to 6, with 0 indicating no change (i.e, diachronic unity) and 6 indicating very high levels of perceived change in identity over time (i.e, diachronic disunity). This scale has been found to have good psychometric properties (Sokol & Serper, 2017).

The Venn Continuous Identity task (VCI; Sokol & Eisenheim, 2016) is intended to measure a sense of continuous identity. For the purpose of this study, a modified version was included as a third measure of diachronicity. Participants were presented with seven pairs of circles; in each pair, one circle was labelled "current self," and the other circle was labelled

"past self" or "future self". The circles within each pair ranged from depicting no overlap to depicting almost complete overlap. Participants selected the circle pair that best described how similar and how connected they felt to their past self, 10 years ago. They were then presented with the same image but the "past self" label was replaced with "future self" for all circle pairs, and participants were instructed to select the circle pair that best described how similar and how connected they felt to their future self, 10 years from now. Scores for the VCI range from 1-7 (lower scores indicating higher diachronic disunity, from present to past (PP) and present to future (PF)). This task has demonstrated adequate test-retest reliability (r = .66, p <.01; Ersner-Hershfield et al., 2009). The MNM and the VCI are correlated (r = .61, p < .01; Sokol & Eisenheim, 2016) and therefore assumed to largely measure similar constructs.

The DCI is designed to measure and distinguish two distinct forms of dissociation - detachment and compartmentalization (Butler, Dorahy & Middleton, 2019) - and so DCI was included as a measure of trait dissociation. It contains 22 items (e.g., "What I see looks 'flat' or 'lifeless', as if I am looking at a picture") rated on an 8-point scale from "It has never happened to you" (0) to "It happens daily to you" (7). Of the 22 items, the DCI contains two items designed to assess for validity of participants responses. In order to measure whether a participant passes these two questions, scores of one or above are transformed into one, then a mean is created from these two scores. Participants pass the validity test if the mean of both items is .5 or 1. An overall mean of the full 20 items (not including the validity items) was computed. Scores range from 0-7. Higher scores indicate greater trait dissociation. The DCI has been shown to be both reliable (Cronbach's alpha coefficient of 0.97) and valid (Butler et al., 2019).

In this study, the Modified Peritraumatic Dissociative Experiences Scale (MPDEQ, Marshall, Orlando, Jaycox, Foy & Belzberg, 2002) was used to measure state dissociation

during the time the participant was completing the survey. The measure contains eight items, rated on a 5-point scale from “not true at all” (1) to “extremely true” (5) (e.g., “My sense of time changed – things seemed to be happening in slow motion”). A single mean score of the eight items were calculated. Scores range from 1-5; higher scores indicating higher state dissociation. This scale was found elsewhere to be a reliable measure of dissociative experiences (state dissociation) (internal consistency reliability estimated at 0.75) (Marshal et al., 2002).

The Thinking about Life Experiences (TALE-15) Scale (Bluck & Alea, 2011) is designed to assess the self, social, and directive functions of autobiographical memory, and was included in this study as a measure of autobiographical reasoning. Two of the three subscales were included (as they were deemed most relevant to the current study); self-continuity function (SCF) and directing-behaviour function (DBF) (yielding a total of 10 items). Self-continuity function measures the degree to which an individual thinks about the past in order to consider whether they are changing or staying the same over time. Directing-behaviour function measures how much an individual draws on their past in order to direct their present and future behaviour. Two general questions were asked in the beginning requesting that participants rate how often they think back over their life and how often they talk about their life. Responses were made on a 5-point scale (1) “almost never” to (5) “very frequently”. Using the same scale, participants then rated frequency of reasons for thinking back over their lives (e.g., “when I want to feel I am the same person as I was before”). Scores from the two subscales were averaged to produce a two final function scores ranging from 1-5 (higher scores indicating higher levels of self-continuity and directing-behaviour function). The psychometric properties of this scale are strong, with each subscale achieving good internal consistency (Bluck & Alea, 2011).

The Survey of Autobiographical Memory (SAM) is designed to measure self-reported memory functioning (Palombo, Williams & Levine, 2013). The SAM contains 26 items rated on a 5 point scale from “strongly disagree” (1) to “strongly agree” (5) (e.g., “Specific events are difficult for me to recall”). A total of 7 items are reverse coded and therefore were adjusted prior to analysis (questions 1, 2, 10, 13, 17, 18, 26). A final score was calculated by computing the mean from all items. Mean scores may range from 1 to 5 with lower scores indicating poorer self-reported autobiographical memory functioning. The SAM has been found to have good psychometric properties and be a valid measure of self-reported autobiographical memory (Palombo, Williams & Levine, 2013).

The Clinical Outcomes in Routine Evaluation (CORE-10) is a self-report questionnaire designed to be administered before and after therapy to measure how the client has been feeling over the last week (Barkham et al., 2013). CORE-10 was included here to provide a general measure of wellbeing. It contains 10 items answered on a 5-point scale from “not at all” (0) to “most or all of the time” (4) (e.g., “I have felt tense, anxious or nervous”). Items are designed to measure four domains; subjective-wellbeing, problems/symptoms, life functioning, and risk (to self and others). Items were summed for a final score which ranges from 0-40 (lower scores indicating better general wellbeing). The CORE-10 has good psychometric properties (Barkham et al., 2013).

Two measures of sense of self were included, the Self-Concept Clarity Scale (SCCS; Campbell et al., 1996) and the Sense of Self Scale (SOSS; Flury & Ickes, 2007), given the conceptual variation in sense of self and to ensure an accurate understanding of this concept was captured. The SCCS (Campbell et al., 1996) measures the extent to which an individual’s self-concept is “clearly and confidently defined, internally consistent, and temporally stable” (p. 141). It contains 12 items rated on a 5-point scale from “not at all” (0) to “very much” (4) (e.g., “My beliefs about myself often conflict with one another”). A total of 10 items are

reverse coded and therefore were adjusted prior to analysis (question 1, 2, 3, 4, 5, 7, 8, 9, 12). All scores were summed to produce a final score which can range from 0-68, but average around 29 (lower scores indicating less self-concept clarity). Campbell et al. (1996) assessed the SCCS and reported the psychometric properties of this instrument are sound.

According to Flury & Ickes (2007) the SOSS is a robust tool with strong psychometric properties, and is designed to measure four components of a weak sense of self. These components include; lack of understanding of oneself; sudden shifts in feelings, opinions, and values; tendency to confuse one's feelings, thoughts, and perspectives with those of others; the feeling that one's very existence is tenuous. The scale contains 12 items rated on a 4-point scale from "very characteristic of me" (1) to "very uncharacteristic of me" (4) (e.g., "I wish I were more consistent in my feelings"). A total of three items are reverse coded and therefore were adjusted prior to analysis (question 4, 7 and 12). Scores were summed and range from 12-48 (lower scores indicating a weaker sense of self).

Procedure

Ethics approval was sought and granted from the University of Canterbury Human Ethics Committee (2020/119). Participants were recruited through the Qualtrics database to derive a representative sample of the New Zealand population based on age and gender. Participants followed a link providing information about the survey. By completing the questionnaire participants were giving consent for their responses to be used anonymously in the study. The survey took approximately 30 minutes to complete. The respondents received a non-monetary incentive that meets minimum wage in NZ (pro-rated for survey length) at a maximum of NZD$8 per respondent.

Data Analysis

The inclusion/exclusion criteria were defined as follows. Any participants who did not complete the survey to 100% were not included in analysis. Furthermore, if participants

failed any of the four validity questions positioned throughout the survey their responses were also excluded from analysis.

Exploratory data analysis (using SPSS version 27) was conducted to examine the reliability of the different scales, examine skewness and kurtosis and to ensure no violation of the assumptions of normality, linearity, multicollinearity and homoscedasticity (see Appendix B for details). Descriptive statistics on demographic variables were then calculated. Then, hierarchical multiple regression was used to assess which variables (state and trait dissociation, autobiographical reasoning, autobiographical memory, wellbeing, self-concept clarity and sense of self) predict diachronic disunity. Hierarchical multiple regression was used, with trait dissociation added in the first block, state dissociation in the second block and all remaining variables (autobiographical reasoning, autobiographical memory, wellbeing, self-concept clarity and sense of self) in the third block. This strategy was adopted as trait dissociation was hypothesised to be a particularly powerful predictor of diachronic disunity (e.g., Lampinen et al., 2004), and it was therefore important to assess the initial influence of it. An alpha level of .05 was used for all statistical tests.

Results

Exploratory Data Analysis

Descriptive statistics and internal consistency were computed for the predictor and outcome variables (see Table 1). Given the DDS and VCI scales produce only a single score, a Cronbach alpha coefficient could not be computed.

Table 1

Descriptive Statistics and Internal Consistency for Predictor and Outcome Variables

Scale	Mean (Standard Deviation)	Cronbach alpha coefficient (α)
DCI	1.45 (1.32)	.95
MPDEQ	1.82 (.90)	.93
TALE (SCF)	2.46 (.97)	.88
TALE (DBF)	2.96 (.93)	.88
SAM	3.07 (.40)	.89
CORE	13.08 (6.51)	.73
SCCS	20.55 (9.67)	.85
SOSS	31.47 (6.19)	.88
DDS	1.33 (2.72)	
MNM (PP)	.81 (.60)	.90
VCI (PP)	4.47 (1.91)	
MNM (PF)	.74 (.63)	.88
VCI (PF)	4.83 (1.97)	

Skewness and kurtosis were examined for the predictor and outcome variables. According to Tabachnick and Fidell (2013), with large samples (200 or more) tests of skewness and kurtosis are too sensitive. Therefore, the shape of the distribution is the best measure of skewness and kurtosis, as opposed to the skewness and kurtosis statistics themselves. Upon examining data for normality, the DDS, VCI (PF), DCI and MPDEQ were considered skewed. However, for multiple regression the variables need not be normally distributed, but rather the residuals should be. Upon examination of the residuals, they were found to be normally distributed. See Appendix B for further details on how the assumptions of multiple regression were met.

All predictor variables were correlated with the outcome variables with the exception of the SAM, which did not correlate with any outcome variable. However, given the theoretical link between autobiographical memory and diachronic disunity, and for completeness of analyses (see Table 2 for correlations between outcome and predictor variables) the SAM was retained and included in the regression analyses.

Table 2

Pearson's Correlations (two-tailed) between all Predictor and Outcome Variables

		DDS	MNM (PP)	MNM (PF)	VCI (PP)	VCI (PF)	TALE (SCF)	TALE (DBF)	SAM	DCI	MPDEQ	CORE	SCCS	
DDS	Pearson's r													
	Sig.													
MNM	Pearson's r	-.29**												
(PP)	Sig.	<.001												
MNM	Pearson's r	-.19**	.51**											
(PF)	Sig.	.002	<.001											
VCI	Pearson's r	.34**	-.39**	-.27**										
(PP)	Sig.	<.001	<.001	<.001										
VCI	Pearson's r	.27**	-.26**	-.25**	.45**									
(PF)	Sig.	<.001	<.001	<.001	<.001									
TALE	Pearson's r	-.25**	.31**	.25**	-.19**	-.23**								
(SCF)	Sig.	<.001	<.001	<.001	.002	<.001								
TALE	Pearson's r	-.24**	.27**	.19**	-.12	-.18**	.71**							
(DBF)	Sig.	<.001	<.001	.002	.055	.004	<.001							
SAM	Pearson's r	-.01	.01	.08	-.04	.03	.20**	.30**						
	Sig.	.807	.863	.213	.552	.623	.002	<.001						
DCI	Pearson's r	-.26**	.39**	.32**	-.34**	-.30**	.40**	.25**	.09					
	Sig.	<.001	<.001	<.001	<.001	<.001	<.001	<.001	.155					
MPDEQ	Pearson's r	-.24**	.31**	.27**	-.30**	-.24**	.38**	.22**	.12	.76**				
	Sig.	<.001	<.001	<.001	<.001	<.001	<.001	<.001	.062	<.001				
CORE	Pearson's r	-.23**	.28**	.35**	-.35**	-.32**	.34**	.25**	.20**	.59**	.54**			
	Sig.	<.001	<.001	<.001	<.001	<.001	<.001	<.001	.002	<.001	<.001			
SCCS	Pearson's r	-.36**	.39**	.43**	-.42**	-.38**	.49**	.33**	.20**	.60**	.56**	.60**		
	Sig.	<.001	<.001	<.001	<.001	<.001	<.001	<.001	.001	<.001	<.001	<.001		
SOSS	Pearson's r	.25**	-.31**	-.32**	.27**	.36**	-.39**	-.24**	-.08	-.47**	-.42**	-.37**	-.54**	
	Sig.	<.001	<.001	<.001	<.001	<.001	<.001	<.001	.231	<.001	<.001	<.001	<.001	

**. Correlation is significant at the 0.01 level (2-tailed).
N = 251 for all scales

Multiple Regression

Diachronicity Past to Present

Hierarchical multiple regression was undertaken to assess the ability of the DCI, MPDEQ, TALE (SCF & DBF), SAM, CORE, SCCS, and SOSS to predict DDS scores (see Table 3). The DCI was added at Step 1 and significantly explained 6.5% of the variance in the DDS, $F(1, 249) = 18.47$, $p < .001$. After inclusion of the MPDEQ at Step 2 the total variance explained by the model increased only slightly to 6.6%, $F(1, 248) = 1.06$, $p = .30$,

with only the DCI accounting for significant variance. However, the DCI was no longer significant after the remaining variables were included in the final model, with only the SCCS (p < .001) and TALE (DBF) ($p = 0.04$) accounting for significant variance. The final model explained 13.3%, $F(6, 242) = 4.21$, $p < .001$, of the variance in the DDS.

Table 3

Summary of Hierarchical Regression Analysis for Variables Predicting DDS scores (N = 251)

	Step 1					Step 2					Step 3				
	B	*SE B*	*β*	t	Sig.	*B*	*SE B*	*β*	t	Sig.	*B*	*SE B*	*β*	t	Sig.
DCI	.54	.13	.26	4.30	< .001	.39	.19	.19	1.99	.05	.06	.21	.03	.29	.77
MPDEQ						.29	.29	.10	1.03	.30	.09	.28	.03	.31	.76
TALE (SCF)											-.11	.26	-.04	-.42	.67
TALE (DBF)											.52	.25	.18	2.06	.04
SAM											-.64	.43	-.09	-1.51	.13
CORE											-.00	.03	-.01	-.13	.90
SCCS											.08	.02	.28	3.23	< .001
SOSS											-.02	.03	-.05	-.73	.46
Adjusted R^2	.065					.066					.133				
F for change in R^2	18.47*					1.06					4.21*				

*$p < .05$

Hierarchical multiple regression assessed the ability of the DCI, MPDEQ, TALE (SCF & DBF), SAM, CORE, SCCS, and SOSS to predict MNM (PP). Step 1 involving DCI accounted for 14.8% of the variance, $F(1, 249) = 44.44$, $p < .001$ (see Table 4). After inclusion of the MPDEQ at Step 2, the total variance explained was 14.5%, with the DCI continuing to be a unique significant contribution, but not the MPDEQ, $F(1, 248) = .22$, $p = .64$. In the third step, the additional six variables contributed a further 5.5% to explaining the variance in MNM (PP), $F(6, 242) = 3.81$, $p = .001$ (20%). The DCI remained a significant contributor to explained variance in MNM (PP) scores. In the final step, the SCCS was also a significant predictor of MNM (PP) scores ($p = 0.02$).

Table 4

Summary of Hierarchical Regression Analysis for Variables Predicting MNM(PP) Diachronic Disunity (N = 251)

	Step 1					Step 2					Step 3				
	B	*SE B*	*β*	t	Sig.	*B*	*SE B*	*β*	t	Sig.	*B*	*SE B*	*β*	t	Sig.
DCI	.17	.03	.39	6.67	< .001	.16	.04	.36	3.93	< .001	.09	.04	.21	2.20	.03
MPDEQ						.03	.06	.04	.47	.64	-.01	.06	-.02	-.17	.86
TALE (SCF)											.01	.05	.01	.13	.90
TALE (DBF)											.10	.05	.16	1.93	.05
SAM											-.15	.09	-.10	-1.67	.10
CORE											-.00	.01	-.01	-.11	.91
SCCS											.01	.00	.20	2.32	.02
SOSS											-.01	.01	-.08	-1.1	.23
Adjusted R^2	.148					.145					.200				
F for change in R^2	44.44*					.22					3.81*				

* $p < .05$

The hierarchical multiple regression assessing VCI (PP) scores showed that the DCI explained a significant 11.6% of variance in Step 1, $F(1, 249) = 33.66$, $p < .001$ (see Table 5). At Step 2 the addition of the MPDEQ did not make a unique contribution, $F(1, 248) = .97$, $p = .32$, with the total variance explained 11.5%. At this step only DCI was found to be significant. In the third step, the additional six variables contributed a further 6.3% to the explained variance of VCI (PP), $F(6, 242) = 4.13$, $p < .001$ (17.8%). Whilst the DCI significantly contributed to variance in Step 1 and 2, it was no longer significant in Step 3, with only SCCS ($p = .01$) accounting for significant variance observed.

Table 5

Summary of Hierarchical Regression Analysis for Variables Predicting VCI(PP) Diachronic Disunity (N = 251)

	Step 1					Step 2					Step 3				
	B	*SE B*	*β*	t	Sig.	*B*	*SE B*	*β*	t	Sig.	*B*	*SE B*	*β*	t	Sig.
DCI	-.50	.09	-.34	-5.80	< .001	-.40	.13	-.28	-2.99	< .001	-.13	.14	-.09	-.95	.34
MPDEQ						-.19	.20	-.09	-.99	.32	.00	.19	.00	.02	.98
TALE (SCF)											.07	.18	.01	.37	.71
TALE (DBF)											< .001	.17	< .001	-.00	.99
SAM											.25	.29	.05	.85	.40
CORE											-.04	.02	-.12	-1.58	.12
SCCS											-.06	.02	-.31	-3.56	.01
SOSS											.01	.02	.03	.44	.66
Adjusted R^2	.116					.115					.178				
F for change in R^2	33.66*					.97					4.13*				

*$p < .05$

Diachronicity Present to Future

Hierarchical multiple regression for the prediction of MNM (PF) scores, showed the DCI accounted for a significant 10.0% of the variance observed, $F(1, 249) = 28.76$, $p < .001$ (see Table 6). After entry of the MPDEQ at Step 2 the total variance explained was 9.8%, with only trait dissociation not the MPDEQ, $F(1, 248) = .39$, $p = .53$, uniquely explaining MNM (PF) scores. In the third step, the additional six variables contributed a further 8.8% of explained variance of MNM (PF) scores, $F(6, 242) = 5.48$, $p < .001$ (18.6%). Whilst DCI significantly contributed to variance in MNM (PF) in Step 1 and 2, it was no longer significant in Step 3, with only SCCS ($p < .001$) accounting for significant variance.

Table 6

Summary of Hierarchical Regression Analysis for Variables Predicting MNM(PF) Diachronic Disunity (N = 251)

	Step 1					Step 2					Step 3				
	B	*SE B*	*β*	t	Sig.	*B*	*SE B*	*β*	t	Sig.	*B*	*SE B*	*β*	t	Sig.
DCI	.15	.03	.32	5.36	< .001	.13	.01	.28	2.9	.00	.02	.04	.05	.55	.58
MPDEQ						.04	.06	.06	.62	.53	-.03	.06	-.05	-.58	.56
TALE (SCF)											-.01	.05	-.01	-.09	.93
TALE (DBF)											.033	.05	.05	.61	.54
SAM											-.04	.09	-.01	-.40	.69
CORE											.01	.01	.14	1.80	.07
SCCS											.02	.01	.27	3.21	.00
SOSS											-.01	.01	-.11	-1.59	.11
Adjusted R^2	.100					.098					.186				
F for change in R^2	28.76*					.39					5.48				

*$p < .05$

The hierarchical multiple regression assessing VCI (PF) scores, show that the DCI predicted a significant 8.6% of the variance at Step 1, $F(1, 249) = 24.63$, $p < .001$ (see Table 7). Adding the MPDEQ in Step 2 did not significantly add additional variance, $F(1, 248) = .15$, $p = .70$, with the total explained 8.3%, and the DCI the only significant contributors. In the third step, the additional six variables contributed a further 10% to the variance of VCI (PF), $F(6, 242) = 6.04$, $p < .001$ (18.3%). Whilst the DCI significantly contributed to variance in VCI (PF), in Step 1 and 2, it was no longer significant in Step 3, with SCCS ($p = .01$), SOSS ($p < .001$), and SAM ($p = .03$) accounting for significant variance.

Table 7

Summary of Hierarchical Regression Analysis for Variables Predicting VCI(PF) Diachronic Disunity (N = 251)

	Step 1					Step 2					Step 3				
	B	*SE B*	*β*	t	Sig.	*B*	*SE B*	*β*	t	Sig.	*B*	*SE B*	*β*	t	Sig.
DCI	-.45	.09	-.30	-4.96	< .001	-.41	.14	-.27	-2.90	.00	-.06	.15	-.04	-.43	.66
MPDEQ						-.08	.20	-.04	-.38	.70	.12	.20	.05	.60	.55
TALE (SCF)											.08	.18	.04	.46	.65
TALE (DBF)											-.22	.18	-.10	-1.21	.23
SAM											.66	.30	.14	2.22	.03
CORE											-.04	.02	-.13	-1.73	.08
SCCS											-.04	.02	-.22	-2.52	.01
SOSS											.06	.02	.20	2.81	.00
Adjusted R^2	.086					.083					.183				
F for change in R^2	24.63*					.15					6.04*				

*$p < .05$

Discussion

This study aimed to examine the impact of state and trait dissociation, autobiographical reasoning, autobiographical memory functioning, subjective wellbeing, sense of self and self-concept clarity on diachronic disunity (past to present; present to future). As hypothesised, higher levels of trait dissociation and reduced self-concept clarity were significantly associated with higher levels of diachronic disunity. Furthermore, autobiographical reasoning, autobiographical memory functioning, and sense of self were found to be weak, yet significant, predictors of diachronic disunity in some, but not all, of the diachronicity measures. Conversely to expected results, state dissociation, and subjective wellbeing did not predict diachronic disunity.

Previous Literature

In line with the findings of Lampinen et al. (2004), higher levels of trait dissociation predicted a greater sense of diachronic disunity. However, the current study was unable to establish a link between state dissociation and diachronic disunity, that Lampinen et al. (2004) suggested exploring. The current study was also not able to establish a clear link between diachronic disunity and autobiographical memory functioning, as proposed by Sokol, Conroy and Weingartner (2017). Though Habermas and Köber (2015) found that autobiographical reasoning was positively correlated with a sense of diachronic unity, this was replicated in only one of the five diachronicity measures (VCI(PF)). The current study was the first to examine self-concept clarity and its link with diachronicity in the general population. Self-concept clarity consistently predicted scores on all five measures. The related concept of sense of self was found to be significant in one of the five measures of diachronicity. The various findings linking diachronic disunity with mental health symptoms (Sokol & Serper, 2019; Sokol & Eisenheim, 2016) were also not replicated.

Diachronic Disunity Scales

Three separate scales were utilized to assess self-continuity over time (DDS, MNM and VCI). All three scales measured diachronic disunity from past to present, and the last two also measured diachronic disunity from present to future. This yielded five measures for diachronic disunity. Given the exploratory nature of this study, all five scales were used in the analysis, including the measurement of both past to present and present to future diachronicity. Using multiple scales also enabled a greater level of interrogation of results in terms of the robustness of predictors. However, upon examination of the correlations between these different ways of measuring diachronicity, only low to moderate associations were observed. This suggests that while conceptually there is some degree of overlap between these scales, they each appear to account for some unique variance.

Diachronic disunity is a complicated phenomenon. It is therefore likely the range of scales used in this study have captured different aspects of sense of self across time, considering the differing nature in which the construct is measured by each tool. For example, overtly asking participants if they feel they are unified (DDS; Lampinen et al., 2004), or requiring participants to judge their diachronicity visually (VCI; Sokol & Eisenheim, 2016), or more subtly having participants rate words in relation to their connection to one's past, present and future selves (MNM; Ersner-Hershfield et al., 2009) will likely capture different parts of the diachronic disunity phenomenon. The DDS and VCI both capture a global self-appraisal, by broadly asking participants the degree to which they are unified. Conversely, the MNM differs from the DDS and VCI as it captures specific dimensions of the self. It is anchored to a concrete representation of the self, through one's personality characteristics. However, overall, the DDS and VCI did not correlate any more highly with one another than with the MNM.

All scales require some degree of self-awareness and meta-appraisals of the self to judge one's own level of diachronicity; possibly the DDS and the VCI do this more so than the MNM. However, all the diachronicity scales rely on subjective responses and therefore interpretation may vary from participant to participant. Consequently, the final results themselves may vary to a large degree depending on individual interpretation, which may explain the low to moderate correlations between these scales. It is also possible that based on the skewness of the outcome variables, particularly the MNM task, the way the question is posed does not capture the full amount of variation within the concept of diachronic disunity. Alternatively, it may be the case that this phenomenon is not as continuous as once thought, and perhaps more categorical in nature.

More understanding of the nuances between these scales can be found by examining the differences between the scales measuring diachronicity from the past to present and

present to future. Conceptually, they are different regarding the time frame one is judging their diachronicity in. The scales measuring past to present diachronicity are a judgement of lived experiences, whereas the scales measuring present to future are a prediction of one's potential diachronicity in the future. Theoretically, the scales measuring diachronicity from past to present should be highly correlated and the scales measuring diachronicity from present to future should be highly correlated. However, in the current study these correlations were in the low to moderate range. Further research is needed to fully understand these counter-intuitive findings.

Self-Concept Clarity and Diachronic Disunity

Of all the predictor variables, self-concept clarity was the only one to consistently predict diachronic disunity with all five outcome variables. This means that having a better self-concept clarity appears to be associated with an increased likelihood of a person feeling diachronically unified (i.e., having a better sense of self across time) regardless of how diachronicity is assessed. It seems that self-concept clarity and diachronic unity are conceptually similar, with both concepts capturing the stability of an individual's sense of self over time.

In interpreting this conceptual similarity, it is important to understand the nature of both measures. Self-concept clarity refers to "the extent to which self-beliefs are clearly and confidently defined, internally consistent, and stable" (Campbell et al., 1996, p.141). It involves a meta-appraisal of self, requiring individuals to appraise or assess how much conflict they have within themselves. It captures self-concept clarity upon a continuum, from a lack of connection with self, and inner conflict regarding identity, through to a sense of knowing oneself.

Diachronicity also ranges on a continuum from a lack of connection with self and is a measure that captures unity over time. Diachronic disunity is the sense that one views their

self now as different from how they viewed their self in the past, as a result of not incorporating experiences and changes into their sense of self, in contrast to unified individuals who view themselves as the same person over time (Lampinen et al., 2004). Unlike, self-concept clarity diachronic unity *does not* appraise how a person experiences their self in the moment. Similar to self-concept clarity, however, it does capture how connected one feels to their self across time.

This conceptual overlap may be a possible explanation as to why self-concept clarity consistently predicted diachronic disunity. Internal consistency and stability of understanding the self, as underpinning features of self-concept clarity, may be foundational for individuals who are more diachronically unified, while the absence of these capabilities may lead to the inability to establish a unified self, in the present as well as over time. This connection was demonstrated in the multiple regression analyses where self-concept clarity remained a salient predictor of diachronic disunity, independent of the model/stage of analysis.

Self-Concept Clarity and Trait Dissociation

An interesting finding in the current study was that trait dissociation significantly predicted diachronicity until the inclusion of self-concept clarity, where in four out of five outcome measures, trait dissociation was no longer significant. The similarities between self-concept clarity and trait dissociation may have resulted in the diminished effect of trait dissociation on diachronic disunity by self-concept clarity. Both self-concept clarity and trait dissociation require self-reflection and capture experiences of the self, particularly experiences or feelings of one's self being internally challenged or in conflict. Items on the DCI that may fit with the SCCS include; "I have strong feelings that do not seem to belong to me" and "At times I feel disconnected from a body that does not seem like mine" (Butler, Dorahy & Middleton, 2019). Items on the SCCS that may fit with the DCI include; "On one day I might have one opinion of myself and on another day I might have a different opinion"

and “When I think about the kind of person I have been in the past, I'm not sure what I was really like” (Campbell et al., 1996). This conceptual overlap in the measures may in part explain the impact of self-concept clarity on trait dissociation in the hierarchical regression analysis, where self-concept clarity washes out the variance explained by dissociation when it is added. However, there are aspects of these concepts that are also distinct from one another. Self-concept clarity captures an individual’s global perception of self-stability, whereas trait dissociation is about an individual’s tendency to dissociate (Bremner, 2010), including experiencing “a loss of continuity in subjective experience”, “involuntary and unwanted intrusions”, “symptoms such as gaps in awareness, memory, or self-identification” and “a sense of experiential disconnectedness” (Cardeña & Carlson, 2011, p. 251-252). Despite the similarities noted, self-concept clarity may be a more potent indicator of diachronic disunity than dissociative symptoms, particularly trait dissociation, as it offers a more global measure of self-functioning, likely impacted on by diachronicity.

The hierarchical regression with MNM (PP) as the outcome measure of diachronic disunity, was the only measure in which trait dissociation remained a significant predictor after the addition of other variables (with self-concept clarity being the only other significant one). This finding suggests trait dissociation contributed something unique to diachronic disunity as measured by the MNM (PP). A possible explanation is that if an individual has a higher degree of trait dissociation this may impact the stability of an individual’s self-appraisals, specifically when they are asked to reflect on explicit aspects of their self. In the MNM scale participants reflect on the diachronicity of their personality characteristics. Therefore, trait dissociation seems to be associated with specific aspects of the self, and how they relate to one’s past to present diachronicity specifically.

Additional Findings

Further findings in the current study include the significance of autobiographical reasoning (specifically the directing behaviour subscale) in the hierarchical regression involving the DDS. Autobiographical reasoning may be significant specifically in the DDS because the wording of the DDS question requires individuals to draw more heavily on their life experiences to respond (see appendix A for wording of full question). The DDS requires a meta-appraisal of the self, whereas the other diachronicity scales give either a visual anchor for individuals to judge their diachronicity (VCI), or uses specific cues (MNM; i.e. personality characteristics). Therefore, it may be the case that more autobiographical reasoning was required to make appraisals of diachronicity for the DDS than the VCI and MNM scales.

Sense of self and autobiographical memory functioning were also significant predictors of diachronic disunity, on the VCI (PF). It may be that this measure of diachronicity is more sensitive to sense of self and autobiographical memory functioning, compared to the other measures of diachronicity. One explanation could be that a person who has more confidence in their ability to remember, also has clearer feelings about their sense of self and therefore has a better capacity to see themselves as unified into the future. This seems to be the case when diachronicity is assessed pictorially (VCI (PF)), and is not the case when it is assessed with words (i.e., MNM task). Therefore, a pictorial assessment of diachronic disunity may be more sensitive when assessing sense of self and memory. This is consistent with the literature on autobiographical memory that verbal and visual cues can differentially impact autobiographical memory (Ridout, Dritschel, Matthews & O'Carroll, 2016).

Implications and Applications

These findings help in enriching the currently somewhat limited field of research surrounding diachronic disunity. They suggest that diachronic disunity can be predicted by trait dissociation and self-concept clarity. The predictive relationship between self-concept clarity and diachronic disunity is a particularly important finding, given it has been largely understudied and therefore not well established in the literature. Such knowledge could be applied in a therapeutic context, by allocating appropriate resources and efforts for treatment. Specifically, individuals who experience trait dissociation may need additional support and psychoeducation regarding the impact this has on their sense of who they are, both in the present moment and across time. Normalising their experience may be an important step in their therapeutic journey and understanding of themselves.

Limitations and Strengths

This study is limited by a general population sample that were not representative on education, relationship status and ethnicity, which may have an impact on the generalisation of results. In addition, the literature review suggested a potential link between diachronic disunity and validated measures of autobiographical memory and reasoning, psychiatric symptoms, dissociation and sense of self. Despite this, only self-concept clarity and trait dissociation predicted diachronic unity. This may reflect a robust empirical finding, but could also represent problems utilising measures of other constructs in this sample, which might underpin their validity. Replication in representative samples, use the current, as well as other measures of the central variables assessed is a priority for future work.

This study is unique in the sense that it is the first to examine diachronic disunity in different ways and its relationship with a number of variables (particularly, autobiographical reasoning, autobiographical memory functioning, subjective wellbeing, and sense of self), in individuals in the general population. Therefore, despite the study's limitations, it does

indeed contribute important new findings to the field and provides a sound point of departure for future research.

Future Directions

A number of other studies have examined factors associated with diachronicity. Personality factors such as introversion, neuroticism, antagonism, and restricted conscientiousness have all been found to be associated with higher levels of diachronic disunity (Hertler, Krauss & Ward, 2014). Further research could investigate these factors in combination with trait dissociation and self-concept clarity, the factors that yielded the most significant results in the current study. Additionally, given the relationship between self-concept clarity and dissociation, future studies could continue to explore this connection and attempt to replicate the data. In order to begin to apply these findings, research is needed to determine if or how these factors (i.e. diachronic disunity and poor self-concept clarity) can be treated in a therapeutic setting.

Conclusion

This study found that higher levels of trait dissociation and reduced self-concept clarity were significantly associated with higher levels of diachronic disunity. In some, but not all, of the diachronicity measures, autobiographical reasoning, autobiographical memory functioning, and sense of self were found to be weak yet significant predictors of diachronic disunity. These findings were somewhat consistent with previous literature. The findings have implication for both practice and future research, specifically, they help to enrich the understanding of the somewhat elusive phenomena of diachronic disunity.

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Appendices

Appendix A: All scales used in the study

Diachronic Disunity Scale (DDS; Lampinen et al., 2004)

Some people have the sense that they have changed a lot over the last 5 years and other people feel that they have not changed much at all. Some people think of themselves as being a different person than they were 5 years ago. Keep in mind that these are slightly different statements. For instance, you can believe you have changed a lot but still see yourself as basically the same person. Or you could think of yourself as actually being a different person than you were 5 years ago.

1. Have you changed or haven't you changed in the past 5 years (please select the response that best applies to you)?
2. Are you the same or not the same person (please select the response that best applies to you)?

Me/Not Me task (MNM; Sokol & Serper, 2017)

Now you will see a series of trait words. Some of the words will have applied to you **10 years ago**, some will apply to you **now**, and some will apply to you **ten years from now**.

In this part of the study, we are interested in how you viewed yourself **10 years ago**. We will show you a series of words, and we will ask you to indicate whether or not each word described you **10 years ago**.

In this part of the study, we are interested in how you view yourself **now**. We will show you a series of words, and we will ask you to indicate whether or not each word describes you **now**.

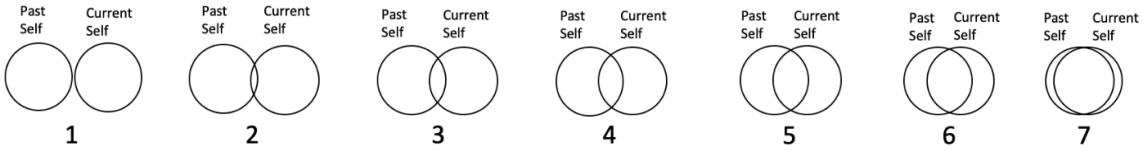
In this part of the study, we are interested in how you view yourself **in the future**. We will show you a series of words, and we will ask you to indicate whether or not each word describes you **in the future (10 years from now)**.

The word does not describe me at all
The word describes me a little
The word is somewhat descriptive
The word describes me quite a bit
The word describes me quite a lot
The word describes me perfectly

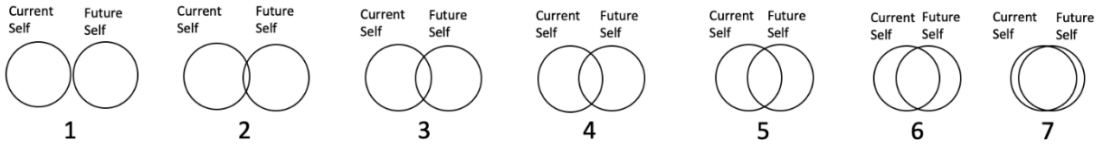
1. Fearful
2. Demanding
3. Worrying
4. Tense
5. Impractical
6. Stubborn
7. Clumsy
8. Unhappy
9. Withdrawn
10. Nervous
11. Calm
12. Casual
13. Untiring
14. Moral
15. Hopeful
16. Confident
17. Easygoing
18. Informal
19. Outgoing
20. Positive

Venn Continuous Identity task (VCI; Sokol & Eisenheim, 2016)

1. Select the circle pair pictured above that best describes how similar and how connected you feel to your **past self, 10 years ago**.



2. Select the circle pair pictured above that best describes how similar and how connected you feel to your **future self, 10 years from now.**



Thinking about Life Experiences Scale (TALE-15; Bluck & Alea, 2011)

Sometimes people think back over their life or talk to other people about their life: it may be about things that happened quite a long time ago or more recently. We are not interested in your memory for a particular event, but more generally in how you bring together and connect the different events and periods of your life.

Almost never
Seldom
Occasionally
Often
Very frequently

1. In general, how often do you think back over your life?
2. In general, how often do you talk to others about what's happened in your life?

I think back over or talk about my life or certain periods of my life . . .

3. When I want to feel that I am the same person that I was before.
4. When I want to remember something that someone else said or did that might help me now.
5. When I am concerned about whether I am still the same type of person that I was earlier.
6. When I believe that thinking about the past can help guide my future.
7. When I am concerned about whether my values have changed over time.
8. When I want to try to learn from my past mistakes.
9. When I need to make a life choice and I am uncertain which path to take.
10. When I want to remember a lesson I learned in the past.
11. When I am concerned about whether my beliefs have changed over time.
12. When I want to understand how I have changed from who I was before.

Survey of Autobiographical Memory (SAM; Palombo, Williams & Levine, 2013)

Please indicate the strength of your agreement with each of the following statements. When answering, don't think about just one event; rather, think about your general ability to remember specific events.

Strongly disagree
Disagree somewhat
Neither agree nor disagree
Agree somewhat
Agree strongly

1. Specific events are difficult for me to recall.
2. When I remember events, I have a hard time determining the order of details in the event.
3. When I remember events, in general I can recall objects that were in the environment.
4. When I remember events, in general I can recall what I was wearing.
5. I am highly confident in my ability to remember past events.
6. When I remember events, I remember a lot of details.
7. When I remember events, in general I can recall which day of the week it was.
8. When I remember events, in general I can recall people, what they looked like, or what they were wearing.
9. I can learn and repeat facts easily, even if I don't remember where I learned them.
10. After I have read a novel or newspaper, I forget the facts after a few days.
11. After I have met someone once, I easily remember his or her name.
12. I can easily remember the names of famous people (sports figures, politicians, celebrities).
13. I have a hard time remembering information I have learned at school or work.
14. I am very good at remembering information about people that I know (e.g., the names of a co-worker's children, their personalities, places friends have visited etc.)
15. In general, my ability to navigate is better than most of my family/friends.
16. After I have visited an area, it is easy for me to find my way around the second time I visit.
17. I have a hard time judging the distance (e.g., in meters or kilometers) between familiar landmarks.
18. I get lost easily, even in familiar areas.
19. If my route to work or school was blocked, I could easily find the next fastest way to get there.
20. I use specific landmarks for navigating.
21. When I imagine an event in the future, the event generates vivid mental images that are specific in time and place.
22. When I imagine an event in the future, I can picture the spatial layout.
23. When I imagine an event in the future, I can picture people and what they look like,
24. When I imagine an event in the future, I can imagine how I may feel.

25. When I imagine an event in the future, I can picture images (e.g., people, objects, etc).
26. I have a difficult time imagining specific events in the future.

Detachment and Compartmentalization Inventory (DCI; Butler, Dorahy & Middleton, 2019).

This questionnaire assesses experiences you may have had. For each item, select the response that best describes how often you have these experiences when **not** under the influence of alcohol or drugs.

Never
Once or twice in my life
No more than once a year
Once every few months
At least once a month
At least once a week
Multiple times a week
Daily

1. When listening to someone talk, I suddenly realize I do not hear part or all of what was said.
2. What I see looks 'flat' or 'lifeless', as if I am looking at a picture.
3. I focus on something going on in my mind and more or less lose track of what is happening around me.
4. I feel like I am watching a situation as an observer or spectator.
5. I feel divided, as if I have several parts or forces that have feelings, ideas, memories and behaviors that I do not regard as my own.
6. I feel as if something or someone has possessed me.
7. At times I go into a trance-like state in which I am barely aware, or unaware, of what is happening around me.
8. I cross the street where there is no pedestrian crossing or crosswalk (i.e., jaywalk).
9. I have strong feelings that do not seem to belong to me.
10. For no medical or physical reason I cannot feel all or parts of my body.
11. I feel detached from memories of things that have happened to me, as if I had not been involved in them.
12. I "blank out" or "space out" or my mind goes totally empty.
13. People tell me that my behavior changes drastically, or that I seem like a different person.
14. I find myself in a place and have no idea how I got there or why I am there.
15. I tell a small lie to stop someone being disappointed or cross with me.
16. At times I feel disconnected from a body that does not seem like mine.
17. Something inside of me seems to make me do things that I do not want to do.
18. I feel mechanical, like a robot or like I'm not really human.
19. I look at the clock and realize that time has gone by and I cannot remember what has happened.
20. I do not feel in control of what my body does as if there is someone or something inside me directing my actions.

21. I switch back and forth between feelings that seem to belong to me, and feeling that I do not experience as my own.
22. I feel my sense of time changes and things seem to happen in slow motion or in double time.

Modified Peritraumatic Dissociative Experiences Scale (MPDEQ, Marshall, Orlando, Jaycox, Foy & Belzberg, 2002)

Please complete the items below by selecting the choice that best describes your experiences and reactions **while you have been completing this survey**. If an item does not apply to your experience, please select 'not at all true'.

Not at all true
Not very true
Somewhat true
Fairly true
Very much true

1. I have had moments of losing track of what was going on – I "blanked out" or felt separate from what was going on.
2. My sense of time has changed – things seem to be happening in slow motion.
3. I have felt as though I were a spectator watching what was happening to me, as if I were floating above the scene or observing it as an outsider.
4. There have been moments when my sense of my own body seemed distorted or changed. I felt disconnected from my own body, or that it was unusually large or small.
5. I have felt as though things that were actually happening to others were happening to me – like I was being trapped when I really wasn't.
6. I have felt confused; that is; there were moments when I had difficulty making sense of what was happening.
7. I have felt disoriented; that is, there were moments when I felt uncertain about where I was or what time it was.
8. I have had gaps in my memory and cannot remember things.
9. I have felt emotionally numb; that is there have been moments where I did not feel any emotions or felt emotionally empty.

Clinical Outcomes in Routine Evaluation (CORE-10) (Barkham et al., 2013)

Over the last week...

Not at all
Only occasionally
Sometimes
Often
Most or all of the time

1. I have felt tense, anxious or nervous.
2. I have felt I have someone to turn to for support when needed.
3. I have felt able to cope when things go wrong.
4. Talking to people has felt too much for me.
5. I have felt panic or terror.
6. I made plans to end my life.
7. I have had difficulty getting to sleep or staying asleep.
8. I have felt despairing or hopeless.
9. I have felt unhappy.
10. Unwanted images or memories have been distressing me.

Self-Concept Clarity Scale (SCCS; Campbell et al., 1996)

Please read each item below and determine how much you believe it is true for you when you are **not** influenced by alcohol and drugs. Please rate your belief about each item on the following rating scale:

Strongly disagree
Disagree somewhat
Neither agree nor disagree
Agree somewhat
Strongly agree

1. My beliefs about myself often conflict with one another.
2. On one day I might have one opinion of myself and on another day I might have a different opinion.
3. I spend a lot of time wondering about what kind of person I really am.
4. Sometimes I feel that I am not really the person that I appear to be.
5. When I think about the kind of person I have been in the past, I'm not sure what I was really like.
6. I seldom experience conflict between the different aspects of my personality.
7. Sometimes I think I know other people better than I know myself.
8. My beliefs about myself seem to change very frequently.
9. If I were asked to describe my personality, my description might end up being different from one day to another day.
10. Even if I wanted to, I don't think I could tell someone what I'm really like.
11. In general, I have a clear sense of who I am and what I am.
12. It is often hard for me to make up my mind about things because I don't really know what I want.

Sense of Self Scale (SOSS; Flury & Ickes, 2007)

Please select a response from 'very characteristic of me' to 'very uncharacteristic of me' to show the intensity of each experience outlined below during your daily life.

*Very **characteristic** of me*
Slightly characteristic of me
Slightly uncharacteristic of me
*Very **uncharacteristic** of me*

1. I wish I were more consistent in my feelings.
2. It's hard for me to figure out my own personality, interests, and opinions.
3. I often think how fragile my existence is.
4. I have a pretty good sense of what my long-term goals are in life.
5. I sometimes wonder if people can actually see me.
6. Other people's thoughts and feelings seem to carry greater weight than my own.
7. I have a clear and definite sense of who I am and what I'm all about.
8. It bothers me that my personality doesn't seem to be well-defined.
9. I'm not sure that I can understand or put much trust in my thoughts and feelings.
10. 'Who am I?' is a question that I ask myself a lot.
11. I need other people to help me understand what I think or how I feel.
12. I tend to be very sure of myself and stick to my own preferences even when the group I am with expresses different preferences.

Appendix B: Assumptions of Multiple Regression

According to Tabachnick, Fidell and Ullman (2007) the assumptions of multiple regression have been met as follows:

Firstly, it is required that the ratio of cases to the predictor variables should be roughly 20:1. In the current study, there are eight predictor variables and 251 'cases', therefore this assumption is met.

The second assumption of multiple regression is the absence of outliers among the predictor and outcome variables. Stem and leaf and box plots were created and examined for all variables. Any extreme outliers were changed to reflect the next highest score. Changes were made with MNM – temporal growth (participants 99, 247, 162 changed to match participant 198 – 6.1), MNM – temporal self- continuity past-present (participant 70 changed to match participant 162 – 3.2), MNM – temporal self- continuity present-future (participants 70 and 196 changed to match participant 288 – 3.05), SAM Mean (participant 301 changed to match participant 318 – 4.08, and participants 203, 316, 296 changed to match participant 90 – 1.96). For the scales that an item was changed, they were recalculated, and all scales no longer had any extreme outliers.

The third assumption of multiple regression is that there is an absence of multicollinearity (i.e. two or more variables that are highly correlated) and singularity (the extreme form of multicollinearity where a perfect linear relationship exists) (among the predictor variables. A correlation matrix of the predictor variables revealed that only the mean score and subscales of the DCI exceeded the required cut off of 0.8. It was initially intended that the two subscales of the DCI would be used for analysis, however due to the high degree of correlation ($r = 0.83$ and $r = 0.74$, see Table 2.) between the subscales, the overall mean was used instead.

The fourth assumption of multiple regression is normality, linearity, and homoscedasticity of residuals. In regards to normality, based on the P-P plot for the outcome variables, all outcome variables can be considered normally distributed. In regards to homoscedasticity, all outcome variables can be considered homoscedastic based on their 'random' distribution on the scatter plot. The DDS and MNM outcome variables showed some pattern, but this is due to the ordinal nature of the data. In regards to linearity, given the results were found to be normally distributed and homoscedastic, then by definition, they are linear.

The fifth assumption of multiple regression is independence of errors. This can be calculated by examining the Durbin-Watson statistic which must lie between 1.5 and 2.5. All errors have a Durbin-Watson statistic of between 1.5-2.5 (Wesolowsky, 1976).

The sixth and final assumption of multiple regression is there is an absence of outliers in the solution. By examining the residual plot (created for examination of the fourth assumption), is can be seen that no outliers exist in any of the outcome variables.

Appendix C: Introduction, consent and end page of survey

Introduction

Department of Psychology
Email: ellen.turnbull@pg.canterbury.ac.nz
HEC ref: 2020/119

My name is Ellen Turnbull and I am a postgraduate student at the University of Canterbury, New Zealand. I am carrying out this research as part of the requirements for a Master of Science in Psychology. My research will investigate the relationship between **diachronic disunity** and a number of factors such as **memory, wellbeing** and **sense of self**. Diachronic disunity is the experience some individuals have when they feel that who they are now is different from who they were in the past or who they will be in the future. That is, they don't feel their sense of self is continuous across time.

If you choose to take part in this study, your involvement in this project will be to complete the online questionnaire, which consists of a series of questions that are answered using rating scales. The questionnaire should take **no longer than 30 minutes to complete**. Data will be **anonymous** and will be recorded and stored electronically on password protected computers.

There may be a risk of experiencing distress from considering your past experiences and current wellbeing. As such, a list of psychological services will be provided below and again at the end of the survey should you need support. However, the questions in this survey have frequently been used in research and have typically not been associated with significant distress. You will not be asked about any distressing events in your life.

Participation is voluntary and you have the right to withdraw from the questionnaire at any point without penalty. Withdrawal from the questionnaire can be done by closing the browser window. However, once the survey is submitted (by clicking on the 'Submit' button at the end), it will not be possible to withdraw your data. This is because identifying information will not be collected and so it will not be possible to identify and withdraw your data.
The results of the project may be published, but you may be assured of the complete anonymity of data gathered in this investigation: information about your identity will not be gathered. Data will be stored electronically on password protected computers. Only the researcher and her supervisors will have access to the information. Anonymous electronic raw data will be retained indefinitely by the research supervisor on a password protected computer for potential future research purposes. A thesis is a public document and will be available through the UC Library.

Please indicate at the end of the survey if you would like to receive a summary of the results of the project. To do this, please click on the link provided which will take you to a separate independent webpage, and enter your email address. Your email address can in no way be linked to your survey responses.

If you have any **questions or concerns** about this project, you may contact me (ellen.turnbull@pg.canterbury.ac.nz) or my supervisor, Professor Martin Dorahy (martin.dorahy@canterbury.ac.nz or +64 3 3694337). Either of us will be pleased to discuss any concerns you may have about participation in the project. Neither I nor my supervisor will be able to link you to your data from any contact that you make with us.
This project has been reviewed and approved by the University of Canterbury Human Ethics Committee, and participants should address any complaints to The Chair, Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (humanethics@canterbury.ac.nz).

New Zealand helplines:
Lifeline – 0800 543 354 or free text 4357 (HELP)
Samaritans – 0800 726 666
"Need to talk?" – 1737 (call or text)
The Depression Helpline – 0800 111 757 or text 4202
www.hewakatapu.org.nz
https://terauora.com

Consent
I have been given a full explanation of this project and have had the opportunity to ask questions.
I understand what is required of me if I agree to take part in the research.
I understand that participation is voluntary and I may withdraw at any time without penalty. Withdrawal of participation will also include the withdrawal of any information I have provided. I understand that withdrawal from the questionnaire can be done by closing the browser window. I understand that once the survey is submitted, it will not be possible to withdraw my data.
I understand that any information I provide will be anonymous and will not be able to be linked to myself or any other participants.
I understand that a thesis is a public document and will be available through the UC Library.
I understand that all data collected for the study will be kept in locked and secure facilities and/or in password protected electronic form. Anonymous electronic raw data will be retained indefinitely by the research supervisor on a password protected computer for potential future research purposes.
I understand the risks associated with taking part and how they will be managed.
I understand that I can receive a summary of the results of this project by clicking on the link provided at the end of the survey and entering my email address. I understand that my email address can in no way be linked to my survey responses.

I understand that I can contact the researcher, Ellen Turnbull (ellen.turnbull@pg.canterbury.ac.nz) or supervisor, Martin Dorahy (martin.dorahy@canterbury.ac.nz or +64 3 3694337) for further information. I understand that neither the researcher nor her supervisor will be able to link me to my data from any contact that I might make with them. If I have any complaints, I can contact the Chair of the University of Canterbury Human Ethics Committee, Private Bag 4800, Christchurch (humanethics@canterbury.ac.nz)

By clicking on the "Submit" button at the end of the survey, I consent to my data being anonymously used for research purposes.

End Page
Thank you for your participation, it is greatly appreciated.
If you would like a summary of the results of this project, please click the link and enter your email address in the new window. Your email address can in no way be linked to your survey responses.

http://canterbury.qualtrics.com/jfe/form/SV_1zYAypHBvLUpsTr

Once again, if you have experienced any distress in completing this survey, a list of support services has been provided below.

New Zealand helplines:
Lifeline – 0800 543 354 or free text 4357 (HELP)
Samaritans – 0800 726 666
“Need to talk?” – 1737 (call or text)
The Depression Helpline – 0800 111 757 or text 4202
www.hewakatapu.org.nz
https://terauora.com

To complete the survey please click the arrow below.

Appendix D: University of Canterbury Human Ethics Committee Approval Letter

HUMAN ETHICS COMMITTEE
Secretary, Rebecca Robinson
Telephone: +64 03 369 4588, Extn 94588
Email: human-ethics@canterbury.ac.nz

Ref: HEC 2020/119

16 November 2020

Ellen Turnbull
Psychology, Speech and Hearing
UNIVERSITY OF CANTERBURY

Dear Ellen

The Human Ethics Committee advises that your research proposal "Diachronic Disunity and Dissociation in the General Population" has been considered and approved.

Please note that this approval is subject to the incorporation of the amendments you have provided in your email of 9th November 2020.

Best wishes for your project.

Yours sincerely

Dr Dean Sutherland
Chair
University of Canterbury Human Ethics Committee